

The Sixth Annual



FRIDAY, 30 MARCH 2007

PETTENGILL HALL

CHASE HALL GALLERY ~ OLIN ARTS CENTER ~ SCHAEFFER THEATRE
BATES COLLEGE

The Mount David Summit

The Mount David Summit is an annual celebration of student research, service-learning, and creative work at Bates College. Each year students from all classes present their work to each other and to faculty, staff, family, and community members in a symposium format at the end of the winter semester.

The Summit spotlights the rich and varied academic activities of Bates students across the disciplines, and honors the vibrant intellectual life of the College.

Named for the landmark "mountain" on the campus, the Summit is guided by the motto of the College

—Amore ac Studio—

*loosely translated, With Love and Zeal, With Ardor and Devotion—
devotion to scholarship, creativity,
and the life of the mind.*

The Summit is sponsored by the Office of the Dean of the Faculty with generous funding from a grant from the Howard Hughes Medical Institute, support from the Mellon Learning Associates Program, and a gift from Ralph T. Perry '51 and Mary Louise Seldenfleur.

ABSTRACTS (alphabetical order)

Kenneth Adams '07

Karen Palin, Biology

The ANCA Enigma: A Study of the Etiology of Wegener's Granulomatosis

The rare but potentially fatal vasculitide Wegener's granulomatosis (WG), characterized by necrotizing granulomatous inflammation of the upper and/or lower respiratory tract, necrotizing crescentic glomerulonephritis, and a necrotizing systemic vasculitis, has perplexed the medical world due to the confounding mechanisms underlying its pathology. Since its identification in 1931 and clinicopathological classification by Frederick Wegener in 1936, researchers have made significant advancements in understanding its etiology. Although recent research has been hampered due to inadequate animal models, current theory suggests that a specific genetic predisposition coincident with exposure to an environmental toxin or pathogen may be the most plausible explanation for the pathogenesis of WG. Using a thorough analysis of medical literature this thesis aims to establish a more complete understanding of the pathology of WG while simultaneously investigating current hypotheses on etiology.

Oleg Alekseev '07

T. Glen Lawson, Biological Chemistry

Nuclear Autoantigenic Sperm Protein Affects the Expression of Estrogen-Responsive Genes

Nuclear autoantigenic sperm protein (NASP) is an H1 linker histone chaperone regulated by the cell cycle. Prior experiments suggest that NASP may also be involved in gene regulatory functions and DNA repair events. In this study, the function of NASP as a regulator of estrogen-responsive genes was examined. Overexpression of NASP in human adenocarcinoma cells in vitro resulted in decreased protein expression levels of two estrogen-responsive genes—Estrogen Receptor α (ER α) and Cyr61—and led to a decrease in the ERE activity of an extranuclear reporter system. I propose that the elevated levels of NASP contribute to the formation of transcriptionally inactive heterochromatin by supplying the nucleus with excess H1 histones. The resulting inaccessibility of the EREs prevents transcription initiation and thus reduces the expression of estrogen-responsive genes. In addition, by reducing the expression levels of ER α , NASP effectively induces a negative secondary effect on other estrogen-responsive genes.

Kimberley Alexander '07

Susan Langdon, Psychology

Parental Influence on Children in Sports

This study examined parental influence on children in sports. Participants were parents and their children from a youth ice hockey team in Maine. There were six variables examined from the parents and children: 1) knowledge of the sport, 2) motivation in the sport, 3) perception of competitiveness, 4) perception of own and others' enjoyment of the sport, 5) post-event perception of competence, 6) and post-event stress levels. All variables were assessed using self-report surveys. Additionally stress levels were tested using a physiological method: testing for cortisol in participants' saliva. Competence and stress were examined multiple times at varying levels of competition. It is hypothesized that parents with more knowledge of the sport, compared to those with less, will have a higher motivation level in the sport for their child, be more competitive, have a more positive view of the sport for their child, and have a higher stress level at all events. Children who have parents with more competitive perceptions of the sport will receive greater stress and less enjoyment from their sport than those with parents who have less competitive orientation.

Meredith Anderson '07

Nancy Koven, Neuroscience

The Involvement of the Anterior Cingulate Cortex in the Cognitive Dysfunction of MS Patients: An sMRI Study

Multiple Sclerosis (MS) is an inflammatory demyelinating disease of the central nervous system. Up to 65% of the MS population suffer cognitive deficits, a major determinant of quality of life. Such deficits

include but are not limited to impaired attention, concentration, and abstract reasoning, and deficits in memory retrieval. Cognitive dysfunction may be caused by atrophy to areas of the brain involved in executive control. Carter et al. (2000) hypothesized that the anterior cingulate cortex (ACC) is part of a circuit involved in executive processes and cognitive function and is considered to have reciprocal interconnections with the lateral prefrontal cortex, which modulates attention and executive functions. Although the ACC is implicated in cognitive function, very little research has been conducted on its effects in MS patients. Structural MRI will be used to examine volumetry, and neuropsychological assessment will be used to index associated cognitive deficit. I will examine structural abnormalities in four functionally relevant ACC subregions: dorsal, rostral, subcallosal and subgenual. I hypothesize that MS patients will show decreased volume in all subregions, but a decreased volume of the dorsal subregion will correlate best with cognitive impairment due to its implications in the control of cognitive functioning (Bush et al., 2000).

Stephanie Beauvais '07

Georgia Nigro, Psychology

An Analysis of Students' Motivation and Decision-Making Processes in Choosing to Apply to and Attend Bates College

In collaboration with the Bates College Office of Institutional Planning and Analysis (OIPA), I interviewed a random sample of students from Bates College in order to determine motivating factors and decision-making processes for the college selection and application process. Participants were asked questions pertaining to the college search process in general, and in regard to Bates College specifically, as well as questions about expectations of and experiences at Bates College. Of interest to OIPA are findings about what distinguishes Bates from other colleges and universities, what students would change about Bates, how students would describe Bates, and what criteria students used in choosing colleges. These findings are organized into major themes, which I discuss in terms of the literature on college decision-making and the implications for college admissions.

Ainur Begim '07

Rebecca Fraser-Thill, Psychology

The Roles of Gender and Temperament in Novelty and Familiarity Preferences for Infant-Directed Singing

This senior psychology thesis explored infant novelty and familiarity preferences for singing directed at infants. The participants were 20 mothers and their healthy 6- to 9-months-old infants who were recruited from the Bates and Lewiston-Auburn communities. There were six conditions: mother sings novel song, mother sings familiar song, "stranger" sings novel song, "stranger" sings familiar song, infant listens to novel recorded song, and infant listens to familiar recorded song. The goal of the experiment was to see whether infants' preference for novel stimuli or familiar stimuli matches the findings of de L'Etoile (2006), and also to further investigate sex differences in preference patterns found by de L'Etoile.

John Bement '09

Sylvia Federico, English

The Finnsburh Episode in Beowulf and in History

The Finnsburh Episode, only touched upon in the epic *Beowulf*, is believed to have been based upon an actual historic confrontation. An original epic was written to commemorate the event, but only two separate pieces of the original remain. From these two fragments, and from whatever historical or archaeological sources can be found, I will try to piece together an accurate description of the battle, where it took place, who led it, and why it happened. In addition, I will examine the episode as a piece of literature within *Beowulf*, and attempt to decipher any meaning or messages within the larger context of the epic.

Dana Bennett '10, Cora Chisholm '10, Nicolas DeFrancis '10, Hannah Inman '10, and Benjamin Smeltzer '10

Matthew Côté, Chemistry

A Nanotechnology Project: Programming an STM

This is the fourth poster in a four-part series generated by students in a first-year seminar on nanotechnology. This poster depicting how we created and programmed the software which ran a Scanning Tunneling Microscope (STM). Using LabVIEW, we created a program to control the scanning motion of the STM, as well as gather data from the STM to represent them as a three-dimensional surface.

Katheryn Black '07

Melinda Harder, Mathematics

Effects of Educational Barriers on Young Adults in Maine

Why do so many Maine students choose to end their education with high school diplomas? The Mitchell Institute in Portland, ME, has been studying the issues affecting the aspirations of students throughout the state. My math thesis involves analyzing data used in the Institute's 2001 report, *Barriers to Postsecondary Education in Maine*. Focusing on information collected through phone surveys of 18- to 25-year-old Maine residents who graduated from high schools in Maine, I look at a large set of variables and, using cross-tabulation, chi-square tests of independence, multinomial logistic regression models, and other statistical methods, investigate their relationship to the highest level of education a student attains. I also explain some of the limitations of the *Barriers* study, including potential sources of bias.

John Bladon '10, Steven Fukuda '10, Joshua Linscott '10, Guang Liu '10, and Nelish Pradhan '10

Matthew Côté, Chemistry

A Nanotechnology Project: Building an Scanning Tunneling Microscope-Mechanical Aspects

This poster is one of a series that grew out of a first-year seminar on nanotechnology, in which first-year students constructed a scanning tunneling microscope (STM) for viewing nanostructures. This group addressed mechanical aspects of the STM. The mechanical component of the STM holds the tip and sample in close proximity so that electrons can tunnel. In order to accomplish this task the tip and sample must be able to move in a range of motion of several millimeters while remaining stable on the nanometer scale. The STM must be rigid enough to be immune to environmental factors such as vibrations and temperature changes while restricting unnecessary movement and absorbing the unwanted vibrations and resonances before they effect the scan.

