ABSTRACTS (alphabetical order)

Tabitha Abrazinski, '05, William Adams, '05, Jacqueline Bowie, '05, Tamotsu Hirai, '06, Marshall Karpel, '08, Byron Viechnicki, '05, Leyi Wang, '07, and Iwang Weili Zhang, '07
Robert Thomas, Biology
Independent Projects in Electron Microscopy, Bio 341: Part I & II
Our poster highlights independent projects featuring techniques acquired in electron microscopy. They are applied on a wide range of topics, including scanning electron microscope imaging of biofilms, molluscan gill cilia, bacterial infection in kidneys, bivalve daily growth lines, high resolution gold on carbon preparations, and imaging associated with florensic applications of scanning electron microscopy.

Evan Ackerman, '05
Gene Clough, Geology and Physics
Volumetric Analysis of Martian Rampart Craters
The morphology of ejecta blankets surrounding many Martian impact craters exhibits a lobate structure, with pronounced distal ridges bordering the ejecta facies. These craters have been termed rampart craters. The process that emplaces this type of ejecta is uncertain, but it may be related to atmospheric entrainment and/or a subsurface volatile component, most probably liquid water. The purpose of this project was to use ejecta volumes in comparison with estimated excavation cavity volumes in order to establish trends in rampart crater structure. Approximately 120 craters on the Lunae Planum geologic region of Mars were measured using digital image mosaics and laser altimetry data. Data analysis shows corrected ejecta volume to excavation cavity volume ratios ranging from ~0.4 to ~2.0. Interpretation of individual crater data in the context of crater characteristics over specific regions provides insight about surface and subsurface properties, as well as the mechanics of rampart crater formation.

Dionne Akiyama, '08
Atsuko Hirai, History
The Representation of Internment Camps through Photographs
The situation within Tule Lake Segregation Center has been depicted through a variety of media: news and news reports, photography and the art of internees, and government publications. Each perspective illustrates a startlingly different portrayal of the camp and the issues surrounding internment. The U.S. Department of War presented the Japanese American internment camps as temporary detention centers, practical and humane holding facilities for people of Japanese ancestry who, at the time, were unable to remain in their homes. The Japanese Americans themselves, however, voiced their discontent with the internment through artistic expression, depicting the isolation and desolation that were absent from the government's descriptions. Contemporary portrayals of the Tule Lake concentration camp, as it exists today, further illustrate the isolation and loneliness of the internment experience, more clearly illuminating the tragedy of the mistake that was internment.

Oleg Alekseev, '07 and Jessica Otis, '05
Paula Schlax, Chemistry
Evidence That Bacterial Transformation Occurs in* E. coli *through the Exchange of Genetic Material in the Form of DNA
The goal of our study was to repeat the famous Griffith and Avery-MacLeod-McCarty experiments, which demonstrated the ability of bacterial cells to undergo genetic recombination and identified DNA to be the genetic material. We repeated these revolutionary experiments using different approaches and modern methods that were not available at the time of the experiments in the early twentieth century. Our major innovations include the use of *E. coli* cells transformed with a plasmid containing the gene for green fluorescent protein (GFP), whose expression is detected with fluorescent microscopy, and a more controlled protocol for the Avery-MacLeod-McCarty experiment.

Marselle Alexander, '05 and Erin Bertrand, '05
Rachel Austin, Chemistry
Mechanistic Studies of Hydrocarbon-Degrading Metalloenzymes in Pristine, Polluted, and Extreme Environments
The use of chemical probes in whole cell bacterial systems can provide insight into the structure and function of hydrocarbon degrading metalloenzymes. Norcarane is a diagnostic substrate used to reveal whether a radical intermediate is formed during metalloenzyme-catalyzed hydrocarbon oxidation. We report the results of whole cell oxidations of this and other diagnostic probes with bacterial and fungi strains isolated from a variety of environments. These include *Rhodococcus erythropolis* (ATCC 15960), *Burkholderia cepacia* (ATCC 25416), *Alcanivorax borkumensis* (ATCC 700651), *Marinobacter hydrocarbonoclasticus* SP.17 (ATCC 49840), strains recently isolated from a gas station in New Jersey--*Hydrocarbophaga effusa* AP103, rJ4 and rJ5; and recent hydrothermal vent isolates--ERP7, EPR 21, ERP 26w, ERP28w, and MAR 14. Analysis of the distribution of diagnostic substrate-derived products allows us to calculate substrate-based radical lifetimes for the enzymes in each organism. By comparing this data to known radical lifetimes for well-characterized hydroxylases, we can extrapolate functional and structural information about these metalloenzymes.

Aleena Ali, '05
Thomas Wenzel, Chemistry
Calixresorcarenes as Chiral NMR Agents
Chirality is important in everyday life especially in the pharmaceutical industry. Two enantiomers of a chiral compound can have very different chemical properties and reactivities. Chiral solvating agents have been used to determine how enantiomerically pure a chiral substance is, using NMR spectroscopy. 4,5 dichlorophthalic anhydride was stirred with L-alanine methyl ester hydrochloride/L valine methyl ester hydrochloride in acetic anhydride to form the chloroimide. Different purification methods were developed to obtain the chloroimide. The chloroimide was combined with octyl resorcarene in several reactions in order to form the cavitand.

David Alie, '05
Peter Wong, Mathematics
Fractals and Deterministic Chaos with Applications to Cryptography
This work explores the possibility of creating a practical encryption method that uses chaos and fractals, rather than computational complexity, as the source of the code's security.

Christina Alioto, '05
Emily Kane, Sociology
Contemporary Social Issues: Sociological Perspectives
In this panel, sociology thesis researchers address a variety of contemporary social issues: immigration, domestic violence, rape, media representations, contraceptive use, and court interventions for child protection. These issues are explored in the context of their connections to key social institutions including law, family, media, and education, as well as in terms of their links to inequalities of race, class, gender, and religion.

Naira Arellano, '05
John Kelsey, Neuroscience
The Effects of Electroacupuncture on Locomotor Sensitization to Nicotine and Cocaine
Addiction to drugs of abuse such as cocaine, morphine or heroine affects a significant portion of the population in the United States and worldwide, and the current therapies available to treat it are not completely effective. In the last three decades, there has been some interest in the possibility of acupuncture as a therapy for drug addiction. Some encouraging animal studies found acupuncture and electroacupuncture to be effective in treating addiction to a variety of drugs (Ho et al. [1978], Choy et al. [1978] and Wen et al. [1979] as cited in Ng 1996). The purpose of this thesis was to conduct an animal study to investigate the effect of electroacupuncture treatment on sensitization to nicotine and cocaine. Animals received an electroacupuncture pretreatment in combination with a drug dose for three days and treatment alone for three additional days after they had been sensitized. Their locomotion in response to a nicotine or cocaine challenge at the end of the treatment phase was evaluated as an indicator of the degree of sensitization.

Christina Austin, '05
Paula Schlax, Chemistry
Translational Regulation of* E. coli *RpoS by mRNA Secondary Structure
The *rpoS* mRNA encodes a transcription factor known as the "master regulator" of the stress response in *Escherichia coli*, σ^S. Translational regulation of cellular σ^S concentrations is largely dependent upon the secondary structure of the *rpoS* mRNA. It is hypothesized that under standard physiological conditions, the mRNA is folded into an "inactive" secondary structure, which occludes the Ribosome Binding Site (RBS). In response to environmental stress, regulatory factors such as DsrA, a small non-coding RNA, stabilize an "active" mRNA structure, allowing for ribosome binding. In this study, ribonuclease structure mapping of *rpoS* indicates that the active and inactive structures have distinct conformations, especially in the area surrounding the RBS. Furthermore, the 30S ribosomal subunit and a DsrA analog were found to stabilize active secondary structures. Recent work has demonstrated that the ribosomal protein S1, which is known to modify RNA structure, binds *rpoS* and DsrA independently. Although our data indicate that neither *rpoS* nor DsrA undergoes structural shifts when bound to S1, we have shown an increase in the rate of formation of a translationally active complex on *rpoS* upon S1 binding. It is consequently proposed that both S1 and DsrA regulate translation by stabilizing an active conformation of *rpoS*.

Kelly Baehre, '05
J. Roxanne Prichard, Neuroscience
The Effect of Light on Fawn-Hooded (FH) Rats: An Animal Model of Depression
Light exposure is a well-established means of treating depression, but the mechanisms are poorly understood. Therefore, to further our understanding of the underlying mechanisms of light therapy, we characterized the effectiveness of light treatment in an animal model of depression--Fawn-Hooded (FH) rats. The performance of FH rats in the forced swim test (FST) was used to analyze the depressive behavior of these rats after exposure to an extended (16:8h light: dark) and a shortened photoperiod (8:16h light: dark). Similar to results with traditional antidepressants, light had a dose-dependent effect in decreasing helpless behavior in the FST. Retinofugal projections in the FH rat will be analyzed with anterograde tracing, and molecular responses to light will be characterized by quantifying the immediate early gene c-Fos. Collectively, these data demonstrate that the FH rats are a useful model for exploring the mechanisms behind light treatment of depression.

Sarah Baldwin, '05
Joseph Pelliccia, Biology
***Annotating the Putative Arylsulfatase Gene, Sol-2, in* Caenorhabditis elegans**
In 1998 *C. elegans* became the first multicellular organism to have its entire genome (97 million base pairs) sequenced. Now scientists are working to annotate the genome by identifying what each gene sequence codes for. Thus far, researchers have identified three arylsulfatase genes in *C. elegans* through computer analysis. The sequence D1014.1 is believed to be the sul-2 gene, which is orthologous to the human Arylsulfatase A gene. The main objective of this study is to experimentally verify that the predicted arylsulfatase gene sequence, D1014.1, is correct. Using a fluorometric enzyme assay, we compared the specific enzyme activities of wild type worms (N2) and worms with deleted D1014.1 sequences (VC382). The wild type worms showed significantly higher arylsulfatase activity, verifying that the gene sequence D1014.1 codes for arylsulfatase.

Katherine Batchelder, '05
Francesco Duina, Sociology
Seeing the Wind: A Consideration of Danish Wind Energy Policy
"Seeing Wind Energy Happen" looks at the application of energy policy. The Danish wind energy policy and industry provide a case study through which environmental frameworks are investigated. Various elements from the theories are investigated in light of the historical, political, and social milieu in Denmark. Theories or parts of theories that have made the Danish case a success are examined. Economic and institutional factors are also explored to elucidate the path to application of one of the most renowned renewable energy policies in the European Union.

Erin Bednarek, '05
Heather Lindkvist, Anthropology
Understanding Barriers to Care in Reducing the Prevalence of Type II Diabetes Mellitus
Currently the prevalence of type II diabetes is increasing heavily throughout the world due to the adoption of sedentary lifestyles and dietary changes. Genetic and cultural differences have caused greater impact on some ethnic groups than on others. Samoa has one of the highest prevalence rates in the world with 23% of the population afflicted (STEPS survey 2002). The country recognized that diabetes is a problem they must deal with, and the government and NGOs have launched prevention efforts to reduce the prevalence of diabetes in their country. The goal of this thesis is to understand the cultural and social barriers to primary, secondary, and tertiary care in order to determine the effectiveness of these reduction efforts. Effectiveness is evaluated through a survey administered to the general public, which allows for comparison of knowledge of methods of prevention of diabetes versus the message the promotion workers have stated. Additionally, interviews and participant-observation provide an ethnographic component to the thesis. Since the onset of this disease can be avoided or its complications mitigated through lifestyle changes taught as part of health education, it is important to evaluate the effectiveness of promotional efforts as well, as this thesis seeks to do.

Erin Beirne, '05
Beverly Johnson, Geology
Geochemical Analysis of Salt Marsh Structure at Sprague Marsh, Phippsburg, ME
Stable isotope values are used to analyze the bulk sediment of cores taken at Sprague Marsh in order to determine the variation in vegetation that has occurred at a single site over time. The diagnostic zonation of vegetation--based upon salinity tolerance and changes in elevation--allows for the correlation of plant species to position in the structure of the modern salt marsh

Siri Berman, '05
Kathy Mathis, Psychology
Sociometry and Group Dynamics: Status among Peers at Genesis
Sociometry is the study of interpersonal relationships within groups or populations through analysis of confidential peer nominations. I am utilizing sociometry to map out the interpersonal relationships among residents at Genesis, a local residential home for troubled adolescent males, so that staff members can have an at-a-glance visualization of the social hierarchy of the house residents. Each resident was asked to confidentially nominate one of their peers at Genesis, who most exemplified a given characteristic, included on a list of questions regarding which resident they most liked or disliked. This knowledge may help inform staff's expectations about the boys, while yielding improved group fluidity, especially considering the rapid turnover rate among residents.

Solomon Berman, '05
Mark Semon, Physics
Perturbed: The Use of Correlation Functions in Physical Chemistry
Many experiments in chemistry are performed by perturbing a system away from equilibrium, observing what happens, and then inferring from the data properties of the system. Statistical mechanics is a field of chemistry and physics that connects macroscopic observations to the microscopic world of a system. For many years, theoretical and computational chemists have worked to develop models that accurately describe how perturbed systems return to equilibrium, a very common class of experiments. In this presentation we examine principles of statistical mechanics that connect the macroscopic and microscopic worlds. As part of this approach we investigate how several theorems and the language of correlation functions are used to understand what occurs in a system, and to describe what happens when a system is perturbed and then allowed to relax back to equilibrium.

Jacqueline Bowie, '05
William Ambrose, Biology
A Photographic Survey of Echinoderms in the Beaufort Sea: Densities, Biomass, and Remineralization
A substantial portion of energy flow in the Arctic shelf ecosystems flows through epibenthic mega fauna. Epibenthic mega fauna in the Beaufort Sea at 12 stations varying in depth between 34 and 250m were

photographed using an underwater camera from October 2004 to November of 2005. Between fifteen and forty photographs were taken at each station. These photographs were then digitized and used to determine the densities, distribution patterns, and size frequencies of echinoderms. Densities and biomasses of echinoderms varied greatly among sites, with differences largely related to differences in depth. At stations with depths higher than 200m the density of ophiuroids was regularly under 30 individuals per m^2 whereas at stations shallower than 200m the density was regularly greater than 70 individuals per m^2. The most common echinoderms seen were ophiuroids, which at some stations reached densities greater than 100 per 1m2. Densities of the mega fauna, were used along with size measurements, biomass estimates and empirical relationships between biomass and respiration to calculate the organisms' respiration. These data will be compared to estimates of infaunal respiration at the same sites and data from previous studies of ophiuroids in the Arctic.

Leah Boyer, '05
Ryan Bavis, Biology
Heat Shock Protein Expression during Hypercapnia
The purpose of my year-long thesis project is to determine whether exposure to elevated levels of CO2 (hypercapnia) will induce the expression of heat shock proteins (Hsps) in adult male rats. Hsps are a type of molecular chaperone that targets unfinished or misfolded proteins and facilitates the proper folding; they are most notably expressed when cells are under stress. To determine Hsp expression, acute and chronic hypercapnia were induced in rats; and liver, heart, and serum samples were assayed for hsp70 expression. Presence of hsp70 would indicate that hypercapnia is interpreted as stress and affects protein folding. Since hypercapnia is experienced during sleep apnea and respiratory disease, it is relevant to establish and understand the cellular and tissue level response. Preliminary results indicate no stress response to hypercapnia.

Heather Bracken, '05
Bonnie Shulman, Mathematics
Inverse Problems and Integral Equations
What is an inverse problem? There is no clear answer to this question, but most mathematical physicists know one when they see one. As calculus students we encounter inverse problems when we move from differential calculus to integral calculus. In a direct problem you know the cause and you need to find the effect. An inverse problem is the opposite, you know the effect and you need to find the cause. We will look at inverse problems and explore integral equations, a common way to solve inverse problems. We will derive Abel's integral equation as a formulation of an inverse problem. Then we will look at applications of this integral equation. For example, how can solving the tautochrone give you a way to build clocks? And, how can we find the shape of a ditch given the amount of water per second that flows through it using Abel's equation?

Michael Brown, '05
Stephanie Richards, Biology
Aspirin Induction of Apoptosis in Mouse Splenocytes Analyzed by Flow Cytometry
Recent literature has suggested the potential use of drugs such as aspirin in the treatment of some cancers because of the drugs' ability to induce apoptosis, a highly regulated process of cell death normally associated with organismal development. In some cases, aspirin has been shown to negatively affect immune cells. However, far less is known about the effects of aspirin on the immune system than on cancer cells. Apoptotic cells undergo several changes as the cell dies including changes in size and membrane asymmetry. A family of proteases known as caspases typically carries out these changes. For my senior thesis, I have grown mouse spleen cells in the presence of aspirin and chemicals that resemble aspirin, and conducted multiple tests using flow cytometry to evaluate the initiation of apoptosis.

David Burns, '05
Keely Maxwell, Environmental Studies
Variables in Policy Process and Implementation of the Ramsar Convention in Costa Rica and Dominican Republic
Wetlands are among the world's most diverse ecosystems, but are disappearing at an alarming rate, especially in the neotropics. The Convention on Wetlands of International Importance especially as waterfowl habitat

(Ramsar Convention) calls on contracting states to include at least one wetland on a list of wetlands of international importance and to take steps toward its conservation. In the neotropical region, both Costa Rica and the Dominican Republic are of similar size. Costa Rica has a 3% wetland cover and the Dominican Republic has an 11% cover. Costa Rica though has eleven protected Ramsar sites covering 510,050 ha, whereas the Dominican Republic only has one site covering 20,000 ha. This thesis project examined the variables in the policy process that have led to the differing implementation of the Ramsar Convention in the two countries, in the hope of further contributing to the definition of successful implementation.

J. Andrew Byrnes, '05
Matthew Côté, Chemistry
Scanning Tunneling Spectroscopy of Tungsten Oxide
A scanning tunneling microscope was used to measure tunneling current versus applied bias voltage and to perform spectroscopic measurements on tungsten oxide and tungsten bronze samples. Through these techniques, information about the electronic structure of the two forms of tungsten can be determined. This information is useful when trying to understand tungsten oxide's unique photochromic properties.

Shoshoni Caine, '05
Joseph Pelliccia, Biology
***Investigating Albinism in the Freshwater Snail* Helisoma trivolvis**
Albinism in many species of freshwater snails, such as those of the *Biomphalaria* genus, a close relative of the *Helisoma* genus (Sullivan and Farengo, 2002), has been attributed to recessive alleles at two gene loci (Richards, 1985). Genetic pigment characters follow simple Mendelian inheritance in planorbid snails (Richards, 1975). In the present study, I will determine the origin of a black-pigmented individual, which was discovered in a tank with members of a highly inbred albino population. To establish whether this snail and its black offspring are genetic relatives of the albino population, I will compare microsatellite sequences in twenty snails, ten pigmented and ten albinos. If all twenty snails possess identical microsatellite sequences, as observed via gel electrophoresis, then it can be concluded that the original black snail is the offspring of an albino, and not a tank contaminant. Because of the paucity of scientific knowledge of pigmentation in *Helisoma trivolvis*, I will analyze the PCR products of primers used in *Biomphalaria* studies. In addition, a series of tyrosinase assays will determine whether a lack of functional tyrosinase enzyme in the albino population is responsible for/contributes to this trait.

Catherine Carroll, '05
Kathryn Low, Psychology
A Study of Children with Pediatric Bipolar Disorder (BPD) versus Attention-Deficit/Hyperactivity Disorder (ADHD) and Their Subsequent Ability to Assimilate into a Public School Setting
Extensive observation, data collection, analysis, and research will be performed on one student currently attending a transitional school. The school is designed to provide individual attention to children with developmental and behavioral needs so they can eventually transition back into public schools. This particular student has improved in numerous ways since his arrival and will be transitioning out of the facility soon. The case study will look at this student’s progress in regard to his behavior, various treatment plans, and medications.

Kathleen Carroll, '05
Kathryn Low, Psychology
Promoting Physical Activity among College Students Using Pedometers
As Americans have become increasingly inactive, it has become necessary to develop effective intervention tools to promote daily activity. Recently, pedometers have become popular as an inexpensive means of motivating individuals to track their daily steps and increase daily exercise. The six-week study examined the effectiveness of a pedometer program for a group of moderately active college students. Participants were encouraged to use their pedometer to increase their daily step count by setting step goals. The Internet was also used as a tool for collecting data and motivating participants. The pedometer program was designed to determine if pedometers are effective for improving the overall health and daily activity of college students, following the conclusion of the program.

Jamie Chafel, '05
Susan Langdon, Psychology
Motivation to Participate in Intercollegiate Athletics across Genders and Sport Type
In the pressure-packed world that is modern day athletics, it is assumed at times that every athlete participates in his or her sport in order to reach a certain level and earn certain accolades. Individuals who engage in athletics for such motives tend to have a high need for achievement. However, achievement motivation is not the only reason to engage in sport. Individuals may participate in athletics for affiliation or social motives. My study seeks to examine the affiliation and achievement motives of intercollegiate athletes. The existence of each motive will also be examined according to gender and sport type, whether individual or team.

Alexey Cherniack, '05
Lynne Lewis, Economics
An Analysis of the Relative Economic Practicability of Grid-Tied Rooftop Solar Photovoltaics as a Form of "Distributed Generation."
Emerging renewable technologies such as fuel cells, concentrating solar power, or just simply larger installations of photovoltaics may have important strategic and economic advantages over the use of grid-connected rooftop solar photovoltaics as a distributed resource. Perhaps the term "distributed generation" should be reassessed as it applies to small photovoltaic systems?

Jessica Ciak, '05
Rebecca Sommer, Biology
Dioxin Response Elements in Beta1-Adrenergic Receptor Genes
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (dioxin) causes cardiovascular toxicity in laboratory animals. β1-AR plays a vital role in the development of the heart and in the toxic effects that result from dioxin. Therefore, we hypothesize that dioxin exposure alters β1-AR gene expression. Dioxin exerts its toxic effects through the ligand-activated aryl hydrocarbon receptor (AhR) and its dimerization partner, the AhR nuclear translocator (ARNT). This dimer binds to specific regions of DNA known as dioxin response elements (DREs) and subsequently affects the transcription of the target gene. The existence of putative DREs in the 5' enhancer region of the human, rat, mouse, and chicken β1-AR gene, respectively, raises the possibility that transcription of this gene may be directly regulated by the AhR/ARNT complex. In support of this hypothesis, we detect specific binding of rat β1-AR DRE to tissue extracts by electrophoretic mobility shift analysis (EMSA). Future studies will determine the ability of in vitro expressed AhR and ARNT to bind β1-AR DREs and the extent of transcriptional regulation of the β1-AR by the AhR/ARNT complex.

Meghan Cochrane, '06, Tinsley Iselin, '07, Gabriela Munoz, '07, and Christine Woll, '07
Gregory Anderson, Biology
Population Characteristics and Recent Mortality Patterns in a White Pine Population at Range Pond State Park, Poland, Maine
A population of white pine (*Pinus strobus*) in Range Pond State Park, Poland, Maine, was characterized for size, age, spacing, and mortality patterns. The stand is unusual in that it exhibits a high rate (~60%) of mortality among pines, and most of the dead trees remain standing. Our study indicates that a majority of pines are approximately 50 to 60 years old and relatively uniform in height and stem diameter. The average distance of live pines to their two nearest live neighbors has increased dramatically as a result of the mortality in the population. We speculate that a combination of interspecific competition for light and nutrients, ice storm damage ('98), poor-quality soil, and drought have contributed to the overall mortality in the population.

Katherine Creswell, '05
Jane Costlow, Russian and Environmental Studies
Maine's Local Agriculture: Bridging the Gap between Farmers and Consumers
Maine is a vibrant agricultural community on the surface, being one of the only states to increase its number of farms in the last decade, and being nearly split between large and small farms. According to those who dedicate themselves to farming, however, various social, economic, and ecological barriers have arisen which make it nearly impossible for a person to function as a full-time owner of a small farm. Local food systems provide the

opportunity for farmers to connect with consumers and consumers to reconnect with the land from which their food comes, thus enabling farmers to continue what they are doing - sustaining communities, economies, and the land.

Julia Crowley, '05
Michael Sargent, Psychology
The Effect of Caffeine on One's Likelihood to Stereotype
People are more likely to rely on stereotyping when forming impressions of others if either their ability or motivation to process information is low. One of the variables that affects this processing of information is one's arousal level, such that during non-optimal times of day, people are more likely to stereotype (Bodenhausen, 1990). But, not much is known about the effects of common drugs, such as caffeine, on the ability to process information and stereotype. Thus, the purpose of this experiment was to determine caffeine's effect on one's likelihood to rely on stereotypes when evaluating others. Caffeine's biggest effect is a behavioral one: it has been shown to reduce deficits in cognitive performance and improve alertness (Magill et al, 2003). So, after ingestion of caffeine, people should be able to process more information. Therefore, participants with caffeine should be less likely to rely on stereotypes when processing information about others.

Patrick Cunningham, '05
Thomas Wenzel, Chemistry
NMR Study of Association Trends of Pheniramine-Based Substrates with Carboxymethylated Cyclodextrins of Varying Cavity Size
Cyclodextrins are cyclic oligosaccharides containing six, seven, or eight glucose subunits (á, â, and ã respectively). Synthetic procedures to selectively attach carboxymethyl groups at the two and six positions have been devised. It is also possible to prepare indiscriminately substituted carboxymethyl derivatives. The association geometry, stoichiometry, and enantiomeric discrimination for a series of pheniramine-based guests with the different carboxymethylated cyclodextrins will be described. Of particular interest are trends in discrimination and association geometry based on the size of the cyclodextrin cavity and the location of the carboxymethyl substituents.

Rebecca Dessain, '05
Kirk Read, French
Analysis of Expert Childrearing Advice, Literature, and Film in the United States, France, and Morocco, 1970-2000
Childrearing methods are examined through a historical comparative content analysis of expert childrearing advice, literature, and film in the United States, France, and Morocco. Top-selling parenting manuals for the United States are examined for four decades--1970, 1980, 1990, 2000. Literature and films are also analyzed in order to understand childrearing methods in France and Morocco. The strong differences among the methods in the countries under consideration prove the strength of cultural ideals and disconfirm theories of a globalizing world and homogeny of values and norms. The United States has continued to foster independence and creativity, while France and Morocco have continued to foster traditional family lifestyles.