Aaron Bobik '09, Meagan Doyle '09, Jennifer Foster '09, Rachel Goodermote '09, Jennifer Rasmussen '07, Winthrop Rodgers '09, Rebecca Wason '09, Charlotte Weidlein '09, and Simon Willbanks '09

Michael Jones, History

Shetland Islands Archaeology

This poster chronicles the work of students in INDS s24, *Shetland Islands: Archaeological Field Course*. The Short Term unit included a three-day stay in Edinburgh to place the archaeological site under study in the context of Scottish history. This work was followed by a three-week archaeological dig at a late mediaeval/early modern farmstead known as Brow, on the Mainland of the Shetland Islands, an archipelago north of Scotland. The Brow site is a revealing laboratory in which to explore the interaction of climate change and human settlement in a fragile coastal zone. Especially in the context of global warming, it is important to understand how people reacted to climate change in the past; this is the focus of the dig. In addition to chronicling the excavation, we will also describe on a series of field trips around Shetland to places of interest such as the island of Unst, Mousa Broch, and the Croft House Museum. By presenting on our experience, we hope to educate the community about this unique Bates program, and encourage other students to become involved in the Brow project in the future.

Elizabeth Brady '07

Rachel Austin, Chemistry

Tools for Studying the Mechanism of Selective Alkane Oxidation

There is a growing industrial demand to obtain more knowledge on and be able to perform selective alkane oxidation. Selective alkane oxidation refers to the process of an oxygen atom being incorporated into a carbon hydrogen bond. Developing a method to perform this oxidation would allow us to do things such as make more environmentally friendly energy sources. Given that oxygen is chemically inert and alkanes are non-polar and have high bond strengths, it would seem as though this would be a difficult reaction to carry out. Yet, 4-6 biological catalysts in nature have been found to perform this task. By studying the tools necessary to analyze this mechanism, including synthesizing various substrates and analyzing possible pathways to the products, we might one day be able to utilize the mechanism ourselves.

Aleksandra Brakalova '07

John Kelsey, Neuroscience

Reconsolidation of Drug Memories: A Means of Reducing Relapse?

Drug-related memories are known to help induce relapse. Recent evidence suggests that the active retrieval of some memories makes them labile to impairment by disruption of a process referred to as reconsolidation. If retrieved drug memories must also undergo this labile process of reconsolidation, a potential therapeutic option for addicts would be to use amnesic agents to disrupt reconsolidation. Only a few recent experiments have attempted to disrupt drug-related memories after reactivation, and most of them use the conditioned place preference (CPP) paradigm to do so. In my initial experiments, I used an antagonist of the glutamate NMDA receptor (MK-801) to disrupt reconsolidation of the CPP created by morphine, as MK-801 had been shown to disrupt the reconsolidation of fear-related memories. Unfortunately, I found no disruption of the drug-related memory, i.e., the animals given MK-801 following retrieval of a morphine-induced CPP subsequently continued to prefer the morphine-paired chamber as much as animals given saline following initial retrieval. In a second experiment, I tried to replicate the published findings that a protein synthesis inhibitor, cycloheximide, would disrupt reconsolidation of the CPP produced by cocaine. I was also unable to replicate this study. Contrary to the findings of previous experiments, my results suggest that drug memories are not easily susceptible to impairment after retrieval and that, therefore, they may not undergo robust reconsolidation. However, further research is necessary to enable us to corroborate or negate this exciting possibility.

George Brandley '07

Robert Farnsworth, English

The Poems of George Brandley

I will present a reading of a selection of my poems, which form part of my senior thesis.

Monique Brown '07

Pamela Baker, Biology

HIV/AIDS in South Africa and the Public Health Efforts

The aim of this research was to investigate HIV/AIDS in South Africa, the public health efforts by the government and nongovernmental organizations (NGOs) and to propose solutions. Articles on health statistics and governmental and nongovernmental policies were analyzed. The government and the NGOs have faced numerous challenges to their public health efforts, which include lack of financial resources and support and culturally-based factors such as prejudice against homosexuals. There has been a stabilization of the numbers of HIV infections, although at a high level. My analysis suggests that combined efforts from the government and NGOs are needed to fight the epidemic in South Africa. Together they should adopt new roles to achieve sustainable gains in economic development and improvements in programs that are geared towards reducing the HIV statistics. Implementation of programs that are geared towards the homosexual community and dissemination of information about proper treatment are needed.

Monique Brown '07

Lavina Shankar, English

A Quest for Identity through Relationships, Body and Skin Color in Meena Alexander's Poetry Collection, Illiterate Heart

Ethnicity, geography, and language are three thematic axes of identity that commonly appear in Asian American and South Asian American literature. Scholars including Lavina Shankar, Rajini Srikanth, and Samir Dayal explore the intricate connections found between these themes. These themes are significant vehicles to demonstrate one's identity, but scholars and literary critics have yet to focus their attention on other important topics in the poetry of Meena Alexander, which have contributed immensely to her search for identity. I argue that in the poetry collection, *Illiterate Heart*, the author Meena Alexander uses relationships, body, and skin color as important representative elements in the quest of self.

Mary Bucci '07

John Baughman, Politics

Public Opinion of Women in the 2000 and 2004 Presidential Elections

Research on the public opinion of women has studied them only in comparison with men. This project moves beyond the gender gap, and examines the public opinion of diverse groups of women. Specifically, I look at variation in opinion among women based on age, marital status, race, and workforce participation. I hypothesize that the dimensions that distinguish the opinions of men and women in the gender gap literature are reflected in the differences among women as well. Upon closer examination of the dominant issues and strategies of the 2000 and 2004 campaigns, it is apparent that women were viewed as politically important. However, not all women were targeted equally, with preferences given to middle-class women with children. Media coverage and survey data from the National Annenberg Election Survey offer insight into what issues groups of women thought was the most important and how campaigns responded.

Caroline Bullock '07

Lee Abrahamsen, Biology

An Examination of Effective Assessments to Adequately Measure Student Understanding in High School Biology

True understanding of a lesson or unit in high school biology should be measured in a way that will test not only the information learned, but the concepts and applications that correspond with that information. This thesis examines different methods of assessing students in a high school biology classroom in order to reflect their understanding of a unit and not just their knowledge or recall level of a science topic. Each student's understanding of a unit in photosynthesis/respiration was assessed using the coupling of formative and summative methods, along with both objective and subjective questioning on those assessments. Approximately 50 students in tenth-grade biology classes at a nearby high school in Maine were assessed. Results aim to show that the coupling of formative and summative assessments along with a more subjective type of questioning will most fully determine a student's understanding of a unit in high school biology.

Laura Burns '08

Robert Farnsworth, English

Poetry Reading

A presentation of my poetic works from beginning and advanced poetry classes, and beyond.

Rashel Burton '07

Jennifer Koviach, Chemistry

Utilization of n-Pentenyl Glycosides in the Synthesis of Disaccharides

This laboratory has previously shown conjugate addition to hex-1-en-3-uloses as a functional way to synthesize n-pentenyl glycosides. This project investigates n-pentenyl glycosides as glycosyl donors with other sugar substrates. This method may be used to produce anti-cancer drugs.

Allison Caine '07

Jonathan Skinner, Environmental Studies

The International Vicuna Festival

With funding provided by the Barlow Thesis Research Grant, I traveled to southern Peru to participate in the International Vicuna Festival. Every year in June thousands of people gather in this remote Andean village in southern Peru to participate in the *chaku*, a ceremony based on an Incan communal hunt. Forming a human chain, they round up thousands of vicuna, a small undomesticated cousin to the llama. The animal is sheared and then set free; its expensive wool sent to luxury retailers in Europe. This ceremony, and the three-day festival that precedes it, was created during the 1990s in response to the re-entry of the previously endangered animal's wool into the world market. As late as 2002, the creators of the festival began to incorporate distinct and strategic cultural elements. For my thesis, I am viewing these events as "invented traditions" and placing them within the context of late 20th-century Peruvian nationalism and "neo-Incaism."

Matthew Capone '07

Kathryn Graff Low, Psychology

Fan Behavior at Collegiate Sporting Events

This study examined the common behaviors at small college sporting events. The study consisted of a matched paired design in which 30 students are surveyed during a men's basketball game then retested in a lab setting in the days following the game. Students responded to their level of identification with their college's sports teams, as well as to the behaviors they normally engage in while attending their college's games. Participants were also asked to rate how acceptable they found certain behaviors to be. It is hypothesized that students while attending a contest will find aggressive behaviors more acceptable than the same students while responding in a quiet lab setting. Moderating effects of alcohol for the results will also be discussed.

Annie Carlton '10, Alexander Gentilli '10, Andrew Laflam '10, Russell Milholland '10, and Caspar Yi '10

Matthew Côté, Chemistry

A Nanotechnology Project: Building an Scanning Tunneling Microscope (STM)-Electrical Aspects of the STM

This is the third poster in a four-poster series that outlines the work completed in our first-year seminar on nanotechnology. Electronic circuits play an important role in the STM. These circuits provide the necessary bridge between the STM head and the computer. Accordingly, there are two natural parts of electronics components: the tip height signal, which is generated by the electronics and sent to the computer to generate an image, the X-Y scan signal which is generated by the computer and sent to the electronics. While signals travel through both circuits constantly, we will explain the circuits starting with the tunneling current that is received by the computer as this is the starting point of the microscope.

Annie Carlton '10, Hannah Inman '10, and Guang Liu '10

Matthew Côté, Chemistry

A Nanotechnology Project: What is an STM?

This poster is the first poster in a series of four completed by our first-year seminar in nanotechnology. The seminar built a scanning tunneling microscope (STM) throughout the semester. This poster provides an overview of our project, as well as a basic guide to an STM. A STM uses an atomically sharp tip to scan conductive surfaces. The tip is connected to a piezoelectric scanner which moves the tip in three dimensions: X, Y, and Z. The tip is positioned within nanometers of the sample so that tunneling can occur. The STM works to maintain a constant tunneling current. If there is too much tunneling current the tip moves away from the sample, and if there is too little the tip moves toward it. Electronic components process the tunneling current characteristics and convert each current to identify a tip height. Software records the heights and creates meaningful images to graphically represent experimental data.

Melissa Chen '07

John Kelsey, Neuroscience

Effects of a Dopamine D1 Antagonist and Caffeine on L-DOPA- Induced Dyskinesia in a 6-OHDA Rat Model of Parkinson's Disease

Research suggests that activation of D1 receptors may be responsible for L-DOPA-induced dyskinesia (LID) in patients with Parkinson's disease. Current findings also suggest that A2a receptor antagonism might potentiate the therapeutic effects of L-DOPA without enhancing the dyskinesias. To test these hypotheses, a unilateral 6-OHDA lesion rat model was used to assess the effects of 0.1 mg/kg SCH-23390 (D1 receptor antagonist) and 15 mg/kg caffeine (an adenosine A1 and A2a receptor antagonist). A high dose of L-DOPA (35 mg/kg) was used to produce LID in these animals as measured by the abnormal involuntary movement (AIM) scale. As expected, SCH-23390 reduced the total AIM scores. However, SCH-23390 also reduced the therapeutic effect of L-DOPA as measured in a forepaw stepping paradigm. While having no therapeutic effects by itself, the addition of caffeine to the combination of SCH-23390 and L-DOPA partially reversed the impairment in stepping produced by the D1 antagonist without reversing the beneficial reduction of dyskinesias produced by the D1 antagonist. These results suggest that the combination of caffeine and a D1 antagonist may be particularly beneficial in the treatment of Parkinson's disease. Subsequent work will explore the role of the adenosine A1 and A2a receptors in this effect of caffeine.

Amanda Chisholm '08, Gregory Henkes '08, Dashiell Hibbard '07, Taimur Khan '07, William Locke '08, Pritesh Patel '07, Alexander Smith '07, Kristina Stafstrom '09, and Benjamin Umiker '07

Robert Thomas, Biology

Plant Physiology Class Projects

We are presenting an overview of group and individual independent laboratory projects undertaken in Winter 2007 Biology 380, *Plant Physiology*. Examples of projects currently in progress include mineral deficiency symptoms, tension in xylem, and effect of light on growth. Work on plant hormones and phytochrome mediation of plant development may also be addressed.

Niraj Chokshi '07

Todd Kahan, Psychology

Proactive Interference Effects on Sentence Production

This study seeks to identify whether proactive interference exists in sentence production, that is, whether thinking of information related to a sentence that is about to be produced delays the production of that sentence. Bates College students are asked to commit three nouns to memory. They will then be presented with a photo depicting an action and a concurrently displayed verb. Each participant will be exposed to both of two conditions: a three-noun memory load related to the subsequent verb e.g., (nouns sink, truck, table, and the verb fix; an action that can be performed on all three nouns) or not related, e.g., (nouns sink, truck, table and the verb eat; an action that cannot be performed on the three nouns). They will be asked to recall the three nouns after each produced sentence. Sentence production time, length, average word frequency, dysfluencies, and optional "that's" employed, and syntactic complexity will be compared between the conditions. Should proactive interference be found it would indicate that the working memory structures that have been found to underlie sentence comprehension also underlie sentence production.

Laura Clarkson '07

Shepley Ross, Mathematics

Wallpaper Groups: Art and Abstract Algebra

In mathematics, the 17 two-dimensional crystallographic groups are called "wallpaper patterns." Each of these groups is produced by repeating a generating unit infinitely in two linearly independent directions. The 17 groups vary by the different combinations of translation vectors, rotations, reflections, and glide reflections which may be seen in each type of infinite pattern. My poster will present examples of the groups from M.C. Escher's work and explain how they are classified. I will also follow the majority of a proof by R.L.E. Schwarzenberger in which group theory is used to prove why there are exactly 17 distinct

wallpaper groups. I will construct a symmetry group, G, which "breaks down" into the group of translations, T, and the group of rotations and/or reflections, H. We will examine the properties of these groups, resulting in three classification theorems that give us 17 distinct groups.

Emily Cohen-Shikora '07

Todd Kahan, Psychology

Blocking, Slowing, and Inhibition: An Exploration of the Mechanisms Underlying Object Recognition in a Scene

Abstract past research has shown the processing of objects to be automatic (e.g., Tipper, 1985; Smith & Magee, 1980) in certain situations. Mathis (2002) conducted an experiment in which she presented objects within either a probable, improbable, or neutral scene context and had participants categorize an unrelated word from inside the object. She found that the objects interfered with word categorization when the object and context were probable (e.g., a dresser in a bedroom scene), but did not interfere with reaction times when the object and context were improbable (e.g., a dresser in a forest) both relative to a neutral baseline condition. Mathis presents three possible hypotheses (blocking, slowing, and inhibition) to account for interference in the probable condition and a lack of interference in the improbable condition. The current study seeks to test these hypotheses by replicating Mathis's procedure and adding a probe trial in which participants must categorize the previously ignored object. Results from this study could help researchers better understand the processes involved in object recognition.

Melissa Coito '07

Nancy Koven, Neuroscience

Schizophrenia and the Biological Vulnerability to Abuse Substances: Investigating Four Subregions of the Anterior Cingulate Gyrus

Over the course of their lifetime, 58.5% of patients with schizophrenia will experience a co-occurring substance use disorder (Regier et al., 1990). This recurrent comorbidity has led some theorists to believe that patients with schizophrenia have a biologic vulnerability to substance abuse. There is one brain region that stands out as being both central in prominent theories of addiction and consistently noted as dysfunctional in schizophrenics, the anterior cingulate gyrus. The anterior cingulate gyrus seems to mediate inhibitory decision-making processes, specifically response selection and response inhibition, and particularly when involving reward related behaviors (Elliot et al., 2002; Fan et al., 2003). In this study, I am working with fMRI data obtained from patients with schizophrenia displaying comorbid cannabis abuse problems, as well as control participants — 10 patients with DSM-IV diagnoses of schizophrenia spectrum disorder and 10 healthy controls. I am tracing the cingulate gyrus into four subregions: the dorsal, rostral, subcallosal, and subgenual regions, so as to detect volumetric differences. In order to implicate a region(s) in the potential biological vulnerability to abuse substances, these volumetric findings are then compared to the results of subjects' response inhibition tests, such as the Stroop-DKEFS, which are known to activate the anterior cingulate gyrus in healthy patients.

Alexandra Cole '07

Bryan Brito, Rhetoric

The Rhetoric of Supreme Court Decisions: A Study in Positive Apologia

For over two hundred years the Supreme Court has asserted rights well beyond the text of the Constitution beginning with the right to judicial review in *Marbury v. Madison* (1803). This thesis examines the rhetoric of Supreme Court decisions in the 20th century. The rhetorical strategies employed in the decisions serve as a kind of justificatory rhetoric for the expansion of the Court's power. This formula falls into the genre of positive apologia, originating in Ancient Greece, which is all but lost today in contemporary scholarly work.

Theresa Conk '07

Karen Palin, Biology

The HPV Vaccine for Women: What Do Bates College Men Think?

The CDC recently approved a vaccine to protect against infection by Human Papillomavirus (HPV) and possible cervical cancer in females. While there are ongoing educational and marketing campaigns, little is known about existing knowledge and opinions about the vaccine among college-age men. An online survey, distributed to heterosexual male students at Bates College, assessed males' knowledge of HPV and of the vaccine, as well as their perceptions on its use in both females and males. The data were compiled and are presented for future use.

Lillian Conover '07

Jennifer Koviach, Chemistry

Investigation of Martin's Sulfurane as an Oxidizing Agent

Oxidation and elimination reactions have a wide range of uses in organic synthesis. Martin's sulfurane, a commonly used dehydrating agent for alcohols, has been shown to give the elimination product in high yields for hydroxyl groups in a variety of chemical environments, with oxidation of alcohols previously unreported (Martin, 1772, Usami et al., 2004, Meyers et al., 2002). In one of the final steps of the synthesis of a spiroketal enol ether, Martin's sulfurane was used to perform an elimination of a propargylic alcohol. Instead of expected alkene formation, oxidation to the ketone was observed. This work is an investigation into the oxidizing capabilities of Martin's sulfurane by synthesizing alcohols with unique and distinguishable structural features that may be predicted to favor oxidation or elimination products, reacting these alcohols with Martin's sulfurane, and analyzing the products to support our proposed mechanism comparable to that of Swern oxidation by which oxidation from Martin's sulfurane occurs.