Rodrigo Dias, '05
Krista Scottham, Psychology
Acculturative Strategies and the Psychological Well-Being of Japanese Brazilian Migrants in Japan
The history of migration between Brazil and Japan dates back to 1908, when the first Japanese immigrants arrived in Brazil. Recently, the course has reversed and Brazilians of Japanese descent are migrating to Japan. Like their earlier counterparts, these contemporary immigrants are faced with the challenge of maintaining their cultural heritage while participating in the host society. Research conducted with various immigrant groups indicates a set of coping strategies, or acculturative styles, typically utilized by immigrant populations adapting to a host culture; furthermore, this research indicates a relationship between acculturative style and psychological health. However, no research to date has targeted Japanese Brazilian populations living in Japan. Thus, the current project focuses on how the acculturation strategies adopted by this population relate to their psychological well-being. In study one, the relationship between acculturative strategies and psychological health was examined among 82 Japanese Brazilians living in Japan. Results indicate a significant relationship

between acculturative style, level of acculturative stress, and life satisfaction. However, measurement issues related to the assessment of acculturation arose within this study. Therefore, study two builds on the first by focusing on the development of an acculturative measure specifically for use with Brazilian Japanese living in Japan.

Karl Dietrich, '05
Ryan Bavis, Biology
Effects of Intermittent versus Sustained Hypercapnia on Respiration in Rats
Sleep apnea is a disorder in which brief interruptions of breathing result in low O2 and high CO2 levels in the blood. The purpose of this study is to examine the effects of high CO2 (hypercapnia) on unanesthetized rats, with the hope that it will reveal more about the body's response to CO2. Previous studies reveal conflicting results on the ability of episodic versus continuous exposure to high CO2 to elicit a long-term depression in ventilation in anesthetized rats. During the fall semester, I found that episodic hypercapnia (5, 5-minute bouts) did not elicit a long-lasting decrease in ventilation in unanesthetized rats. Winter semester was spent looking at the effects of continuous exposure. I hypothesize that exposure to continuous hypercapnia (~ 45 minutes) in adult rats will result in a long-lasting (~1 hour) decrease in ventilation.

Robert Dion, '05
Kathryn Low, Psychology
Differences in Perceived Body Image between Caucasian and African American Men
Research has shown that there are cultural differences in the way that Caucasian and African American women perceive their bodies, with African American women having considerably higher levels of perceived body satisfaction. (Davis, Clance, Gailis 1999) However, relatively few researchers have examined body image satisfaction among males. The aim of this research is to replicate the typical pattern that is found using female participants, and to determine if this same pattern occurs for male participants. Data were collected online using a web-based survey. This research may help advance our understanding of perceived body image among males, a topic which has received very little attention.

Joanna Dove, '05
Kathryn Low, Psychology
Co-morbid Addictive Tendencies: Substance Abuse and Eating Pathology and Body Objectification
Eating behaviors and substance abuse were investigated in relation to each other and personal variables such as depression, self-esteem, and body objectification in this study of 104 male and female college students. Participants completed sections of The Shorter PROMIS Questionnaire on bingeing, alcohol, nicotine, and drug use; The Eating Disorders Diagnostic Scale (EDDS); The Fredrickson Self-Objectification Questionnaire; The Rosenberg Self-Esteem Scale; Center for Epidemiological Studies Depression Scale; and an alcohol use questionnaire. It was predicted that use among substances would correlate and that substance use would be related to bingeing and body objectification. Alcohol use (PROMIS) in women was significantly related to nicotine use, bingeing (PROMIS), EDDS total, and depression. Nicotine use in women was also related to drug use and alcohol use, but not to any eating measures. Unlike alcohol use, female nicotine and drug users had higher body objectification. As was hypothesized, bingeing was also significantly correlated to body objectification. Stepwise multiple regression models were used to predict bingeing, nicotine use, drug use, and alcohol use after controlling for gender and body mass index (BMI). This previously unstudied relationship between nicotine, drugs, and objectification requires further investigation.

Emmanuel Drabo,'08, Muhammad Saif Farooqui, '08, and Kristofer Jonsson, '08
Charles V. Carnegie, Anthropology
The Ivorian Identity Crisis through a Historical Lens
In the dawn of the twenty-first century, Côte d`Ivoire, once the most prosperous state in West Africa, is facing critical political, economic, ethnic, and religious conflicts, rooted in an identity crisis involving foreign West African actors as well as Western states and institutions. This paper investigates the current conflict in Côte d`Ivoire in light of that identity crisis and considers the conflict within the context of Côte d'Ivoire's pre-colonial and colonial history, the influence of France under Houphouet Boigny, and the political and economic vacuum following Boigny's death.

Elise Duggan, '05
Karen Palin, Biology
Designing a Survey to Investigate Factors Associated with Elevated Blood Lead Levels of Maine Children
The Maine State Housing Authority (MSHA) estimates 144,853 children live in homes that contain lead-based paint. In 2002, 59% of children with blood lead levels ≥20 µg /dl reported to the Maine Childhood Lead Poisoning Prevention Program (MCLPPP) lived in homes with recent or continuing renovations (MSHA, personal communication). Half of the children with blood lead levels ≥ 20 µg /dl lived in single-family privately owned homes; the other half lived in rental units. This profile differs from the rest of the country where the majority of lead poisoning cases occurs in rental homes. Working with the Maine Department of Environmental Health, I reviewed summaries of recent cases of elevated blood-lead levels reported to the MCLPPP and conducted a review of published literature to determine risk factors pertinent to lead poisoning in Maine. With this knowledge, I have drafted a survey which will be used by the MCLPPP to understand the difference in the housing profile of lead-poisoned children as well as other risk factors for and sources of lead poisoning among Maine children. This information will be used to target public health resources and education more effectively for populations most at risk.

Jessica Edgerly, '06
William Ambrose, Biology
Relationship of Annual Growth in* Mya arenaria *to Changing Environmental Factors of Coastal Alaska
Mya arenaria, soft-shelled clam, lay down annual growth lines, which can be used to construct growth curves and examine interannual variability in growth. Differences in annual growth can reveal potential links between clam growth and changing environmental factors, including changes due both to local variation and global climate change. I used the internal annual growth rings of a sample of *Mya arenaria* to address the relationship between clam growth and environmental conditions in coastal Alaska (Kotzebue). To correct for ontogenetic (age-based) changes in growth, standard growth indices (SGIs) were then calculated based on the Von Bertalanffy growth model. These SGIs were then related to records of environmental factors such as ice cover, temperature, precipitation, and oscillatory climate regimes (Pacific Decadal Oscillation, Arctic Oscillation, Arctic Climate Regime Index). Correlations such as these will be useful in attempting to predict the effects of continued climate change, specifically on marine mollusk populations and more generally on Arctic bottom communities.

Nihal Eisa, '07
Joseph Pelliccia, Biology
Genome-Wide Search for Human MeCP2 Targets* in Vivo *by Mapping of MeCP2 Binding Sites
Recent studies show that the X-linked methyl-CpG-binding protein 2 (MeCP2), a transcriptional repressor and member of Methyl-CpG binding domain (MBD) proteins, is mutated in human disorders affecting the brain. One such neurodevelopmental disorder is Rett Syndrome. MeCP2 mutations are also associated with other neurological diseases such as X-linked mental retardation, autism, and forms of Angelman syndrome. It has been found that expression of MeCP2 in the brain is developmentally regulated and highly abundant in neurons; however, its specific molecular role is unknown. We hypothesized that MeCP2 may have specific gene targets rather than involving global gene repression. We used chromatin immunoprecipitation combined with analysis of genomic tiling and human promoter fragment arrays to identify specific sites where MeCP2 binds to DNA. Performing these experiments using human fibroblasts, we obtained preliminary data showing that a genome-wide, specific binding profile of human MeCP2 is present in diploid human cells.

Brett Finegold, '05
Michael Sargent, Psychology
The Effect of Mortality Salience on Shooter Bias
A sample of college students was administered a computer simulation to test whether manipulating mortality salience influenced false alarms in shooter bias. A 2 (Target Ethnicity: African American v. white) X 2 (Prime: "death" v. "field") between-participants analysis of variance (ANOVA) was performed, with the expectation of a main effect on target ethnicity, where participants are more likely to shoot unarmed African Americans than unarmed whites. A two-way interaction was also expected, with the rate of shooting unarmed African Americans higher when reminded of mortality. These results would imply that during ambiguous and

potentially dangerous situations, racial or ethnic biases in "shoot/don't shoot" decisions may be amplified by mortality salience, as terror management theory would suggest.

Ryan Fitzpatrick, '05
Rebecca Fraser-Thill, Psychology
Does Mugshots Exposure Affect Identification Accuracy?
The present experiment examines the reasons for false identifications in the legal system. The study researches how mugshots prior to lineups can possibly decrease the accuracy of correctly identifying the perpetrator. These misidentifications could be occurring because of different theories such as the fuzzy-trace theory, familiarity effect, or commitment effect.

Kathryn Franich, '05
Kathy Mathis, Psychology
Language Environments and Concerns about Preservation of Culture among Somali Immigrant Students
Studies have shown that respect and promotion of the development of immigrant students' native language, and encouragement surrounding native culture and values create a greater connectedness with family, classmates, and school community (McGroarty, 1986). This type of language and cultural "sensitivity" has also been shown to enhance the intellectual experience of immigrant students in the ESL (English as a Second Language) or ELD (English Language Development) classroom (Cummins, 1991; García, 1986; Genishi, 2002). For this research project, I plan to interview Somali students in ESL classes at Lewiston High School about the level of cultural sensitivity they experience in their classes at school; their perceptions of the difficulty of learning English as a foreign language within this high school setting; and their concerns about maintaining their native Somali language and culture. Ultimately, I seek to determine whether there are connections between perceived levels of classroom cultural sensitivity and perceived levels of difficulty in learning English among Somali students, and whether there are connections between students' perceptions of cultural sensitivity and students' levels of concern about maintenance of their native language and culture.

Daniel Frost, '05
Michael Retelle, Geology
Paleoclimate Reconstruction Using Physical Sedimentology and Organic Matter Biogeochemistry of Varved Sedminets, Basin Pond, Fayette, Maine
Basin Pond is a small, 34-acre, meromictic pond in Fayette, Maine. In this study, sediment cores were obtained from the pond to reconstruct the paleoenvironment back to late glacial times. Laminated gyttja persists for most of the Holocene before grading down-core to minerogenic, massive late glacial sediments. The regular deposition of light-dark biogenic couplets suggests that the laminae are annual, or varved. Percent LOI and organic carbon values show minimum rates of organic matter deposition in late glacial sediments, rising to maximum sustained rates in the early to mid-Holocene. Low C/N ratios (11-13) and ä13C values ranging from –33 to –30 per mil suggest organic matter production in the basin is dominated by C3 algae with some input from terrestrial C3 vegetation. Sedimentological evidence for a late glacial climate reversal exists in a zone of relatively coarse, organic-poor sediment that occurs within a zone of generally increasing organic matter content up-core. A radiocarbon age estimate of a terrestrial wood macrofossil from the zone dates the beginning of the climate reversal to 10,960 +/- 60 14C years BP. Similar horizons have been observed in late glacial sediments from Maine and Atlantic Canada associated with the Younger Dryas cooling event.

Linnzi Furman, '05
Matthew Côté, Chemistry
Imaging Biomolecules Using an Atomic Force Microscope
Atomic force microscopy (AFM), a form of scanned probe microscopy (SPM), has been used for imaging biomolecules at the nanometer level for the past 20 years. However, most imaging is done using an amplitude-modulated AFM, where the tip of the instrument taps the sample to record tip-to-sample force interactions to measure the topography of the molecule. Recently, atomic force microscopes have been designed to utilize a quartz tuning fork for frequency-modulated AFM; this type of AFM is new to the field of biomolecular imaging. The purpose of this study is to acquire DNA images using a quartz tuning fork AFM, with the additional goal of imaging specific viral proteins, hepatitis A virus, EMCV, and polio virus 3C proteases to gain

insight on their structures. Structural similarities could lead to further insight on the ubiquitination-mediated proteolysis, or protein degradation, which may play a major role in the mediation of these viruses.

Eve Gasarch, '05
Holly Ewing, Environmental Studies
Fire As a Local Control on Frost Composition
Fire can play a major role in shaping species composition of a forest. Oak-dominated stands in the Catskill Mountains of New York are hypothesized to have originated through repeated burning by Native Americans. This study examines whether a particular oak-dominated stand in the eastern Catskills is a product of historical burns. Analysis of charcoal and pollen within a dated peat core are used to determine the history of fire and forest composition within the surrounding area. Changes in species composition, particularly with respect to the fluctuating levels of oak relative to the three periods of fire found, are examined. Through these, the influence of fire on the vegetation is assessed. Determining such a relationship for this site aids in understanding the origin of the modern oak forest. Relating the findings of this study to records of climate and Native American activity further seeks to explain the dynamics of forest composition by considering the roles of climate, human interaction, fire, vegetation, and how they are connected.