Katy Corrado '07

Georgia Nigro, Psychology

Social Story Intervention and Asperger Syndrome: Improving Social Skills within the School Environment

This service-learning thesis involved one-on-one work with a 6th-grade student with Asperger syndrome (AS) within an elementary school setting. Children with Asperger syndrome, an autism spectrum disorder, typically have average to above average I.Q.s but possess an array of social impairments including difficulties reading the social and emotional cues of others. Children with AS also possess marked repetitive and stereotyped behaviors. To reduce these behaviors in the child, a social story intervention was utilized with the student over a one-month period. The stories provide the child with a clear method of understanding the social cues and appropriate behaviors of specific social situations. I discuss the results in terms of previous case studies that utilize social story strategies to teach children social empathy and reciprocity as well as behavioral flexibility. I address the impacts of AS on the middle school transition and the application of social stories in educational settings.

Anita Deshpande '07

Kathryn Graff Low, Psychology

How Children with Emotional and Behavioral Disorders Cope with Having Alcoholic Parents

This study was designed to work with children attending the Renaissance School, a department of St. Mary's Regional Medical Center's Behavioral Medicine Division, and is a licensed, special purpose school designed to meet the educational and behavioral needs of children with the educational diagnosis of Emotional Disability (ED). This center for behavioral and emotional health has provided itself as a valuable resource for exploring the different aspects of clinical psychology that have perhaps only been covered in a theoretical sense thus far in the classes offered at Bates. The focus of this study is to develop and run a therapy group that would be functioning as a support for those children that attend the school and have an alcoholic parent or parents. Different exercises will be created that will help the children from these homes begin to talk about their experiences and perhaps help them to seek comfort in sharing and hearing other children talk about their situations.

Sulochana Dissanayake '09

Sargaree Sengupta, Asian Studies

Friends of Prisoners' Children of Sri Lanka

The Friends of Prisoners' Children (FPC) of Sri Lanka is a nongovernmental, private charity that provides educational grants to children of prisoners in Sri Lanka, to finance their schooling up to age 18. I am a double major in economics and theater, and my economics thesis will be an independent study of the effectiveness of these grants on the education of each individual recipient, measured by the additional days of school attended by the recipient in comparison to a nonrecipient. The poster will be an awareness poster of the plight of prisoners' families in Sri Lanka and will provide information on the causes of imprisonment, the effect of imprisonment on families, the functions of the FPC, and how individuals can support their cause.

Kathryn Doherty '07

Kathryn Graff Low, Psychology

The Effects of a Web-Based Intervention on College Students' Knowledge of Human Papillomavirus and Attitudes towards Vaccination

Research suggests that college-age individuals lack pertinent knowledge about human papillomavirus (HPV). Studies have demonstrated that educational interventions have increased knowledge of HPV in this age group, but there are no extant studies exploring the effects of an intervention on attitudes towards being vaccinated. The current study attempts to determine whether a brief Web-based educational intervention can alter college students' knowledge of HPV and attitudes towards being vaccinated. There were approximately 100 participants in the study. One half of the participants were randomized to a complete a baseline survey, to view a Web-based, self-administered intervention and finally to complete a follow-up survey, while the other half of the participants served as the control group and completed the two surveys without participating in the intervention. Preliminary findings indicate improvement in levels of knowledge of HPV and possible attitude changes towards vaccination, as a result of the intervention. Results also indicate possible gender differences in the effects of the intervention on levels of knowledge.

Akiko Doi '07

T. Glen Lawson, Biological Chemistry

Mechanism of Encephalomyocarditis Virus Protein Concentration Regulation

Protein concentrations within a cell play a crucial role in cell function. We have studied the regulation of encephalomyocarditis virus (EMCV) 3C protease and 3D RNA polymerase concentrations which are proteins crucial for viral polyprotein processing and RNA replication. The EMCV 3C protease is targeted for degradation by the ubiquitin/26S proteasome system. Previous studies have indicated that an EMCV 3C protease with no lysine residues can be ubiquitinated at its N-terminus in the presence of ubiquitin hydrolase inhibitors. This N-terminal ubiquitination event and its effects on the 3C protease stability were analyzed in detail. In vivo studies were also performed with mouse fibroblast cell line stably transfected with the genome encoding for the EMCV no lysine-3C protease. The results show that N-terminally conjugated ubiquitin is preferentially removed from the 3C protease by the ubiquitin hydrolase activity, and that a mapped destruction signal is not needed for the N-terminal conjugation event to occur. The down-regulation of the EMCV 3D RNA polymerase synthesis was studied and preliminary results suggest that transcription can be attenuated at the 3C/3D junction region. These findings provide a foundation for additional experiments to prove or disprove the existence of a higher-order structure which regulates EMCV RNA synthesis.

Jessa Doleac '07

William Ambrose, Biology

Long-term Changes in Glycera dibranchiata Abundance at a Protected Mudflat in Wiscasset, Maine, USA, and the Effects of Commercial Baitworm Digging on Benthic Communities

My study examined long-term changes in the abundance of the commercially important worm *Glycera dibranchiata* over a thirty-year period at a mudflat in Wiscasset, Maine, which is protected from digging.

The influence of commercial digging on the local benthic infaunal community was also assessed at a frequently dug flat (Cod Cove) at the protected flat and an adjacent flat, which is infrequently dug. Eighty 0.06m² cores were taken from each flat (Cod Cove, Wiscasset dug, and Wiscasset protected) to determine the average *Glycera* density per flat and ten 0.02m² cores were taken to determine the local infauna densities. A strong positive correlation ($r^2 = 0.62$) was found between *Glycera* density and annual precipitation. This relationship is probably due to changes in river flow, and seasonal run-off. A decrease of 2% was found in *Glycera* densities over the past thirty years along with a 4% decrease in annual precipitation. The removal of *Glycera* due to digging was found to have an effect on the local infaunal community. Commercial digging was found to have adverse effects on infaunal populations with a significant reduction in total infauna between Wiscasset protected and dug areas. There was a complete absence of *Nephtys* from the recently dug flat due to digging disturbance, *Streblospio* abundances were significantly reduced and the presence of *Nereis virens* significantly increased by 338%. The intertidal mudflat is a very dynamic habitat, as can be seen in the changing *Glycera* densities due to abiotic factors and from human interference.

Jonathan Dunn '07

Todd Kahan, Psychology

Examining How Maximizers and Satisficers Make Decisions for Other People

This experiment investigates whether maximizers and satisficers act generously or selfishly when making monetary decisions for themselves and either a friend or a stranger. Each participant completed the Maximization Scale in order to determine whether they were in fact a maximizer or a satisficer. The participants then had to solve anagrams in order to unlock various options on how to divide up a sum of money between themselves and another person. Half of the participants believed that they were dividing the money between themselves and a friend that they had specified, while the other half believed that they were dividing the money between themselves and a complete stranger. The results were analyzed in order to determine the effort the participants put into unlocking the different options and how generously they acted. This study will help psychologists and economists better understand how people make decisions for others.

Keith Egan '07

Karen Palin, Biology

An Investigation of the Microbial Populations Found in Fog in Southern Maine

Research has shown that airborne microorganisms are abundant throughout the troposphere and can even be cultivated from the upper stratosphere. While it seems reasonable to assume that weather conditions would have an effect on these populations, little is known about the composition of microbial populations during differing weather events. Chemical analysis has found nutrient conditions in cloud droplets and rain water to be as good, if not better, for aquatic bacteria as conditions in many freshwater lakes, suggesting that precipitation may provide a favorable environment for airborne microbes. This study examines microbial populations collected during fog events. Both active and passive sampling methods were used during fog events to collect microbes on agar plates at three separate locations in the Lewiston-Auburn area in Maine. Bacterial populations collected on the plates were identified using standard bacteriological methods. Fungal populations were identified primarily on morphology. Preliminary data suggest an abundance of gram-negative rods.

Nathan Eichelberger '07

J. Dykstra Eusden, Geology

Block Rotation in the Clarence-Elliott Wedge as a Product of Dextral-Reverse Motion in the Oblique Compressional Marlborough Fault Zone, New Zealand

Detailed structural mapping via DEM, aerial photography, and field observations were carried out within the Clarence-Elliott wedge (CEW), defined by the Clarence and Elliott dextral-strike slip reverse faults of the Marlborough Fault Zone. Two N-NE striking cross faults link the Clarence to the Elliott fault. The CEW cross faults are the Acheron fault in the west and Dillon fault in the east, both displaying sinistral normal or sinistral reverse motion. These two cross faults define the boundaries of three clockwise-rotated

fault blocks within the CEW. Regionally, the CEW shows progressively variable degrees of uplift/thrusting and collapse/extension with low topographic relief in the west giving way to progressively higher relief in the east. Evidence for similar rotational systems can be seen throughout the Marlborough Fault Zone suggesting that they are a governing structural feature for the entire region and play a key role in its southward development.