Kristin Gerard, '05
Karen Palin, Biology
Inhibitory Effect of Cranberrry Juice on the Growth of* Staphylococcus saprophyticus *in vitro
Urinary tract infections (UTIs) are common bacterial infections affecting nearly half of all women in their lifetimes. Most UTI research focused on *Escherichia coli* because it causes 80% of community acquired infections. In young women aged 15 to 24, *Staphylococcus saprophyticus* is the second major cause of UTIs. Research has shown that some bacteria form a biofilm under certain conditions, developing a mucous layer that is difficult to eradicate from the body. Biofilms in the bladder may lead to increased urinary tract infections and increased recurrences. Research has also shown that cranberry juice might play a role in the prevention of UTIs by altering attachment of uropathogens--including *E. coli*--to the bladder. My thesis examines the effect of cranberry juice on *S. saprophyticus* growth in vitro, using a model biofilm. The data shows that cranberry juice inhibits growth of uropathogenic *S. saprophyticus.*

Kristin Gerhold, '05
Nancy Kleckner, Neuroscience
***Partial Molecular Characterization of Two Ionotropic Glutamate Receptors from the Pond Snails,* Helisoma trivolvis**
Ionotrophic glutamate receptors (iGluRs) are a class of four subunit transmembrane proteins that, in the presence of glutamate, form specific pores in the cellular membrane producing depolarization of the cell. In the mammalian nervous system, these channels are important for excitatory signaling between neurons. In the pond snails *Helisoma trivolvis* and *Lymnaea stagnalis*, glutamate signaling between neurons is essential for the patterning of feeding behavior. Two iGluR subunits have already been sequenced from *Lymnaea*. Using this sequence information, as well as sequence information from other organisms, we hope to amplify and sequence iGluR subunits from *Helisoma trivolvis* and its close relative *Biomphalaria glabrata*, the intermediate host of the human blood fluke *Schistosoma mansoni* which is the target of an ongoing genome project. These sequences will allow us to characterize the activity of *Helisoma* iGluRs in vitro and will help elucidate the mechanism of patterned feeding behavior in these animals.

Meryl Glicksman, '05, Adrienne Levin, '05, Dora Plummer, '05, Nicole Schulman, '05, Meghan Thornton, '05, Diane Tolis, '05
Marcia Makris, Education
Variations on a Senior Thesis through an Education Lens
This presentation provides insight into the thesis process and product of six seniors whose work this year created multiple forms of connections between an interdisciplinary or department major and a secondary concentration in education. These students, whose work is interdisciplinary in nature and whose interests fall under the social sciences broadly and the field of education particularly, have become increasingly creative in locating a focus for their thesis that allows them to merge diverse interests and methodologies. These theses

have provided valuable evidence and results for a variety of community-based research questions that are co-generated by community organizations, senior students, and academic department faculty. We offer thematic orientations for our six thesis projects which include: parental participation in issues of children's schooling, family-school complexities, children's pre- and early-elementary literacy, social and cognitive development, and the relationship between institutional climates and the gay and lesbian individuals and communities involved within them.

Robert Gomez, '05
Rachel Austin, Chemistry
The Photodecomposition of Carbaryl in the Presence of Silver-Doped Catalysts
Carbaryl, a pesticide that is toxic to some target insects as well as some non-target insects and animals, collects in surface waters via run-off and evaporation and decomposes slowly over time. In this experiment, in an attempt to accelerate the decomposition in solution, carbaryl was photodecomposed using various silver-doped zeolites in the presence of UV light. Results showed that the decomposition of carbaryl was anywhere from 30 to 180 times faster in the presence of silver-doped zeolites than without the catalysts. It was also determined that the catalyst remains intact after interacting with carbaryl.

Michelle Gomperts, '05
Kirk Read, French
The Separation of Mosque and State: Unveiling the New French Secularism
My presentation will share the results of my thesis, which argues that the contemporary application of the principle of secularism in France does not match its original intentions. The reconceptualization of secularism is partly in response to and disproportionately affects the Muslim minority living in France. In particular, this new secularism is manifested in the recent law that prohibits conspicuous religious symbols in schools. My presentation will problematize the conception of the original law of secularism, exploring its origins and intentions. I will then turn to the context surrounding the introduction of the law against *ìsignes ostentatoiresî.* My research examines the complexities of the Muslim veil, which has become the rallying point of the debate, as it is the most visible and contested religious symbol in France. I will conclude by examining the implications of the new law and its effect on isolation and assimilation of the French Muslim community.

Caitlin Hager, '05
J. Roxanne Prichard, Neuroscience
Performance on a Cognitive Task as Modulated by Time of Day, Sleep Debt, and Alcohol
College students are notorious for poor sleeping habits and excessive alcohol consumption. Few studies have investigated the cognitive impairments that may result from sleep loss and alcohol consumption at different times during the day. The present study investigates the interactions between alcohol use and sleep debt on cognitive performance during the morning, afternoon, and evening. In order to assess the effects of alcohol and sleep loss, alcohol consumption was measured by self-report and sleep was measured using an actigraph (a device which monitors movement) for about five days. Cognitive performance was measured with a computerized negative priming task. For each participant, cognitive performance was compared at three times of the day; and within-subject analysis was conducted to compare performance following a day of sobriety and a day following a typical night of drinking. In a quantitative analysis of the interactions of sleep loss and alcohol, it is expected that there will be interactive negative effects on cognitive performance following alcohol consumption in participants who receive fewer than eight hours of sleep.

Megan Hamilton, '06
Robert Farnsworth, English
Prose Reading
I will read from *Empty Space*, a work in prose that I wrote as part of the advanced prose- writing class.

Jennifer Hanley, '05
Meredith Greer, Mathematics
Bovine Spongiform Encephalopathy (Mad Cow Disease) Meets Bifurcation Theory
The recent surge of media coverage concerning bovine spongiform encephalopathy (BSE) has made its more commonly known label, mad cow disease, a household name. However, beyond its name and a handful of defining characteristics, scientists remain uncertain about the majority of facts concerning the disease. Current evidence suggests that BSE is a prion disease, which spreads through a host by the biological process of nucleated polymerization. Regarding this assumption as true, we investigate the development of BSE within a host by applying an area of mathematics, known as bifurcation theory, to a pre-existing, continuous model of nucleated polymerization, referred to as the prion model. We then examine the bifurcation's potential biological implications on BSE and prion diseases in general

Jevede Harris, '05
Joe Pelliccia, Biology
The Role of Dehydration in Asthma
Asthma is a chronic disease that affects the respiratory system. In fact, it is the most common chronic illness of childhood and the fourth leading cause of disability in children. It is characterized by constriction and inflammation of the bronchial airways. Among the various triggers of asthma is airway dehydration, a factor that has received insufficient attention. Consequently, the role of dehydration in asthma is a matter of debate. A review of primary literature on the link between dehydration and asthma was undertaken in order to ascertain the role that dehydration plays in the exacerbation of asthma episodes. These revealed that dehydration plays a significant role in this disease. Therefore, current and evolving therapies for asthma may be more effective if the role of dehydration were correctly understood and taken into account.

Joshua Harris, '05
Rebecca Herzig, Women and Gender Studies
***Critical Transformation in the Writing of* Zhuangzi**
Through an examination of the attitude taken toward knowledge and sensory structures in the *Zhuangzi*, a work of Chinese philosophy from the fourth century B.C.E., we are not only challenged to come to terms with a fascinating epistemology, but are presented with a model from which to build a better understanding of what it means to think critically.

Marie Hemmelgarn, '06
Kathryn Low, Psychology
The Protestant Ethic, and Risk for Eating and Body Image Concerns in College Women
Sixty-six undergraduate women completed measures for a trial of an eating disorders prevention program. Based on multiple regression models, the Protestant ethic predicted internalization of the thin ideal after controlling for socioeconomic status and body mass index (BMI). Further, the Protestant ethic is associated with weight and shape concerns after controlling for BMI and internalization scores. Finally, in a sub-set of participants, high BMI in combination with the Protestant ethic is associated with later purging.

Nancy Highcock, '05
Sylvia Federico, Classical and Medieval Studies
The Negative Evidence for Christianity in Fourth-Century Britain: The Destruction of Mithraeums Reconsidered
This paper is a chapter from my thesis on the archeological evidence for Christianity in fourth-century Roman Britain. The destruction of Mithraic Temples in both London and along Hadrian's Wall has long been thought to be the work of Christians attempting to wipe out the Oriental mystery cult of Mithras. In recent years, however, alternative viewpoints have arisen. I will discuss these viewpoints and draw my own conclusions.

Julie Hilliard, '05
Michael Sargent, Psychology
Self-Confidence: Does It Moderate Stereotype Threat for Women in the Domain of Mathematics?
Past studies have shown that women often perform worse on difficult math tests than do men. According to stereotype threat researchers, this result is due to the fact that women risk being judged by the stereotype that women are worse at math than men and therefore the anxiety which this fear causes may lead to poorer performance on a math test. This thesis attempts to assess whether or not an individual's self-confidence within the domain of mathematics or their global self-confidence moderates stereotype threat in women.

Elizabeth Howard, '05, Erol Kholi, '05, Kathryn King, '05, Heather Kromer,'06, Toshi Odaira, '06, David Waters-Honcu, '06, and Iwang Weili Zhang, 07
Karen Palin, Biology
Biofilms: The Secret Life of Bacteria
A biofilm is a community of microbes embedded in an extracellular matrix. This community, which can be single or multi-special, adheres to a surface. Recent studies indicate that biofilms are ubiquitous in nature and have been linked to common human infections including periodontal disease and bladder infections. The structure and complex organization of the biofilm confers increased resistance to antimicrobials and environmental stress. Using a variety of techniques, we created and destroyed biofilms in vitro. The biofilms were visualized with scanning electron microscopy.

Thomas Hutcheon, '05
Todd Kahan, Psychology
The Automaticity of Face Recognition: A Test of the Task-Choice Procedure
It has long been recognized that perception of faces holds an important role for humans. Recently it has been suggested that this is an automatic process, which occurs without intention while taking up limited to no mental capacity. The present experiment assessed this claim using a new experimental task-choice procedure originated by Besner and Care (2003). Participants responded to pictures of famous faces as quickly as possible; these faces were either clear or were visually degraded and the participant's task changed from trial to trial. A cue informed the person how to respond to the face and this cue either appeared well in advance of the face or simultaneously with it. The results of the experiment may provide a more nuanced understanding of the automaticity of face recognition.

Leslie Ishizuka, '05
Todd Kahan, Psychology
Differences in Drinking Tendencies among Students of Different High Schools
Alcohol consumption is a severe problem on many college campuses across the country. Past studies have indicated that many factors influence consumption frequency and tendencies in college, such as existing social norms, values, peer pressure, and peer expectancies (Thombs et al. 1997; Beck et al. 1995). High school drinking behavior is also correlated with college drinking behavior (Yu & Shacket, 2001; Reis & Riley, 2000). Different types of high schools--private boarding v. private day v. public--vary in terms of social pressures (Luthar, 2003; Luthar & D'Avanzo, 1999), social norms and values (Kairouz & Adlaf, 2003), and demographic variables (socioeconomic status, etc.) (National Center for Education Statistics, 2001; Persell et al., 1992). This study used a questionnaire to investigate whether all high school students exhibit similar drinking behaviors, tendencies, and frequencies, or whether there are clear differences based on what type of school the student attended.

Jon Ivers, '05
Kathryn Low, Psychology
Elderly Attitudes toward Computers and the Internet
In our twenty-first century society, reliance on computers and the Internet is at an all-time high. Computer use is being taught to grade school students across the United States, so that the next generation does not fall behind. However, the elderly are often forgotten or neglected in the struggle to stay updated. In an age where information and services are at one's fingertips, it is clearly a disadvantage not to have access to them. Many people attribute elderly persons' lack of connectivity to negative attitudes toward new technology and an

unwillingness to learn how to navigate such technology. In fact, there is previous data that supports such claims. This study examined attitudes toward computers and the Internet among elderly persons at a residential facility in Lewiston, Maine. Subjects were low in socioeconomic status (SES) and also afflicted with some minor psychological disability. Previous studies were used to determine the scales to measure such attitudes.

Alexander Jacobson, '08
Elke Morris, Art
Group Photography Exhibition
An exhibition of work by students in Photo II and Photo III classes. Photo III students will show an excerpt of their semester project which has been their sole focus, while Photo II students will show work from various assignments throughout the semester. The exhibition will be on view in Chase Hall.

Lara Jacobson, '05
Kathryn Low, Psychology
Service Learning: Attention Deficit/Hyperactivity Disorder in Special Needs Students
It is estimated that 3% to 5 % of school-age children have attention deficit/hyperactivity disorder (ADHD). ADHD is generally characterized by impulsivity, hyperactivity, and inattentiveness. These characteristics can lead to higher risks for academic struggles and failure, behavioral problems, substance abuse, high-risk behaviors, divorce, and mental disorders. Furthermore, research has shown that ADHD is often co-morbid with other DSM disorders including conduct disorders (30%-50%), mood disorders (15%-75%), anxiety disorders (25%), and oppositional defiant disorder (54%-67%). While there are those who believe that ADHD is over-diagnosed and stimulants over-prescribed, ADHD is a real disorder that must be taken seriously in order to provide children with the best opportunities to excel in academics and life.

Jill Jakimetz, '05
Jane Costlow, Russian and Environmental Studies
***Imagining Place: Nature, Identity, and Creative Imagination in the* Kalevala**
In the early nineteenth century, Elias Lönnrot, a physician and folklorist, collected the old songs and poems of the rural people who lived and worked among the forests, lakes, and coasts of eastern Finland and from them created the *Kalevala*, an epic story about the land of heroes. Themes from the *Kalevala,* which became the national epic of Finland, were taken up by artists and politicians, who derived from it a sense of national identity ranging from romantic to militaristic. This poster focuses on the portrayal of the natural landscape in the text and illustrations of the *Kalevala* and the way in which this nature imagery interacts with romanticism, nationalism, and imagination in creating a Finnish sense of place.

Rugiatu Jalloh, '05
Eli Minkoff, Biology
Disparities in Incidence and Mortality Rates of Breast Cancer among Black and White Women in the United States
My aim is to present accumulated evidence for an etiological role for biological, environmental, and other exposure factors, and then to examine what roles these factors may play as contributors to the development of breast cancer. Also, I want to provide evidence about how age, race, and socioeconomic status affect the outcome for women who have been diagnosed with breast cancer. I want to find out why there is such a significant difference in the incidence and mortality rates between black and white American women.

Robin Karfunkel, '05
John Kelsey, Neuroscience
The Effect of PCP and Clozapine on Cognitive Symptoms in Animal Models of Schizophrenia
Schizophrenia is a neurological disorder that affects approximately one in 100 people. There are three main symptom types: positive, negative, and cognitive. Cognitive symptoms are a recently defined category and are now thought to be the most debilitating. It has been suggested that the core cognitive deficit in schizophrenia…[is] working memory impairment…leading to impairment in other domains of cognition.

Kathryn King, '05
Karen Palin, Biology
The Implementation and Evaluation of the Group Health-Visit Model
This year-long, service-learning thesis focuses on creating a group health-visit program at B Street Health Center for female patients who have or are at risk of developing type II diabetes. At these sessions, health education, support, and the opportunity to socialize with other patients take place. Outcomes to be measured at the end include patient satisfaction, changes in behavioral health, and an analysis of the group clinical data. The goal of the project will be to determine the efficacy of the group health-visit program and to assess the sustainability of the program at the health center.

Angela Knox, '05
Nancy Kleckner, Neuroscience
***Mapping of Glutamate-Responsive and Glutamate-Containing Neurons in the Central Nervous System of* Helisoma trivolvis**
Little information is available about the role of glutamate in invertebrate central nervous systems. Some research has shown that glutamate acts as a neurotransmitter controlling the feeding behavior of pulmonate mollusks like *Aplysia*, *Lymnaea*, *and Helisoma trivolvis* (Katz and Levitan, 1983; Levenson et al., 2000; Brierley, Yeoman, and Benjamin, 1997; Quinlan and Murphy, 1997). To better understand the role of glutamate in invertebrates it is important to identify glutamate-containing and glutamate-responsive neurons. Two species of the freshwater snails, *Helisoma trivolvis* and *Biomphalaria glabrata*, will be used to identify these neurons. Classification of glutamate transporter (GLT) and receptor (GluR) types is also important in understanding the neuronal circuitry underlying behaviors such as feeding in *Helisoma, Biomphalaria*, and other invertebrate organisms. Lucifer yellow dye and immunohistochemical staining techniques will be used to visualize glutamatergic neurons, their follower cells, and to classify GLTs and GluRs. A map of glutamate-responsive and glutamate-containing neurons will then be created.

Erol Kohli, '05
Pamela Baker, Biology
Medicine: A Study of Acupuncture
This meta-analysis of acupuncture and an additional Asian medical technique will examine the efficacy of the technique in the treatment of various medical conditions. A number of different clinical studies will be investigated to determine the efficacy of the treatment. Finally, the difficulties of studying Eastern medical practices in a Western setting will be discussed.

Jessica Kubat, '05
Kathryn Low, Psychology
Teaching Social Skills to Children with Behavioral Disabilities
Research on the success of social interaction, determined by an individual's level of social competence and skills, suggests that deficits within social functioning may be an integral part of many emotional and behavioral problems (Spence, 2003). As I complete my service-learning thesis at the Child Health Center, Auburn, my main aspiration has been to continue the center's curriculum of guiding children to acquire knowledge about the physical and social world through playful interaction. My poster presentation delineates the research on social skills training for children with behavioral disabilities, providing a variety of situations that enable children to role-play and interact with peers, as well as to further develop their peer relations, self-management, compliance, and assertion skills.

Matthew Lajoie, '05
Holly Ewing, Environmental Studies
Benthic Macroinvertebrates Assessment of the Water Quality and Biological Health of the Upper Merrimack River
My poster will include a brief introduction to the upper Merrimack River, an outline of the materials and methods of my thesis study, and a summary of my findings. This summary will be composed mainly of trend graphs with some tables. There will also be pictures of some common benthic macroinvertebrates.

Nicole Langelier, '05
John Kelsey, Neuroscience
The Therapeutic Effects of Caffeine and Adenosine 2A Antagonists on Forepaw Stepping in an Animal Model of Parkinson's Disease
Parkinson's disease (PD) is an age-related motor disorder that results from the neurodegeneration of dopamine producing neurons within the striatum. Epidemiological studies have suggested that caffeine consumption lowers the risk of developing PD. Subsequent studies employing an animal model of PD have supported this finding suggesting that caffeine mediates its neuroprotective effects through antagonism of adenosine 2A (A2A) receptors within the basal ganglia. The purpose of this study was to determine if caffeine and the A2A antagonist SCH-58261 would exert a therapeutic effect in an animal model of PD. The neurotoxin 6-hydroxydopamine was used to create a unilateral Parkinsonian lesion by selectively destroying dopamine neurons within the medial forebrain bundle and the forepaw stepping test was used to assess the efficacy of these drugs in treating motor impairment. It was found that caffeine (15 mg/kg) improved stepping, and while SCH-58261 (1 mg/kg) did not improve stepping on its own, a combination treatment of SCH-58261 (1 mg/kg) with L-DOPA (8 mg/kg) had a synergistic therapeutic effect and improved stepping to a greater extent than L-DOPA therapy alone. This study shows that caffeine and caffeine-like drugs have therapeutic properties that may make them possible future targets for PD treatment.

Laurie Lau, '05
Rebecca Fraser-Thill, Psychology
The Effect of Childhood and Current Environment on Materialism
This thesis examines how the urban, suburban, or rural environment individuals grew up in and the one in which they currently live influence their present level of materialism. Data was collected from colleges in each of the environments being studied. The participating institutions were Boston College, Connecticut College, Rhode Island College, Southern New Hampshire University, University of Southern Maine, and the University of Maine at Presque Isle. Based on survey responses about childhood environment, participants were categorized in one of six combinations: urban/urban, urban/suburban, urban/rural, suburban/suburban, suburban/rural, or rural/rural.

Matthew Lawler, '05
T. Glen Lawson, Chemistry
Evaluation of the Binding of EMCV 3C and 3CD Proteins to 5'- Untranslated Region RNA
This project advances research into the biochemistry of encephalomyocarditis virus (EMCV) RNA replication, and will both expand the knowledge base of picornavirus replication and probe for the existence of novel regulatory processes. Because analogous proteins from other picornaviruses have been shown to bind RNA and this behavior is known to be a crucial event in poliovirus RNA replication, demonstrating specific RNA binding by these EMCV proteins is highly valuable in elucidating the mechanism of EMCV RNA synthesis in infected cells. The project goals will be accomplished using wild type and mutated EMCV proteins expressed from cloned genes in *E. coli* cells and purified using a histidine residue tagging (his-tag) affinity procedure. Purified proteins are then incubated with 32P radio-labeled RNA, and binding affinity is analyzed using acrylamide gel mobility shift assays to determine whether the binding of purified EMCV 3C and 3CD proteins is specific to viral 5'- untranslated region RNA molecules and whether the binding affinity is different for the two viral proteins.

Kerry Adam Lewiecki, '05
Lynne Lewis, Economics
Water Markets: Promoting Efficiency and Sustainability in the Western United States
This study addresses the issue of water scarcity in the western United States and the development of water markets as a solution to meeting competing demands. The Colorado Big Thompson water market in northern Colorado serves as a case study to illustrate the characteristics of an active water market. Market transactions over the last 46 years are evaluated for changes in water allocation that have taken place over time. Institutional and administrative recommendations for water markets are made based upon the analysis of the Colorado Big Thompson water market.

Mary Locker, '05
William Corlett, Political Science
***Reconsidering Equality, Difference, and Democracy: A Contemporary Look at Tocqueville's* Democracy in America**
Many people today are interested in a kind of democracy that includes equality, participation, and just forms of governance. Unfortunately, it is extremely difficult to agree on concrete principles and values. One crucial issue that confronts democratic theorists and participants alike is the predicament of reconciling equal conditions and equal rights with respect for each member's uniqueness amidst a diversity of morals. In his well-known *Democracy in America*, the nineteenth-century French philosopher Alexis de Tocqueville records observations about the distinctive nature of liberty, constraint, formal government, and society found in the pre-Civil War United States. His discussion of equality and of religion as democracy's mediation, as well as his general observations about democratic peoples, unearth important distinctions and clarifications inextricably related to democracy's problem of accommodating both difference and agreement. Using Tocqueville's work, I assess and reformulate this crucial question facing modern democratic theory.

Christina Maki, '05
Holly Ewing, Environmental Studies
The Spatial and Temporal Patterns of Conductivity in the Lake Sunapee Watershed, New Hampshire
Data collected by the Lake Sunapee Watershed Association has revealed significant variation spatially temporally in the ion levels in streams entering Lake Sunapee. Two areas of the watershed have extraordinarily high conductivity levels (a measurement describing the amount of ions in the water), while a third site has extremely low conductivity levels. This thesis describes the chemical analysis of tributary water samples, in conjunction with the historical Lake Sunapee data previously collected. The data collected will provide the Lake Sunapee Watershed Association with a greater understanding of the elements impacting the watershed, as well as anthropogenic activities potentially affecting the watershed.

Christina Maki, '05, Craig Saddlemire, '05, Ryan Sparks, '06, and Joshua Stoll, '05
Melissa Paly, Envrionmental Studies
For the Love of Small Scale
The fusion of film and environmental activism provides a platform to effectively address complex issues in ways that are educational, motivational, and provocative. *For the Love of Small Scale* is a product of Melissa Paly's class on environmental filmmaking in theory and practice. The film offers an inside look at the influence of free trade agreements on farmers in Androscoggin County and offers ways in which local communities can become actively involved. Interviews with local farmers, a state representative, and Ronald Jagor, author of the *Fate of Farming,* are interwoven with extensive footage of the local farmscapes. This film offers a local view of a global issue and illustrates the potential value of film, and more broadly, creativity, within the realm of activism.

Matthew Mann, '05
Susan Langdon, Psychology
The Effects of Personal and Competitive Collective Efficacy on a Sports Task
Group function is very important, especially in sports like football where it is essential to have confidence in teammates to become successful. The purpose of this study is to examine the relationship between personal collective efficacy, competitive collective efficacy, competitive outcome, and performance in a sports task. Personal collective efficacy is defined as a group's belief about a performance that is internally referenced. For example, a football team believes that as a team they can score 24 points in a particular game. Personal collective efficacy is thought to override competitive collective efficacy in relation to performance. Competitive collective efficacy is defined as a group's belief about a performance that is externally referenced. For example, a football team believes that as a team they can beat a certain opponent. Competitive outcome feedback should affect competitive collective efficacy, but not more than personal collective efficacy.

Kelton McMahon, '05
William Ambrose, Biology
The Impacts of a Changing Food Supply on Arctic Benthos
Climate change-mediated reductions in Arctic sea ice may decrease ice algae and increase phytoplankton. It is thought that this changing food supply will not impact the benthos because ice algae is assumed to be a lower quality food source than phytoplankton. My study assessed the digestibility of ice algae and phytoplankton by the Arctic benthos. Individual organisms and sediment cores collected in Ny Ålesund, Svalbard (79°N) were fed ice algae or phytoplankton for 19-32 days. Although reductions in sediment chlorophyll-a concentrations over time show that both ice algae and phytoplankton were rapidly consumed, elevated respiration rates in the ice algae-treatment suggest differences in digestibility between ice algae and phytoplankton. Consequently, three different phyla fed ice algae exhibited significant enrichment in carbon isotope values compared to control. These experiments show that ice algae is readily consumed and assimilated into biomass, making it a valuable component of the Arctic benthic food web.

Helen Minsky, '06
Matt Côté, Chemistry
A Study of Metal Oxide Films through Atomic Layer Deposition
The aim of this work is to fabricate nanostructures by direct growth of metal oxides. Atomic layer deposition (ALD) has been used as a means of creating uniformly thin films and nanostructures of metal oxides. TiO_2 films were grown on Al_2O_3 substrates and then studied using ultraviolet/visible (UV/vis) as well as infrared (FT-IR) spectroscopy. To get very accurate thickness measurements ellipsometry will be used. Currently the design and construction of a rotating analyzer ellipsometer is in progress. These methods allow for an in-depth study of film growth, which should help with interpreting future research involving patterned metal oxide nanodots.

John Mulligan, '06
Steven Dillon, English
Remembering Democracy in the Berlin Abgeordnetenhaus
The history of democracy in Berlin is one of interruption and interpretation. Over the past century and a half, Berlin has been ruled in turn by governments imperial, totalitarian, and democratic. A possible focal point for considering all of these regimes is the Berlin Abgeordnetenhaus, which housed Berlin's first viable democracy, witnessed the antidemocratic practices of the Third Reich, and was even hailed as the birthplace of Germany's communist party. My presentation explores these histories, specifically through the lens of Berlin's contemporary public life and its reinterpretation of this building's past.

Charles Murnane, '05
Kathryn Low, Psychology
Asperger's Syndrome and Social Interaction
My poster features a case study of a child from a local public school who has Asperger's Syndrome, a key symptom of which is lack of social skills. After observing the student for several weeks, I implemented a plan to help him increase his social skills in order that he might feel more comfortable in a social setting.