Jeanethe Falvey '07

Áslaug Ásgeirsdóttir, Politics

The Politics of Hunger: Food Riots in Industrializing States

This thesis is a compilation of information from newspapers, historical secondary sources, and scholarly articles concerning the public and political response to food shortages in industrializing states. A comparison is drawn between the shortage induced violence which occurred in Britain and France during the 18th and 19th centuries, two of the most economically powerful states of the time, and those which occurred in India following its independence in 1947 and those of Argentina which occurred during its economic crisis in 2001. These examples were chosen deliberately to show that the food riot is not isolated to one culture or region, rather it is a form of public protest that can occur anywhere given the right conditions. Riots concerning food availability are indicative of the conflict between state markets and local needs. While food and price protests were not contained to urban areas, they seem to have occurred most frequently and violently where the affected groups were relatively close to their political authorities; and being wage earners, had no opportunity to grow food of their own. The riots were reactions to urbanization, economic trouble, class conflict, and public frustration with the political regimes. The adaptability of a regime to meet the needs of its populace ultimately determines its stability. Food scarcity violence is the political attempt by disadvantaged groups to redirect their states attention towards its social responsibilities.

Lucas Feinberg '07

William Ambrose, Biology

Effect of Baitworm Digging and Epibenthic Predation on Soft Shelled Clam *Mya arenaria* Growth and Survival

In Maine, commercial digging for bloodworms (*Glycera dibranchiata*) and soft shelled clams (*Mya arenaria*) occurs simultaneously on intertidal mud flats. My study examined the effect of baitworm digging on the growth and survival of juvenile, pre-commercial and commercial size clams. It also examined the effect of epibenthic predation and digging on pre-commercial clams through predator exclusion. Eight experimental digging experiments were established during the spring and summer of 2006 at 3 sites along the coast of Maine to determine the effect of digging on clam growth and survival. Harvesting resulted in 15-20% return of seeding clams and preliminary results suggest lower clam survival in dug treatments. Juvenile clams did not show a difference in growth between dug and undug plots as there was an extremely low return rate (~4%), which can be attributed to the experimental methods used. Preliminary results show a distinct negative effect of digging on growth as dug commercial clams displayed 15-45% less growth than undug clams. There was significantly less growth (RMG 0.31mm) in pre-commercial clams that were subject to dug conditions. My study shows that baitworm digging negatively affects clam growth and survival through the physical process of digging suggesting a need for possible changes in management to create a more sustainable clam fishery.

Kate FitzGerald '10

Bonnie Scarpelli, Music,

Italian and Spanish Voice Performance

During the Mount David Summit, I will sing several Italian and Spanish songs, including: "Dolce, sherza," by G.A. Perti, "El tra la la y el punteado," by Enrique Granados, and "Nel cor piu non mi sento" ("Why feels my heart so dormant"), by Giovanni Paisiello.

Christine Fletcher '07

William Ambrose, Biology, and Edmund Zuis, Education

Marine Science Education

An understanding of the marine environment is essential to comprehending our planet and our lives. The ocean covers almost three quarters of the Earth and provides food, jobs, and medicine. Our climate, transportation systems, and water sources are directly affected by the ocean. Therefore, an increase in marine science education in public schools is important. I designed a high school marine science curriculum focused on marine biology, oceanography, and anthropogenic effects on the marine environment. Five laboratories were created, three of which include field-work. Because schools are having increased problems offering elective courses, I created two units to supplement existing science courses. The units are Fisheries and Population Dynamics and The Inter-tidal Zone and Biodiversity. The fisheries unit was implemented in three Lewiston High School biology classes.

Katherine Forester '07

Kathryn Graff Low, Psychology

The Prevention of Substance Use/Abuse in Androscoggin County: Data Collection and Planning Stages of a Public Health Campaign with Healthy Androscoggin

Healthy Androscoggin is a coalition of community members working to improve the public health of Androscoggin County through preventive measures such as smoking cessation, obesity prevention, and substance abuse prevention. The goal of the research was to develop an evidence-based plan to prevent substance use/abuse in the community. The focus was on perceptions in the community that may act as barriers to prevention and treatment of substance abuse. Data on substance use among youth (under 18), adults (18-65), and the elderly (over 65) was collected through surveys, focus groups, and key informant interviews. My involvement in the project included data analysis and data collection and reporting results to a steering committee of community members. My work with Healthy Androscoggin will continue until the end of May, as the plan based on this data will be submitted to the Maine Office of Substance Abuse by June.

French 395H Class Performance

Alexandre Dauge-Roth, French

Documenting the Genocide of the Tutsi in Rwanda

Students from the French seminar, *Documenting the Genocide of the Tutsi in Rwanda*, present their findings about and understanding of this genocide, in which more than one million people were killed in 100 days. Thematic posters, audio, and video archives introduce the public to this genocide followed by a 45-minute performance based on the personal correspondence Bates students have had this semester with Rwandan student survivors of the 1994 genocide. The performance aims to bear witness to the traumatic history of these young survivors and highlight their resilience to live despite the struggles they face within a society seeking national reconciliation. This session is linked to the conference, *Rwanda from National Disintegration to National Reunification* (March 30-31), which opens on Friday, March 30, at 7:45 P.M. in Chase Lounge and is open to the public.

Sara Gips '07

Heather Lindkvist, Anthropology

The Commodification of Guatemalan Women's Bodies: The Production of Children for Intercountry Adoptions

Recent news reportage criticizes intercountry child adoption between Guatemala and the United States, suggesting that babies are sought out or produced for the "adoption market." This honors thesis examines the validity of such assertions by considering an ethnographic case study of the production of "adoptive children" in Guatemala and how the Guatemalan female body becomes commodified through this process. This thesis employs extensive literary research as well as direct participant observation and interviews both in Guatemala and the United States. Using a critical cultural relativistic position and a conceptual frame-

work based on feminist theories from medical anthropology and studies of reproduction, this thesis examines to what extent political, economic, social and inter- and intracountry powers influence the adoption process in Guatemala. By focusing on the production of Guatemalan children for the benefit of intercountry adoption, this thesis seeks to ascertain whether the current adoption system in Guatemala serves the children's and the biological mothers' best interests or whether these interests are subordinate to the interests of American parents who hope to adopt Guatemalan children.

Kay Gonsalves '07

Rebecca Sommer, Biochemistry

Identification of a Putative Dioxin Response Element in the Promoter Region of the Human Beta-Adrenergic Receptor Gene

The halogenated aromatic hydrocarbons are a widely studied group of chemicals that are either commercially produced or found as trace contaminants in manufacturing and cause a variety of species-specific toxic responses including wasting, chloroacne, hepatotoxicity and cardiovascular toxicity. The most potent of this group of chemicals is 2, 3, 7, 8, tetrachlorodibenzo-*p*-dioxin, commonly referred to as TCDD. TCDD acts through a signaling pathway via which a TCDD/protein complex binds to a core sequence of DNA, known as a dioxin response element (DRE), located in the promoter region of certain genes. The binding of this complex to a functional DRE alters the transcription of the respective gene, which accounts for TCDD's toxic responses. Since TCDD has been shown to cause cardiovascular toxicity, especially in chicken embryos, it is hypothesized that TCDD may affect the genes encoding the beta-adrenergic receptors (β -AR's), an integral part of a signaling pathway that regulates cardiac function. Through the use of electromobility shift assays, it was demonstrated that the TCDD protein complex binds to a putative DRE in the promoter region of the human β 2-AR gene. The effect that this interaction has upon gene transcription will be further investigated through luciferase assays.

Kristine Goulding '07

Eric Hooglund, Politics

The Gendered Politics of Participation: Women, Revivalism, and Politics of the Jamaat-i-Islami and the Naqshabandi Sufis

The role of Muslim women in Indian society is complex. In a society where strict gender roles are a part of the culture, the shifting of a woman's identity within a group becomes a matter of communal concern. The role of women within religion-political groups such as the Naqshabandi Sufis and the Jama'at-i-Islami blur the lines of a woman's collective and individual identity. The Naqshabandi and the Jama'at-i-Islami, both conservative Muslim groups, share a remarkable number of similarities in their approach to gender roles. However, their *styles* of gender politics are drastically different. Those differences are the key to female political participation in North India. I argue that the one very visible arena of engagement in public-sphere activism among Muslim women is in *anti*-Sufi agitation/organization/proselytizing among women of the Jama'at. In short, one must refine one's understanding of the ways in which scripturalist Islam "subjugates" women in the public sphere.