Erica Nason, '05
Kathryn Mathis, Psychology
Effects of Youth Sports Participation on Visuospatial Ability
The relationship between sports participation and cognitive ability is one that has been extensively studied, and the mass of the literature suggests that there is a correlation between sports participation and improved cognitive ability. Of particular interest to those studying this phenomenon is visuospatial ability because it enables athletes to locate teammates and opponents on the field, to predict the possible trajectory of an object, and to predict where or how a play might occur before it happens. The best way to test the effects of youth sports participation on visuospatial ability is to test directly within youth populations. This study seeks to determine whether children who participate in sport have better visuospatial ability than children who do not participate in sports. In two experiments, this study will assess possible correlational and causational relationships between youth sports participation and visuospatial ability. Experiment I will compare athletes' and non-athletes' scores

on the WISC block design test and the Rey-Osterrieth Complex Figure to determine whether a correlation between sports and visuospatial ability exists. Experiment II will be the first-ever experiment to attempt to find a causal relationship between sports and visuospatial ability. Participants' visuospatial scores before and after the winter sports season will be compared to determine whether playing sports improves visuospatial ability.

Daniel Neems, '05
Paula Schlax, Chemistry
Binding Studies between Ribsomal Protein S1 and Several Ribonucleic Acids
Under environmental stresses, *Escherichia coli* is able to maintain viability through the heightened expression of certain proteins. This change in expression is transcriptionally controlled by sigma factor, σ^S which stimulates the production of over 50 proteins. It is hypothesized that the σ^S is regulated through interactions with the small non-coding RNA DsrA and ribosomal protein S1. Electrophoresis mobility shifts, competition assay, and Rnase H digestions were performed to elucidate the structure of the S1 binding site on DsrA. Current results show that DsrA and S1 interact with a preference for pyrimidines.

Chi Nguyen, '05
Shepley Ross, Mathematics
How Do We Define Julia Sets?
Julia sets play an important role in understanding iterations of functions mapping the extended complex plane into itself. For example, given polynomials such as $f(z) = z^2 + c$ where c is a complex number, we want to understand how the sequence of iterates $z,\ z^2 + c,\ (z^2 + c)^2 + c, \ldots$ behaves. In the literature there exists a simple definition of a filled Julia set for certain polynomials. This year-long senior thesis seeks to answer the question: Is there a more general definition of Julia sets for other types of functions, namely rational and exponential, that encompasses the easy definition for polynomials? Three common definitions of Julia sets are examined in order. One involves basins of attractions; the second uses the closure of the set of repelling periodic points; and the third requires normal families of functions and complements of the Fatou set.

Ryan O'Banion, '05
Keely Maxwell, Environmental Studies
Ecosystem Management in the Gulf of Maine: The Advantages to Institutional Obstacles and Implementation
The Gulf of Maine is a unique ecosystem bordered by the United States and Canada. Both countries have become dependent on the Gulf of Maine fishery for resource extraction. Unfortunately, the countries have managed the extraction of fish from the ecosystem in a manner that has not allowed for their continued existence. This study shows how ecosystem management can give the fishery and ecosystem in the Gulf of Maine a better chance of survival. It then discusses the institutional obstacles to the implementation of an ecosystem approach to management.

Thomas Ober, '05
Kathryn Low, Psychology
The Effect of Class Size in Special Education
This semester I have been working as a special education intern at the Renaissance School in Lewiston. I took a particular interest in how numbers of students in the classroom impacted behavioral patterns and ability to learn. The experience has been interesting, sometimes trying, and often eye opening, due in large part to the uniqueness of all the students, whose specific needs, as well as talents and gifts, made for a dynamic and complex classroom setting.

Kari Ording, '05
Ryan Bavis, Biology
Effects of Postnatal Hypercapnia on the Development of Ventilatory Chemoreflexes of Rats
The ventilatory control system in animals is complex and little is known about the effect of external factors on its development. Normally, in response to high levels of carbon dioxide (hypercapnia), ventilatory chemoreflexes will stimulate an increase in breathing. However, animals that are naturally exposed to hypercapnic conditions, such as burrowing animals, show a reduced ventilatory response. In female birds, adult

breathing is affected by exposure perinatal hypercapnia. Studies exposing rats to similar conditions have produced conflicting results on adult ventilatory ability, which may be attributed to the sex of the animals studied. By using whole-body plethymography, I determined if there is a significant difference in the ventilatory response of male and female rats after postnatal exposure to CO2. The results from this research may help us understand burrowing animals' ability to withstand hypercapnic conditions and allow us to uncover the causes of diseases such as central hypoventilation syndrome and sudden infant death syndrome (SIDS).

Olga Osadchaya, '05
John Kelsey, Neuroscience
Depletion of Dopamine through 6-OHDA Lesions in the Medial Prefrontal Cortex Mimic the Cognitive Symptoms of Schizophrenia?
Schizophrenia is a devastating, multifaceted, developmental disorder that impacts one in every 100 people, most often between the ages of 15 and 25, regardless of gender, ethnicity, class, or culture. Patients with schizophrenia display a wide range of symptoms from a variety of domains. For a long time schizophrenia was described primarily in terms of its positive and negative symptoms. However, over the past decade the focus has shifted towards what is now considered to be the most devastating manifestation of the disease: the cognitive deficits. In particular, working memory ability is severely compromised in schizophrenic patients. Working memory deficits are associated with abnormal dopaminergic transmission within the medial prefrontal cortex (mPFC). Therefore, the present experiment was designed to test the effect of dopamine depletion in rodent mPFC through bilateral 6-hydroxydopamine (6-OHDA) injections on working memory ability as measured by a spatial delayed non-matching to sample test (DNMTS).

Holly Page, '05
Krista Scottham, Psychology
Anxiety and Consumption: A Terror Management Theory Approach
Making people aware of their own mortality can create anxiety. Anecdotal evidence indicates that some people cope with this anxiety by engaging in consumerism, or retail therapy. The current project is designed to empirically examine whether or not the acquisition of material objects serves to ameliorate psychological anxiety. It is also designed to shed light on whether individual levels of materialism moderate the relationship between mortality salience and consumerism; or whether shopping helps to diminish anxiety only among those individuals who place high value on materialistic objects. Experimental findings are contextualized within Terror Management Theory, and the potential economic benefits and consequences of living in fear will be discussed.

Emily Parker, '05
Kathy Mathis, Psychology
The Presence of Juvenile Recidivism in the Lewiston District Court: The Effects of Specific Interventions Have in Deterring Juveniles from Repeat Offending
The Maine District Court-Lewiston has jurisdiction over all juvenile cases from Lewiston, Auburn, Durham, Greene, Lisbon, Mechanic Falls, Minot, Poland, Sabattus, and Wales. Specifically, each case is heard before one of the district judges who is then responsible for assigning an appropriate sentence for each juvenile. Rates of juvenile recidivism in Maine surpass 35%, suggesting that interventions imposed by courts may not be successful in deterring juveniles from repeat offending. Consequently, the Lewiston District Court is interested in determining whether the sentences they impose on juveniles are effective in reducing these high rates of recidivism. A study was conducted in order to address these questions posed by the court. The first part of the study was archival and consisted of the 472 case files from 2003. Statistical analyses were run in order to determine whether any specific programs or interventions were more successful than others in deterring juvenile offenders from being recidivists. The second part of the study entailed personal interviews with juveniles incarcerated at Long Creek Youth Development Center and participants in the Lewiston/Auburn Youth Court. This part of the study served to gather qualitative data, focusing on the perspectives of the juvenile offenders and how they viewed their experience in the court system.

Michaela Patterson, '05
Joseph Pelliccia, Biology
The Potential Use of Embryonic Stem Cells in the Treatment of Diabetes and Parkinson's Disease
My presentation will discuss the derivation and maintenance of embryonic stem cells, along with their potential application in cell-based therapies. I will discuss their use in the treatments of diabetes and Parkinson's disease as specific examples.

Jessica Perrie, '05
Ryan Bavis, Biology
How Does Farm Management Affect the Transmission of Johne's Disease?
Johne's disease (pronounced yo-knees) is a chronic wasting disease of ruminants, specifically bovines, caused by the bacterium *Mycobacteria paratuberculosis*. This is a very resistant strain of bacterium which can survive antibiotic treatment, UV radiation, and, most importantly, pasteurization. Even though transmission of the disease can be prevented by proper farm management, over the past four years Johne's disease has become an increasing problem on dairy farms within the state of Maine. By comparing three farms with an on-site history of the disease, this study examines the prevalence of the disease within the state and how transmission can be managed.

Jessica Perrie, '05
Jennifer Koviach, Chemistry
Synthesis of 2-Deoxyglycosides by Conjugate Addition
2-Deoxyglycoside sugars are present in numerous biologically active natural products and exhibit properties that can be used in anti-tumor antibiotics. The C-1 bond between the sugar and a functional group, known as the glycosidic linkage, is very important to its physiological activity and a method encompassing an optimal synthesis of this linkage is a focus throughout scientific research. Previous investigations have shown that, under basic conditions, 2-deoxyglycosides act as Michael acceptors in a 1,4 conjugate addition with a variety of primary alcohols. This study investigates methods by which 2-deoxyglycosides, in the glucose and galactose forms, can be used as glycoside donors by conjugate addition under various acidic conditions.

Jason Rafferty, '05
Nancy Kleckner, Neuroscience
***Glutamate Signal Transduction Pathways Causing Inhibition in Buccal B5 and B19 Neurons of* Helisoma trivolvis**
The inhibitory effects of the neurotransmitter glutamate play an essential role underlying feeding behavior in the pond snail, *Helisoma trivolvis.* Feeding behavior is produced through a specific pattern of interneuron activation maintained through the strategic excitatory and inhibitory signaling of glutamate within the buccal ganglia of the central nervous system. There is little information on glutamate's role in invertebrate systems, particularly concerning inhibitory signaling. The signaling pathways through which two specific buccal neurons, B5 and B19, are inhibited by glutamate are determined as well as whether activated receptors facilitate this inhibition directly (ionotropic) or indirectly using second messenger proteins (metabotropic). The electrical properties of these buccal neurons are observed while they are in the presence of pharmacological agents that induce or inhibit specific protein functioning. Neurons are tested while isolated from the ganglia to eliminate influences from other neuronal connections. Evidence from other mollusk systems suggests that the glutamate inhibitory response follows a metabotropic pathway using G proteins.

Karina Reynolds, '05
John Kelsey, Neuroscience
Possible Therapeutic Effects of Nicotine on the PCP Induced Deficits in Working Memory in the Animal Model of Schizophrenia
Schizophrenia is a debilitating, lifelong disorder that affects an estimated 1% of the world's population. Interestingly, an estimated 90% of schizophrenic patients smoke cigarettes, as compared to 25% of the general population. This discrepancy may be due to the fact that patients smoke cigarettes as a form of self-medication, specifically against the cognitive symptoms of the disease. These symptoms include deficits in language, perception, attention, learning, and memory. Specifically, the working memory deficit has been hypothesized to

be the core deficit of schizophrenia, therefore finding a drug which effectively treats this symptom may be quite beneficial. This study will focus on the possible therapeutic effects of nicotine on the working memory deficit in schizophrenia. The phencyclidine (PCP) animal model of schizophrenia is widely accepted as one of the best animal models of schizophrenia to date. Animals will be tested on a classical working memory test, the delayed-non-match to sample paradigm. Preliminary data suggests that 0.4 mg/kg PCP impairs working memory, while 0.4mg/kg nicotine paired with 0.4 mg/kg PCP results in less impairment. This latter finding suggests that nicotine may protect against working memory deficits in the animal model of schizophrenia.

Lauren Reynolds, '05
Stephanie Richards, Biology
Interaction of the MAPK and Akt Protein-Signaling Pathways with the Estrogen Receptor in Breast Cancer Cells
According to the National Cancer Institute, each year 182,000 women are diagnosed with breast cancer, 43,000 of whom will die. It is for this reason that research pertaining to prevention, diagnosis, and treatment of breast cancer is crucial. Recently, findings suggest that factors such as hyperactivity of the Ras protein and varying expression of estrogen and progesterone receptors may lead to an increased proportion of cells containing activated MAPK and Akt proteins. It is believed that these proteins influence the development and growth of breast cancer by transmitting and amplifying signals involved in cell proliferation and death; malfunctions in these signals may result in cancer. I am treating four breast cancer cell lines with differing estrogen receptor expression with chemotherapeutic drugs that block either the estrogen receptor function or MAPK function. I will then be able to assess the protein activation state of different signaling proteins in the MAPK and Akt pathways to investigate the influence of these pathways on the estrogen receptor.

Christopher Richards, '05
Thomas Wenzel, Chemistry
Tetra-L-Amino Acid Derivatized Sulfonated Calix[4]resorcarenes and Their Lanthanide Complexes as Chiral Solvating Agents in ^{1}H NMR Spectroscopy
A family of water-soluble L-amino acid derivatized sulfonated calix[4]resorcarenes was developed and their effectiveness as chiral solvating agents (CSAs) in nuclear magnetic resonance (NMR) spectroscopy was determined. The L-proline derivatized member of this family was found to be a very effective CSA for water-soluble bicyclic aromatic substrates, inducing up field NMR shifts as great as 1 ppm. The amounts of enantiomeric discrimination observed with the L-proline compound in this study represent some of the largest chiral discrimination observed with any CSA in any system. Other members of this family were also tested as CSAs with varying degrees of success. The effectiveness of the paramagnetic lanthanide shift reagents europium, dysprosium, and praseodymium (as their nitrate and chloride salts) in inducing greater enantiomeric discrimination in the NMR spectra was also investigated. The ability to effectively discriminate the enantiomers of water-soluble chiral compounds represents a potentially useful advance in the ability to create optically pure pharmaceuticals.