Ryan Griffin '07

Nancy Koven, Psychology

The Effect of Priming on Executive Functioning

Response inhibition refers to the ability to suppress behaviors when they are inappropriate. While response inhibition is significantly impaired in clinical conditions such as ADHD, bipolar disorder, and OCD, this skill varies considerably across non-pathological individuals. This project examines the role of priming stimuli in response inhibition, specifically how presentation of supraliminal and subliminal stimuli can affect unconscious memories such that behaviors and cognitions change as a result. Priming appears to be a ubiquitous phenomenon in that it is known to affect aspects of social cognition and intellectual performance, but the effect of priming on response inhibition in particular remains unclear. In this study, healthy college students were randomly assigned to one of three lexical priming conditions: primes that were hy-

pothesized to increase response inhibition (e.g., "focus"), primes hypothesized to decrease response inhibition (e.g., "error") and neutral primes (e.g., "secretary"). A neuropsychological measure of sustained attention and response inhibition was utilized to examine relative changes that may have resulted from the primes. The implications of this study could mean that cues in a person's environment affect one's ability to suppress inappropriate behaviors, which is of particular interest to those who work with individuals diagnosed with ADHD, bipolar, or OCD.

Samantha Haaland '07

Lee Abrahamsen, Biological Chemistry

Intraventricular Hemorrhage in Premature Neonates

Intraventricular hemorrhage (IVH) is the most frequent and severe type of intracranial hemorrhage in premature neonates. Although there have been advancements in neonatal care and technology, IVH continues to occur at a relatively high incidence rate. This is primarily due to the high incidence of premature births, the increasing survival rates of premature neonates, and the high incidence of IVH among this cohort. Between 1994 and 2004, the rate of premature birth in Maine has increased significantly to more than 20%. As the incidence of IVH increases with decreasing gestational age, IVH will be a continued problem for the neonatal intensive care unit. A major complication of IVH is extensive brain injury, which extends the problems of premature birth to later in life. Previous research has indicated decreased incidence of IVH with indomethacin administration; additional research is investigated.

Elizabeth Hamm '07

Kimberly Ruffin, English/Environmental Studies

The Reflection of Global Trends toward Local and Sustainable Agriculture in Maine

I have been conducting thesis research on the reflection of global trends toward local and sustainable agriculture in Maine. My research focuses on three different types of local, sustainable agriculture that are currently undertaken in the Lewiston-Auburn area. The first of these three is immigrant farming, with a specific focus on the Somali Bantu who have been working with the New American Sustainable Agriculture Project (NASAP). The second focus is on urban agriculture, looking specifically at the urban gardening program Lots to Gardens. Finally, I have looked at local farmers who own their own farms and are using sustainable methods of agriculture. My research has been conducted through interviews, participant observation, and study of background literature. The trends toward sustainable farming have become an important part of agriculture today.

Monica Hayden '07

Georgia Nigro, Psychology

ELL Literacy and Language Development: Evaluating the Potential for a Family Reading Program at the Adult Learning Center

The Adult Learning Center (ALC) in Lewiston offers English classes to a diverse population of adults, many from Somalia. The purpose of my study was to evaluate multicultural and bilingual resources for use at the ALC and to determine if the resources would be beneficial to parents and children learning English. The research question asked: What characterizes the experience of shared reading for Somali parents and their children? The methods of data collection included observations of parent and child interactions during a pilot shared-reading event and semi-structured interviews with the parents. The results showed that families enjoyed the reading event, and the level and content of many of the books were appropriate for English language learners. The event also revealed variations in family reading interactions to be considered when creating a family reading program. Additionally, I made suggestions for how families can utilize bilingual resources at the Adult Learning Center.

Gregory Henkes '08

William Ambrose, Biology

Investigating Feasibility of Acoustic Telemetry and Habitat Use of Adult Hickory Shad, *Alosa mediocris*, in the Mullica River/Great Bay Estuary, New Jersey

Hickory shad, *Alosa mediocris*, is an anadromous fish classified with its more abundant congeners as a "river herring." Little is known about the ecology of hickory shad because of low abundance and false identification. We utilized acoustic telemetry to track the movements of hickory shad within the Great Bay/Mullica River estuary. Mobile distribution tracking following an established protocol for other species in an established grid failed to relocate any tagged hickory shad; however, they were tracked by a complementary fixed hydrophone array in the estuary. Hickory shad retained gastrically implanted tags in tanks and at liberty. Captive, tagged specimens experienced mortality similar to untagged captives probably related to captivity; it is unclear whether tags may interfere with eating over long scales. Hickory shad entered a small embayment at night near or on high tides. This behavior and others may make the species cryptic to our established hydrophone sampling designs.

Gregory Henkes '08

William Ambrose, Biology

Shifts in the $\delta^{13}\text{C}$ Signal of Greenland Cockle, *Serripes groenlandicus*, Shell Organic Matter: An Indicator of Intra- and Inter-Annual Changes in Primary Production in the Arctic Ocean?

Primary production in the Arctic Ocean is primarily partitioned between ice algae and phytoplankton; these producers bloom differently on seasonal scales as Arctic Ocean ice cover decreases from winter to early summer. Ice algae and phytoplankton have different carbon isotope signatures which are passed on to the tissue of primary consumers. Little is known about the annual and seasonal variability of these food sources and their use by benthic communities. We used the circumpolar Greenland cockle, *Serripes groenlandicus*, from a fjord on the west coast of Svalbard (ca. 80° N lat.), to evaluate inter- and intra-annual variability of carbon isotope composition in shell organic matter. This isotopic information may be a proxy for primary productivity, shifting seasonal diets, or variability in ice algae versus phytoplankton reaching the seafloor. Previous work revealed consistent carbon isotope values between 1991 and 2000 followed by a 6% shift in carbon isotope values between years 2000-2001, suggesting an increased rate of primary production. This shift may also reflect a change in the amino acid composition of the shell organic matter. Seasonal evidence suggests that isotopic differences could be attributable to increased uptake of ice algae during the winter months. Our study seeks to verify this interpretation by sampling more, recently collected individuals (from the year 2006) with both inter- and intra-annual resolution.

Lauren Jacobs '07

Sylvia Federico, English

The History of Old English: An Exploration through the Poem Beowulf

The origins of Old English can be studied using the poem *Beowulf* as a starting point. *Beowulf* is arguably the most important piece of literature to be written in Old English and thus serves an essential role in any study of the language. This presentation will explore the history and geography of northern Europe during the first millennium through the context of *Beowulf* in order to help us understand how Old English was shaped by a variety of influences. An understanding of this history also sheds light on how present day English came to be.

Andrew Jagger '07

Helen Boucher, Psychology

Flow in Online Role-Playing Games

This study investigates the psychological changes one experiences as a result of playing a massively-multiplayer online role playing game (MMORPG), World of Warcraft. It is hypothesized that players can achieve a state of "flow" while playing, and that the degree to which one experiences this state can be predicted by several variables. Four predictor variables will be measured: gender, absorption, self-esteem, and

self-awareness. Male participants are expected to experience flow to a greater degree than females, and absorption scores are expected to predict greater flow across all participants. This study also examines whether self-esteem and self-awareness have any effect. Because a consequence of flow is elevated mood, affective changes are also assessed.

Maria Jenness '07

J. Dykstra Eusden, Geology

Structural Influences on an Eruptive Fissure on the Reykjanes Peninsula, SW Iceland

The Reykjanes Peninsula in Southwest Iceland is an oblique segment of the mid-Atlantic ridge system. It is oriented 060°-075°, approximately 30° oblique to the direction of absolute plate motion. The dominant tectonic structures on the peninsula are NE trending eruptive fissures and normal faults with a dominant strike 20° oblique to the rift axis. A new GIS-based map of the 2,000-year-old Sundhnukur crater row shows 22 segments, varying in length and azimuth, with a mean direction of 033°. En echelon geometry of crater row segmentation is used to evaluate the influence of pre-existing fractures during magma propagation. Variations in crater morphology are also correlated to influences of pre-existing fractures and bedrock structures. The area around the fissure is crossed by a number of N-S trending, right-handed, strike-slip faults. It is the interaction of these faults with the fissure that is used to explain variations in crater row morphology.

Rachel Judson '07

Susan Langdon, Psychology

Medical and Illicit Use of Prescription Stimulants among College Students: An Investigation of Knowledge and the Theory of Planned Behavior

Published studies have reported that illicit prescription stimulant use is increasingly prevalent on college campuses across the country. The present study is exploratory research investigating factors which contribute to both licit and illicit prescription stimulant use by undergraduates at Bates College. Factors include patterns of and motives for use, self-diagnostic tendencies, attitudes, and knowledge of stimulant pharmacologic actions and side effects. Using the theory of planned behavior as a basis for this investigation, it is predicted that there will be a significant correlation between the combined factors of attitudes, subjective norms, perceived behavioral control and consequent use. Cognizance and perception of associated risks and benefits are also anticipated to be related to use, with perceptions holding more weight than cognizance. Tendency for self-diagnosis is another factor that is of interest as it is possible that students who are using stimulants illicitly are doing so as a method of self-medication.

Nicole Kahn '10

Loring Danforth, Anthropology

Bumper Stickers to a Beat: Different Views of the Arab-Israeli Conflict in Hip Hop

Music plays a critical role in world culture. Musical often use their music to promote their political views and bring about social change. The Israeli hip hop group Hadag Nachash manipulates cultural symbols to challenge Israeli political beliefs concerning the Arab-Israeli conflict. They do so by setting a wide range of bumper stickers to music in their song and video for Shirat Hasticker. Many of the political slogans on the bumper stickers are proverbs, which present interesting views of the contemporary internal political situation in Israel. In their presentation I use an interpretive approach to the study of metaphors and proverbs to analyze Shirat Hasticker. I will also show how Hadag Nachash subverts the original meaning of the bumper stickers when recognizable groups in Israeli society recite slogans that conflict with their expected political beliefs.

Gary Kan '07, Zachary Lapin '08, and Binit Malla '08

Hong Lin, Physics

The Study of Polarization Dynamics of a Multi-Mode Vertical-Cavity Surface-Emitting Laser

Optical feedback affects the polarization dynamics of multi-mode vertical-cavity surface-emitting laser.

With appropriate alignment of optical feedback, a polarized state can be enhanced while its orthogonal polarized state is depressed. We investigate the intensity of each polarized mode in the fast time scale. During periods of optical feedback, out-of-phase dynamics are observed between the two orthogonal polarized modes. We also observe that the instability of the polarized states is sensitive to the strength of optical feedback.

Patrick Kenna '07

Rebecca Fraser-Thill, Psychology

Music in After-School Programs

A service-learning project for a Bates psychology thesis was conducted at the Lewiston Multi-Purpose Center's After-School Program. A music curriculum was implemented and behavioral results were identified. Additional developmental characteristics of students in the program were also addressed.

Linda Lam '09

Lavina Shankar, English/Asian Studies

The Power of Silence in Asian American Literature

In Western societies, silence is considered passive, weak, and a sign of subordination. To the Japanese, silence is a form of virtue, strength, confidence, and tranquility. In the novel *Obasan*, Japanese Canadian writer Joy Kogawa uses the theme of silence in an effort to portray the Japanese Canadian internment experience during WWII. Using Asian American feminist theory, this paper raises questions such as: Is the use of silence appropriate in a novel that attempts to convey to readers such a significant and painful historical event? How loud can silence be? Is Kogawa's practice of silence demeaning to the image of Asian Americans today?

Stephanie LeBourdais '07

John Kelsey, Neuroscience

The Role of Corticotropin Releasing Factor in Nicotine Withdrawal

Corticotropin-releasing factor (CRF), a neuropeptide involved in mediating behavioral, neuroendocrine, and central nervous system responses to stress, has recently been implicated in drug withdrawal. CRF levels have been shown to increase when rats are in withdrawal, and the somatic symptoms of withdrawal are attenuated with CRF receptor antagonists. Much of the research done on CRF's role in withdrawal has focused on opiate, cocaine, or alcohol withdrawal. Therefore, this thesis investigates CRF's role in mediating nicotine withdrawal in rats. Rats were addicted to nicotine over a seven-day period through the use of implanted osmotic minipumps, and withdrawal was precipitated by injections of mecamylamine. It was predicted that an injection of antalarmin, a CRF1 receptor antagonist, prior to withdrawal, would block both the somatic symptoms of withdrawal and the acquisition of a conditioned place aversion. Preliminary data support both of these predictions, indicating that blocking CRF mediates some aspects of nicotine withdrawal.

Bennet Leon '07

Michael Retelle, Geology

Recent Sedimentation Chronology of Linnévatnet, a High Arctic Proglacial Lake, Svalbard, Norway

Due to the sensitivity of high latitude regions to global climate change, it is important to understand the role and response of the arctic system in past climatic events. Lacustrine sediments can provide an ideal archive of past environmental change preserved in structural, textural, and compositional variation. Linnévatnet, a large proglacial lake on Svalbard in the Norwegian High Arctic, contains a long record of annually laminated or varved sediments. This thesis strives to develop a master chronology from the laminated sedimentation record of the last century. Sediment cores were retrieved during fieldwork conducted in 2006 from sites along two transects. Using digital images of thin sections manufactured from these cores, annual sediment couplets and intra-annual deposition laminae were identified. Laminae were visually correlated from proximal to distal coring sites in order to interpret sedimentation across the entire basin.

Christopher Leonards '07

Nancy Koven, Neuroscience

Volumetric Implications of the Orbitofrontal Cortex in Response Inhibition, Schizophrenia, Addiction, and Dual Diagnosis: A Structural MRI Study

Significant comorbidity exists between schizophrenia (SCHZ) and substance use disorder (SUD). Because imaging studies have provided evidence suggesting that the orbitofrontal cortex (OFC) is linked to SCHZ and SUD by mediating response inhibition, this study examined OFC gray matter volumetry in schizophrenic, comorbid, and healthy patients, using structural magnetic imaging (sMRI). It further tested the role of the OFC in response inhibition using three neuropsychological techniques (perseverative error in the Wisconsin Card Sorting Test; false positive errors on the Continuous Performance Test; and inhibition on the Delis-Kaplan Executive Function System Color-Word Test).

Benjamin Lepageur '07

Michael Retelle, Geology

Limnology of a Small New Hampshire Lake

Lily Pond is a small alpine lake situated at an elevation of 2,180 ft. near the top of Kancamagus Pass adjacent to NH Route 112. Generated from data collected from field monitoring and lab testing, this thesis is a comprehensive study of the current status of a mountain watershed characterized by historical, present, and future sources of anthropogenic input, primarily caused by the effects of salt runoff from NH Route 112 and local timber harvest.

Ann Lovely '07

Thomas Wenzel, Chemistry

Chiral NMR Discrimination of Secondary Amines with (18-crown-6)-2,3,11,12-Tetracarboxylic Acid

The effectiveness of optically pure (18-crown-6)-2,3,11,12-tetracarboxylic acid as a chiral solvating agent (CSA) for secondary and tertiary amines in nuclear magnetic resonance (NMR) was determined. A large amount of enantiomeric discrimination was observed in the ^1H and ^{13}C NMR spectra of a wide variety of secondary amines including the piperidines, piperazines, pyrrolidines, and alkyl aryl amines. Discrimination results from the protonation of the secondary amines by one of the carboxylic acid groups of the crown ether to produce the corresponding ammonium and carboxylate ions. The secondary ammonium ion then forms two hydrogen bonds with the crown ether oxygen atoms, as well as an ion-pair with the carboxylate anion. Preliminary studies indicated some enantiomeric discrimination in the ^1H and ^{13}C NMR spectra of tertiary amines with optically pure (18-crown-6)-2,3,11,12-tetracarboxylic acid although it was not as pronounced as that observed in the spectra of secondary amines.

Katherine Luddy '07

Rachel Austin, Chemistry

Probing Monooxygenase Mechanisms Using Diagnostic Substrates

The mechanisms of enzymes ω -Alkane Hydroxylase (AlkB) and Cytochrome P450 were characterized in vivo with diagnostic substrates norcarane, bicyclohexane, and bicyclopentane. In addition to the wild type AlkB enzyme, two clones with point mutations were used. Norcarane (bicyclo[3.1.0]heptane) which has been used in the past as a diagnostic substrate, but the current study also uses the smaller and previously unstudied bicycle[3.1.0]hexane in addition to the five carbon bicycle[2.1.0]pentane radical clock diagnostic substrates. The three substrates show clear rearrangement products and evidence for a substrate based radical, which are consistent with the oxygen rebound mechanism for P450 proposed by Groves, et al. The radical persists longest in bicyclohexane, which suggests that steric hindrance in the active site may be a factor with norcarane. AlkB does not show the same consistencies between the different radical clocks as P450, showing distinct differences in the active sites of the two enzymes.

Jordan Manly '07

Joseph Pelliccia, Biological Chemistry

BRCA-Associated Breast Cancer

Five to ten percent of breast cancer cases occur as a genetically inherited syndrome. The BRCA1 gene was discovered in the mid 1990s and has since been identified as a tumor suppressor. A large amount of research has been completed to better appreciate its mutational significance in relation to breast cancer. BRCA1 mutations are inheritable and predispose its carriers to a heightened risk of contracting the disease. Unfortunately, the detailed pathways and mutations of the BRCA1 gene remain largely unknown. My thesis was devoted to the effects of BRCA1 mutations on its mechanisms and the subsequent therapies available to genetically predisposed patients. Better understanding of this gene will ultimately expand our knowledge about breast cancer in both sporadic and inherited cases.

Jacob Mark '07

Lee Abrahamsen, Biological Chemistry

Multiplexed Oligonucleotide Ligation-PCR (MOL-PCR): A Novel Technique Applied to the Detection of Plant Pathogens

The ability to simultaneously detect multiple pathogens in an environmental sample (multiplexing) is applicable in diverse fields ranging from environmental stewardship and endangered species protection to disease diagnostics in clinical settings and detection of bioterrorism attacks. Traditional methods, such as cultures, are impractical for many of these applications because of time and labor constraints, difficulty of culturing some organisms, and the presence of viral pathogens. MOL-PCR is a method that can simultaneously detect up to one hundred different DNA sequences corresponding to different pathogens in a sample. Using MOL-PCR on synthetic plant pathogen constructs, we were able to correctly identify all species and able to differentiate between most strains and isolates with high sensitivity and specificity.