Cynthia Roman, '05
J. Roxanne Prichard, Neuroscience
The Effect of Common Drugs on College Students' Sleep Quality
Psychosocial, environmental, and physiological factors largely contribute to poor sleep quality in college students. The present study focuses on physiological effects on sleep quality, specifically how common campus drugs such as caffeine, nicotine, alcohol, and marijuana influence sleep quality. Participants include at least 200 male and female students enrolled at Bates College. An adaptation of the Morningness Eveningness Scale (MES) is presented to assess morning/evening types. Participants completed adaptations of the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality differences during the week and weekend. Drug intake of each of the four drugs is measured by a psychoactive drug survey created for the study, which also differentiates between behavior during the week and weekend. Descriptive and correlational analyses of data are performed, and a multiple regression analysis is conducted. It is predicted that evening types will be more likely to intake higher levels of each drug, and that poorer sleep quality will be associated with higher intake of each drug.

Brian Rose, '05
Susan Langdon, Psychology
Athletics, Gender Roles, and Alcohol: A Losing Combination?
Alcohol use among athletes is a growing concern in colleges. This concern arises because repeated studies have demonstrated that athletes drink more than non-athletes do. Previous research has looked at issues such as attribution error, anxiety, and coping strategies as reasons for alcohol use among athletes. This study examines the relationship between team cohesion as well as athletic and gender identity in an effort to connect them with alcohol expectancies. The first hypothesis is that individuals who identify as athletes use alcohol more than individuals who do not identify as athletes. The second hypothesis is that masculinity is related to more positive alcohol expectancies compared to femininity. The third hypothesis is that perceptions of higher team cohesion combined with a team norm of alcohol use will produce positive alcohol expectancies.

Lauren Rosenberg, '05
Lee Abrahamsen, Biology
***The Response of Cultured Kidney Cells to Co-culture with Uropathogenic* E. Coli**
Urinary tract infections (UTIs) are caused by bacteria that are able to adhere to bladder and kidney epithelial cells and induce an inflammatory response that can result in damage to the tissue. We have exposed human embryonic kidney (HEK 293) cells to bacteria isolated from patients with UTI as well as commensal isolates to study the adherence and cytotoxic effects of the bacteria and the immune response they induce relative to known bacterial virulence profiles. Our methods include cytotoxicity assays, immunofluorescent staining for IL-6, and scanning electron microscopy. Our results suggest that particular virulence factors are related to IL-6 production, adherence, and cytotoxicity in vitro.

Katherine Savalchak, '05
Heather Lindkvist, Environmental Studies
The Relationship between Herbalism and the Conservation of Native Medicinal Plants in Maine
As the popularity of herbalism increases in the United States, the potential for negative effects on wild medicinal plant populations increases as well. Herbalists work in close association with many native medicinal plants, and, as a result, they form a link between the preservation of these plants and the general public. This thesis investigates the relationship between herbalists in Maine and the conservation of native medicinal plants, examining specifically whether or not Maine herbalists can be characterized as eco-herbalists--those practicing with an ethic of stewardship and conservation toward the land.

Matthew Savas, '08
Atsuko Hirai, History
Laughing Out Loud: How Cartoons of World War II May Have Affected American Children's Views of the Japanese
My study concerns the presentation of the Japanese in cartoons during World War II and how they may have affected children's views of the people of Japan. I discuss comics found in newspapers across the country as well as cartoons that appeared on television. My study is theoretical, as I could find no definitive evidence that the cartoons truly did alter children's perception of the Japanese. However, I argue that the cartoons probably affected children's views in a negative way.

Justin Schlawin, '05
Holly Ewing, Environmental Studies
White Pine (*Pinus strobes*) Age and Growth Patterns of White Pine in a Peatland in Poland, Maine
The dominance of white pine (*Pinus strobus*), a species often associated with dry or sandy soils, in a peatland in Poland, Maine, is an anomalous occurrence, the origin of which may be related to human disturbance. Dendrochronolgy (tree ring) analysis of white pines, basal area measurements, and analysis of shrub cover were performed and compared spatially with hydrology patterns of the site to understand the history of white pine, how increased waterlogging may affect tree growth, and whether ericaceous shrubs may be used as indicators for tree growth on the site.

Kara Seaton, '05
Michael Sargent, Psychology
Implicit Health Attitudes: Can Health Behaviors be Predicted by the Implicit Association Test?
This study seeks to understand the connection between implicit and explicit attitudes and behavior. Specifically, the research uses the Implicit Association Test (IAT; Greenwald, McGhee & Schwartz, 1998) to predict specific health attitudes and behaviors. In the first experiment, two separate IATs are used to measure health attitudes toward doctors and medicine, and exercise. The second experiment uses additional measures to investigate when health-related attitudes predict health behaviors. Experimental conditions utilize Krantz's Health Opinion Survey (Krantz, Baum & Wideman, 1980), the Attitudes to Doctors and Medicine Scale (Marteau, 1990), and the Health Anxiety Questionnaire (Lucock, 1996). In order to determine exercise habits, participants also fill out an exercise timeline followback calendar on which they record the duration of their exercise sessions over the previous thirty days. The results are expected to show that implicit attitudes predict behaviors related to health professionals and exercise.

Luke Selby, '05
Stephanie Richards, Biology
Oxygen Transport and Endurance Sport: Methods of Abuse
Elite athletes have a checkered history of looking for ways to increase their performance. Ancient Olympians are reputed to have used bull testicles and stimulating herbal potions to increase their stamina. More recently endurance athletes have turned to medical advancements to provide performance-enhancing substances, and sporting officials have had to play a game of catch-up when it comes to detecting illicit use of these substances. Endurance athletes have historically focused on improving their blood's ability to transport oxygen from the lungs to the muscles. By improving their oxygen transport, these athletes seek to improve their aerobic capacity and their performance. My thesis investigates several methods that endurance athletes use to enhance their aerobic capacity and the current techniques employed to detect those methods.

Whitney Sheen, '05
John Kelsey, Neuroscience
Frontal Cortex Dopamine and Addiction to Nicotine
People with schizophrenia show a much greater inclination toward nicotine addiction compared to patients with and without other forms of psychosis. The reasons for this phenomenon have yet to be understood. One possible factor could be the depletion of dopamine in the medial prefrontal cortex of schizophrenic patients and its downstream ramifications on the sub-cortical reward structures of the brain that are known to be intimately linked to the etiology and pathology of addiction. My poster exhibits preliminary results of the effects of medial prefrontal cortex dopamine depletion on locomotor sensitization--a common measure of addiction-related behavior--in rats. This research is being conducted to better elucidate the physiological link between schizophrenia and nicotine addiction. An understanding of this link could contribute to the understanding, treatment, and prevention of the nature and causes of nicotine addiction.

Juyoung Shim, '05
T. Glen Lawson, Chemistry
Investigation of the Encephalomyocarditis Virus 3C Protease Containing Polyproteins in an* in vivo *Expression System
The 3C protease in the encephalomyocarditis virus (EMCV) is a rapidly degraded substrate of ubiquitin (Ub)/26S proteasome-mediated proteolysis. EMCV 3C protease-containing polyproteins, such as 3CD, have been found to be relatively stable toward the Ub/proteasome system. One study has demonstrated the translocation of the EMCV 3C protease into the nucleus in infected cells as part of a polyprotein precursor mediated by the nuclear localization signal (NLS) in the 3D protein. However, recent work in our laboratory has revealed that mature EMCV 3C protease without the NLS signal is localized to the nucleus in vivo systems in a presence of the proteasome inhibitor. The goal of this study is to develop an in vivo system using stably transfected cultured mouse cell lines (ER-NIH3T3), which is capable of expressing EMCV 3CD polyproteins, and to investigate whether the EMCV 3CD diprotein is a substrate for Ub-mediated proteolysis in vivo. In addition, this system will be used to determine whether the 3CD diprotein can be translocated into the nucleus in the absence of viral infection.

Anna Sleeper, '05
Lee Abrahamsen, Biology
A Study to Determine Patterns of Diurnal Eyelid Swelling
My poster demonstrates a prospective, single-center, double-masked, randomized, placebo-controlled study to determine patterns of diurnal eyelid swelling, while also assessing the safety and efficacy of 0.1% D-mannitol or 5% sodium chloride on the reduction of eyelid edema.

Brittny Somley, '05
Todd Kahan, Psychology
Performance Stress v. Social Stress and Sex Differences in Stress Responses and the Impact of Elevated Cortisol on Declaration and Working Memory?
This study examined the impact of performance and social stressors on men's and women's salivary cortisol levels and the effect of varying cortisol levels on declarative and working memory. Memory tests were taken pre- and post-stressor, and saliva samples were collected to monitor cortisol. Preliminary results indicate group differences among control and both stress groups in declarative and working memory performance, pre- and post-stressor. Furthermore, there is a significant interaction between group and gender. After analyzing salivary cortisol levels, we expect that men will exhibit greater cortisol elevations in response to the performance stressor, whereas women will display greater cortisol responses to the social rejection stressor. Furthermore, we expect greater working memory sensitivity to cortisol due to glucocorticoid receptor distribution in the brain and an inverted U-shaped function, such that high and low cortisol levels are associated with decreased memory performance, and moderate levels correlate with enhanced performance.

Adam Staley, '05
Kathryn Low, Psychology
Comorbid Pediatric Bipolar Disorder and Attention Deficit Hyperactive Disorder: A Case Study of Adolescents with Dual Diagnoses
The focus of this study is the use of prescription amphetamines in treating young children. A group of ten- to thirteen-year-olds was selected from a local transitional school that seeks to prepare adolescents with developmental, behavioral, and/or emotional deficits for assimilation back into the mainstream public school system. The overwhelming majority of these children are prescribed some form of amphetamine or stimulant. It is hoped that the knowledge gained from analysis of varying dosage, usage, and corrective context of these prescribed drugs to this select group, in addition to the review of literature on prescription stimulants, will influence further treatment decisions.

Lani Stinson, '05
William Ambrose, Biology
Growth of the Arctic Bivalve (*Serripes groenlandicus*) from Norway, Alaska, and Greenland: Large Scale Climate Patterns and Local Conditions
Many bivalves produce annual growth increments that can be used to determine the organism's age as well as temporal variation in growth. Our study examined the external growth bands of the circumpolar Arctic cockle, *Serripes groenlandicus*, in order to relate interannual growth variations to changes in regional and local environmental conditions. Clams were collected from Ny Ålesund, Svalbard (Norway), Kotzebue Sound, Alaska, and Young Sound and Thule, Greenland. Annual external growth bands were measured to generate an average growth curve for the *S. groenlandicus* populations at each of the different locations, which was then used to calculate Standard Growth Indices (SGI) using parameters derived from the von Bertalanffy growth model. Mean annual SGIs were correlated with local environmental variables as well as large-scale climate oscillation patterns. The growth of *Serripes* in both Alaska and Norway was positively correlated with average annual temperature and total yearly precipitation. Alaska *Serripes* growth was also highly correlated with the Arctic Oscillation Index, especially when the AO was lagged one year behind the SGI, while the North Atlantic Oscillation was related to growth of *Serripes* in Norway, also with a one-year lag. Growth of the Norway bivalves was also positively correlated with Barents Sea temperature, which is an indication of warm Atlantic water inflow into the Arctic Ocean. These results suggest that climatic variations influence Arctic benthic

organisms through effects on local environmental parameters. Greenland bivalves are undergoing analysis and their growth patterns and environmental factors will also be presented.

Joshua Stoll, '05
Holly Ewing, Environmental Studies
Delimiting the Sustainability of Sludge: Examining Class B Sludge Utilization within the Context of Local Communities
In this study I evaluate the extent to which land application of Class B sewage sludge fits into common perceptions of economic, ecological, social and cultural sustainability. Material obtained from farmers, state municipalities, the Department of Environmental Protection, sludge contractors, anti-sludge groups and newspapers reveals wide agreement that sludge utilization is or can be sustainable. Despite such sentiment, over the past ten years there has been a substantial decline in the agricultural utilization of Class B sludge partially as a result of strong public opposition. That opposition, insufficient communication among those involved, and the inability of municipalities to distribute sludge locally are among issues that must be addressed by the DEP, municipalities, contractors, and local communities if sludge utilization is to be part of a sustainable system.

Andrew Stowe, '06
Ryan Bavis, Biology
Trends in the Abundance and Distribution of Bird Species of the Bates-Morse Mountain Conservation Area
Breeding and migratory bird populations were last studied at the Bates-Morse Mountain Conservation Area (BMMCA) from 1978–1983. To assess changes in the bird species present at the BMMCA and to determine whether these changes reflect the downward population trend of many North American species, the distribution and abundance of the birds of the BMMCA were re-examined in 2004. Birds were studied through the use of both point-count stations and walking transects in plots of all major habitat types, and presence of birds was recorded based on visual and/or auditory cues. From May 28 until August 1, bird-count studies took place from dawn until five hours after dawn on every day that weather permitted positive identification. The nationwide trend of decline among bird species was consistent with the trend observed among bird populations at the BMMCA. Conservation of the BMMCA is considered a priority by national and state organizations and an understanding of the bird species' population trends over time is a crucial component of this conservation.

Samuel Swope, '05
Matthew Côté, Chemistry
Band Theory from Two Perspectives, and an Application
This study examines the photochromic and electrochromic properties of transition metal oxides from the point of view of the relevant quantum mechanics. Two points of view are developed, that of chemistry and that of physics, which are then related to each other.

Eben Sypitkowski, '05
William Ambrose, Biology
Sediment Disturbance and Estimates of Bloodworm* (Glycera dibranchiata) *Stocks in Maine
Unlike most commercial harvesting of marine species, little is known about the impact of bloodworm (*Glycera dibranchiata)* digging on habitat. This is partly due to the lack of data on frequency of sediment disturbance by diggers. I collected data on the temporal and spatial patterns of worm digging using two methods: surveying entire mudflats and observing the harvesting behavior of individual diggers. I used aerial photography every 15 to 20 days for a six-month period (July to January) to monitor sediment disturbance on seven flats in mid-coast Maine. In addition, I observed and interviewed individual diggers on a sporadic basis during the same time period to quantify the sediment overturned. Using these data, I calculated catch per unit effort. An average digger turns about 87 m^2 of mud/hour, digs two hours/tide, and harvests 166 worms/hour. I calculated that about 16%-18% of the entire mud area of Maine is disturbed each year. Also, I correlated air temperature and the variation in the North Atlantic Oscillation with bloodworm catch and effort. My results suggest that bloodworm flats are subjected to high levels of disturbance that likely influence the abundance and distribution of non-target species.

Adam Taranto, '05
Kathryn Low, Psychology
Autism Spectrum Disorders
Autism spectrum disorders (ASD) include neurological disorders which hinder a child's physical, social and language skills, as well as abilities to normally relate to people, objects, and events. The increasing prevalence of ASDs (in 2001 as many as 15,000 children in the United States aged 3 to10) presents a major problem in the academic domain. My data collection and observation will be conducted at the Renaissance School in Lewiston, ME. Research will reflect the observed behavioral patterns of children medically diagnosed with an ASD.

Heather Taylor, '05
Susan Langdon, Psychology
The Effects of Flow Enhancing or Flow Debilitating Manipulations on Flow State and Performance
Flow is a psychological state, experienced in and out of sports, that allows people to perform at an optimal level. Up to this point research on flow has been strictly correlational. This study builds upon previous research by using the factors that are associated with flow and manipulating them in order to create two different experimental conditions: flow enhancing and flow debilitating. The assigned task in each of the conditions will be to shoot 25 free-throws. Participants will first complete a baseline and then be assigned to one of the two conditions. People's performance and mental state in their assigned condition will be compared to their baseline scores. It is predicted that the performance-enhancing condition will increase the likelihood of flow, while the flow- debilitating condition will decrease the likelihood of flow.

Brooke Thorpe, '08
Atsuko Hirai, History
Japanese-American Internment Camps
The politics of the World War II era were fallacious in reasoning and rationalization, particularly in regard to the internment of the Japanese Americans. President Franklin Roosevelt touted "military necessity" as the basis for the internment, declaring the Japanese Americans as disloyal and subversive. Yet intelligence provided by the Munson Report and other sources contradicted the theory of military necessity and established the fact that the Japanese-Americans were loyal to the United States. In reality, President Roosevelt operated in response to election-year political pressure. By interning the Japanese Americans, Roosevelt was able to improve the economy, appease voters, satisfy the demands of fellow politicians, and address the politics of pseudo-science.

Anne Tiernan, '06
Stephanie Kelley-Romano, Rhetoric
Museum L/A: Lewiston-Auburn's Labor History Museum
Students in a class on fieldwork in American cultural studies participated in Museum L/A's Millworker Oral History Project. Students were matched with retired millworkers and conducted interviews under the direction of Professor Margaret Creighton and Rachel Desgrosseillers, the museum's director. Recordings of the interviews will become a part of Museum L/A's permanent collection. This service-learning work allowed students to not only become educated about the local community but also to become familiar with local residents and hear their stories. My poster will show how this work was integrated into our course work, and will highlight my interview.

Carrie Trevisan, '05
J. Roxanne Prichard, Neuroscience
Development of Acute Light Response System in the Subcortical Visual System of Rats
Appropriate behavioral responses to sudden changes in light are critical to an animal's survival. The five retinorecipient areas that coordinate acute responses to light develop postnatally, but it is not clear at what point the neural networks mature. In order to examine the development of this acute light-response system, we exposed rats on postnatal day 0 (p0), p6, p12, p17, p23, and p30, to a thirty-minute light pulse at midnight. Locomotor activity was used to measure behavioral adaptation to the light change, and the immediate early gene c-fos was used to mark neuronal activation in these five brain regions. Activation in this system did not develop until p12, five days before eye-opening. Activity data correlates with these findings, as newborn rats

did not show changes in activity levels in response to a light pulse until p12. Thus, this behavior appears to be localized in these areas of the subcortical visual system.

Alexander Verhave, '05
J. Dykstra Eusden, Geology
Evidence of Left Lateral Shear within the Eastern Contact of the Waldoboro Pluton, Muscongus Bay, Maine
Muscongus Bay, Maine, represents an area of complex geologic and tectonic history. Effects of successive orogenic events overprint one another in an increasingly intricate sequence of events. Field work conducted during the summer of 2004 as part of a National Science Foundation grant that funded research experience for undergraduates confirmed the presence of left lateral shear on Harbor and Black islands in Muscongus Bay through use of precision GPS survey equipment, georeferenced digital photo-mosaics, and GIS digital mapping. Observed evidence for left lateral shear can be categorized into three main stages of deformation: rotation and folding of originally orthogonal granite intrusions during a ductile phase; brittle-ductile phase extension and boudinage of granites; and finally, late stage brittle faulting resulting in pseudotachylyte. It is the purpose of this study to determine the tectonic interactions between this fault zone and other major faults in the region such as the Norumbega and Sennebec Pond faults.

Caitlin Vincent, '05
Rebecca Sommer, Biology
Effects of an Aryl Hydrocarbon Receptor (AhR) Agonist on the Beat Rate of Embryonic Chick Cardiomyocyte
Dioxin is a ubiquitous environmental pollutant that disrupts normal cardiovascular activity. These disruptions are hypothesized to be the result of the direct interaction of dioxin and beta-adrenergic receptors (β–AR), and decreased β_1–AR responsiveness has been observed after exposure to dioxin. Myocytes are the primary contractile cell of the heart and are highly specialized to respond to a complex network of stimuli, including β_1-AR agonists. Primary cultures of embryonic chick cardiomyocytes are exposed to BNF, a dioxin-like compound; subsequently exposed to the pharmacological β_1-AR agonist, isoproterenol; and cardiomyocyte cluster beat rates are measured. These measurements will determine if the decreased β_1-AR responsiveness observed in vivo is a result of the direct interaction between dioxin and the β_1-AR of the myocytes, or a secondary result due to conditions of congestive heart failure.

Sienna Vorono, '05
Kathryn Low, Psychology
The Effects of Stimulants Prescribed for the Treatment of ADHA on Fatigue during Exercise
In recent years there has been an increase in awareness and knowledge of attention deficit hyperactivity disorder (ADHD), as well as an increase in the number of prescriptions for the treatment of ADHD. It has been suggested that there is a need to learn more about whether prescribed stimulant medications provide mental or physical advantages or put people at risk for health complications during exercise. It is unclear whether new stimulants, and in particular methylphenidate, have similar effects to Dexedrine, which has been shown to have performance-enhancing effects. In addition, it is unknown whether the effects will be apparent in young adults and/or females, as past researchers have often not included these populations in their studies. This study tested lactic acid accumulation, heart rate, blood pressure, and exercise tolerance through measures of fatigue in individuals both on and off prescription stimulants and non-stimulant user controls during a running task.

Genevieve Waite, '05
Kirk Read, French
Plus d'Américains en France? Les défis Sociaux et Economiques de l'Industrie Touristique en France au XXIème Siècle
This thesis examines the tourist industry in France, from its political and social structures, to its historical and economic implications for the country. Examining the role of foreign tourists in France, specifically of American tourists, this thesis attempts to explain why and how France has come to be known as the number-one receptor country for tourists in the world. I observe the relevance of American tourists in France, why Americans come to France, their importance to the tourist industry, and how French and American attitudes shape this tourism. In order to study this phenomenon more closely, my thesis focuses on tourism in one

particular city: Aix-en-Provence. This part of my study involves surveys conducted in English and in French and directed toward American tourists and French citizens. They pose qualitative questions that attempt to discover how Americans in France have been affected by renewed anti-French sentiment in the United States after 9/11/2001, and how much tourism in France has suffered from the loss of American tourists. Surveys of French citizens, moreover, examine how the French have reacted towards American tourists since the war in Iraq.

Allison Wensley, '05
Jennifer Koviach, Chemistry
Towards the Total Synthesis of a Spiroketal Enol Ether Natural Products
This thesis work is aimed at the first total synthesis of a spiroketal enol ether that has been isolated from chrysanthemums. The target molecule is in a class of natural products in the *Asteracae* family that have proved to be biologically active, including tumor inhibition and spasmolytic capabilities. The synthesis is efficient and flexible, which allows for future syntheses of similar compounds.

Rebecca White, '05
Rebecca Fraser-Thill, Psychology
Do Nullification Instructions Exacerbate Jury Biases?
The presence of racial and own-gender biases in the courtroom is well documented. The present study investigated whether providing jurors with nullification instructions exacerbates these biases. In Study 1, participants read a trial summary about either a black or white defendant and received nullification or standard instructions from the judge. Subsequently, they rated the guilt of the defendant and the strength of both the prosecution's and the defense's cases. Linear regressions were run on guilt, prosecution, and defense case strength by instruction type (standard v. nullification), race of defendant (black v. white) and race of mock juror (black v. white), co-varying dogmatism. It is expected that providing nullification instructions will worsen the bias, even after the effects of dogmatism are controlled for. The same procedure was executed for Study 2, with the variable gender. There were trends toward participants being more punitive when given nullification instructions and when the defendant was female

C. Challen Willemsen, '07
William Ambrose, Biology
New Findings in the Distribution of Guatemalan Orchid Species
The object of my study was to partially document the distribution of Guatemalan orchid species. I traveled throughout Guatemala for two months during the summer of 2004, taking photographs and carrying out field observations, documenting the habitat, locality, altitude, and growth habit of each observed species. In combination with previous personal observations, new localities have been described for over 80 different species, including one lithophytic/epiphytic species (*Ondicium lindleyii*) whose locality within the country had not been previously identified, and a possibly new terrestrial species within the genus *Govenia*. Data collected demonstrate that the areas with highest undocumented orchid-species diversity are the mountains bordering Lake Atitlán in Sololá, the Lake Yolnabaj area in northern Huehuetenango, the municipality of San Miguel Pochuta in western Chimaltenango, and the municipality of Villa Canales in southern Guatemala, each with at least 10 species new to each area.

Jason Zopf, '05
Stephanie Richards, Biology
The Nuclear Localization Sequence of RSK1 through the Use of Green Fluorescent Protein
The protein RSK is found in a signal pathway of mammalian cells that is responsible for starting the process of cellular division. Mutations that activate this pathway have been shown in high prevalence among cancerous tumors. This work aims to identify how the signal passes from the cytoplasm of the cell to the nucleus, where its deleterious effects are evident. In order to identify the mechanism of signal transfer, we aimed to discover the nuclear localization sequence (NLS) of RSK through the utilization of green fluorescent protein. Currently, efforts are still focused on the identification of the NLS, with future goals of expression, the fusion protein in mammalian cells.

Jamil Zraikat, '05
Matthew Nelson, Political Science
Islamic Banking in Malaysia: From Piety to Profit
The 1982 Islamic Banking Act in Malaysia created a dual banking system, allowing Islamic and conventional banks to operate simultaneously. I will be presenting my senior thesis for political science, in which I examine the theoretical background of Islamic banking practices and Islamic financial instruments and how the concepts of Islamic banking were implemented in Malaysia. I touch on the history of ethnic tensions in the early days of the Malaysian federation and the subsequent deliberate affirmative action policies on the part of the Malaysian government to raise the welfare of the then economically disadvantaged Malay majority. I seek to demonstrate that Islamic banking in Malaysia has served a largely political purpose as opposed to an economic one that, beyond the no-interest rule, promotes welfare and access to capital.

Olivia Zurek, '05
John Kelsey, Neuroscience
An Animal Model of a Neurobiological Link between Schizophrenia and Drug Addiction
Schizophrenic individuals are much more likely to abuse drugs than healthy people or those suffering from other mental illnesses. Although some investigators have suggested that the drug abuse may represent attempts to self-medicate, more recent research suggests that the neurobiology underlying schizophrenia and drug addiction are similar, such that schizophrenia directly increases the likelihood of drug addiction. This study examines whether 6-hydroxydopamine (6-OHDA) lesions of the medial prefrontal cortex (mPFC), which have been shown to enhance aspects of addiction, will enhance schizophrenic-like behavior in rats. Everyday, rats were injected with PCP, clozapine, or a combination of PCP followed by clozapine and individually placed in a hole-board apparatus (HBA), a square open field with evenly spaced holes on its floor, where activity was recorded for five minutes. We expect to see increased locomotion and decreased exploratory behavior, both indicative of schizophrenic symptoms, in the lesioned rats.