Neil Marya '07

Nancy Kleckner, Neuroscience

Characterization of Glutamate-Receptor Containing Neuronal Cells in *Helisoma trivolvis*

Central pattern generators are essential for the function of several types of behaviors (e.g., walking, breathing, swimming, digestion) in both vertebrate and invertebrate systems. This thesis focuses on characterizing the central pattern generator that controls the feeding behavior of the pond snail *Helisoma trivolvis*. Previous studies have helped characterize this particular CPG, and have identified different neurotransmitters that control and modulate neuronal cells that are integral to the function of this particular system. Some studies have specifically focused on the prevalence of the neurotransmitter glutamate and this is the focus of this thesis as well. Thus far, a specific group of neuronal cells have been identified as containing glutamate receptors using immunostaining and Lucifer Yellow techniques. Currently, electrophysiological techniques are ongoing to further characterize these cells.

Kristin Masino '07

Elke Morris, Art and Visual Culture

Working With Light: An Advanced Photographic Study

I present an exhibition of black-and-white and color prints created as part of an Independent Study in photography. Topics include night photography, digital enhancement, and the use of light to create unique images.

Atdhe Matoshi '07

Joseph Pelliccia, Biological Chemistry

The Use of Chemosensitivity and Resistance Assays for Predicting More Effective Treatment Protocols for Cancer Patients

Cancer chemotherapy has progressed significantly since the introduction of the nitrogen mustards in the 1940s. Unfortunately, individual patients with the same type of cancer do not necessarily respond identi-

cally to a given drug or a combination of drugs (Blumenthal, 2005), and no single regimen has ever been proved to be effective in 100% of patients with a given tumor type (Bellamy, 1992). As a result, chemotherapeutic drug resistance and sensitivity remains a major obstacle to the effective treatment and cure of almost all cancer patients (Autexier & Ward, 2005, Rosenblum et al., 1987). In an attempt to better understand drug sensitivity and resistance, researchers have developed in vitro assays (Kimmel et al., 1987, Schrag et al., 2004) that might be capable of predicting the clinical response and possibly of demonstrating specific choices of chemotherapy for individual patients by eliminating ineffective drugs from a treatment regimen, and thus avoiding unnecessary toxicity. My thesis research studies in vitro assays, and how they can improve our ability to identify more effective treatment protocols for cancer patients.

Natasha Mayet '07

Mary Rice-DeFosse, French

The Importance of Franco-American Folklore in Transmitting Cultural Identity in Maine

As part of my senior thesis in French, I explored the transmission of Franco-American cultural identity from one generation to another via oral traditions, including storytelling, fables, and songs. Members of the local Franco-American community in Lewiston were interviewed and asked to recall stories from their childhood. The questions asked focused on family traditions, and the importance of folklore during childhood. Those interviewed were asked to share stories of their childhood experiences, their favorite songs, and the stories and tales that they were told as a child. The purpose of the project was to reveal the importance of these songs and stories, and their personal, religious, and cultural significance. By recording the personal accounts of individuals, the project took a personal approach to uncovering the cultural heritage of this community. The project was undertaken in conjunction with the Harvard Center for Community Partnerships as well as the Franco-American Heritage Center.

Jacob McChesney '08

Melinda Plastas, History

Soldiers under the SOFA: The Debate over and Implications of U.S. Extraterritoriality in Great Britain during World War II

This project examines the Status of Forces Agreement (SOFA) between the United States and Great Britain during World War II. This agreement ensured extraterritoriality for U.S. soldiers stationed on British soil. The SOFA guaranteed that U.S. soldiers committing crimes of any magnitude while stationed in Great Britain would be tried under American military tribunal and according to American rather than British law. This thesis explores the debate, which lasted for the entire period of the two world wars, between the United States and Great Britain, which led to the adoption of the SOFA. It also looks at the implications this agreement had for the U.S. soldiers subject to it. The project analyzes the developing American foreign policy of the time, specific examples of soldier conduct and military trials, and the position of African-Americans under U.S. law in Great Britain. An examination of the historical use of these agreements leads to a better understanding of its use in the American foreign policy of today, and why the use of such agreements is on the decline in modern foreign relations.

Taegan McMahon '07

Ryan Bavis, Biology

The Effects of Acid Rain on the Growth and Morph-Out Rates of *Epidobates tricolor* Tadpoles

Amphibian populations are in decline throughout the world, much of which is associated with the devastating effects of acid rain. The purpose of this study is to investigate the effects of acid rain on the survival, growth rate, and morph-out rate of *Epidobates tricolor* tadpoles. Tadpoles were collected from adult *E. tricolor* and were reared in tanks containing either neutral water (pH 7.0 control), or acidic water (pH 6.0 treatment). The growth rate of the tadpoles were determined by measuring body lengths, snout to tail, every three days, and the frog development and morph-out was carefully watched. There appears to be a reduction in the growth rate, general size, morph-out rate, and survival of the tadpoles in the acidic treatment, as compared to the neutral control. This study will provide insight on the potential influence of acid rain on poison dart frog populations.

Peter Meisel '07

Rebecca Sommer, Biological Chemistry

Investigation into Beat Rate and β 2-Adrenergic Receptors mRNA Levels Following β -Naphthoflavone Exposure

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is the most potent toxin of the aromatic halogenated hydrocarbons, a family of powerful teratogens and carcinogens. Exposure to cardiomyocytes corresponds with decreased β -adrenergic receptor (β -AR) responsiveness and decreased contractility. This study attempts to determine the mechanism through which the TCDD-like toxicant β -Naphthoflavone (BNF) decreases β -AR responsiveness in primary cultures of day 7 chick embryo cardiomyocytes. Cardiomyocytes cultured in N2 supplemented growth media exhibited increased length and stability of cardiomyocyte beat rate when compared to cardiomyocytes cultured in 20% fetal bovine serum. Isoproterenol doses of 50 μ M were shown to be acutely toxic to cardiomyocytes, and characteristics of toxicity were also demonstrated by isoproterenol doses of 25 μ M. RT-PCR analysis revealed that cardiomyocytes that were exposed to 10 μ M BNF and 10 μ M dimethyl sulfoxide (DMSO), the vehicle for BNF, 24 hours prior to treatment of 10 μ M isoproterenol demonstrated increased β 2-AR mRNA expression than cardiomyocytes that were not exposed to BNF or DMSO. These results suggest that BNF toxicity occurs through the β 2-AR pertussis toxin pathway.

Hannah Meyer '07

Peter Rogers, Environmental Studies

Improving the Water Quality of the Androscoggin River: Efforts and Effectiveness of the Natural Resources Council of Maine and the Androscoggin River Alliance

The Androscoggin was once named one of the ten dirtiest rivers in the country as discharge from industry poured freely into the river. However, efforts were made to clean up the river and by the 1980s the river had significantly improved. But today, the Androscoggin River still does not meet federal or state water quality standards. And in recent years, the issue of water quality and the Androscoggin River has been heavily debated in the State of Maine. My thesis outlines federal and state water quality regulations and the current water quality of the Androscoggin. I discuss efforts made by two non-governmental organizations, The Natural Resources Council of Maine and the Androscoggin River Alliance, to improve the water quality of the Androscoggin River. By conducting numerous interviews I have attempted to determine the perceived effectiveness these organizations have had on improving the water quality of the Androscoggin River.

Brooke Miller '07

Ryan Bavis, Biology

Respiratory Plasticity after Perinatal Hyperoxia is Not Prevented by Antioxidant Supplementation

The surrounding environment influences the development of the respiratory control system of mammals and birds. When animals are exposed to hypoxia, they have a hypoxic ventilatory response (HVR) manifested as hyperventilation. Perinatal hyperoxia is known to disrupt rat carotid body development and to reduce the HVR. This effect may be linked to an overproduction of reactive oxygen species (ROS) during hyperoxia. To test this hypothesis, rat pups were injected daily during their two week postnatal hyperoxic exposure with an antioxidant (superoxide dismutase mimetic), which would counteract ROS. Carotid body volume was reduced in rats exposed to hyperoxia in both control and ROS treatment groups. The antioxidant did not eliminate the effects of hyperoxic exposure on adult HVR, suggesting that there are other mechanisms for hyperoxic influences on respiratory control development than the overproduction of ROS.

Gabriela Muñoz '07

Todd Kahan, Psychology

Boat Activity Affects Bottlenose Dolphin *Tursiops truncatus* Behavior in Mississippi Sound

This study was conducted to better understand the effects of boat activity on the behavior of bottlenose dolphins (*Tursiops truncatus*) in the Mississippi Sound, MS, USA. This study site has high boat traffic from

both recreational and commercial vessels, and has a dolphin population of over 500 photo-identified individuals. Boat surveys were used to collect over 70 hours of video recordings and written observations during the fall and winter of 2004-2005 and 2005-2006. Dolphin behaviors were coded as: feed, mill, rest, social, travel, with boat, displays, and multiple. Boat activity was classified as: anchored/moored, passing, docked, fishing/shrimping, in the distance, and multiple. Dolphins were seen feeding significantly more around trawling shrimp boats than any other boat activity. Also, this population fed significantly more in the winter than the fall and milled significantly more in the fall than the winter. There were no calves seen post-Katrina and animals milled more post Katrina than pre Katrina. The majority of boat activities had no affect on the animals' behavior, which may suggest that this population has habituated to boat traffic.

Nels Nelson '07

Elke Morris, Art and Visual Culture

Lewiston-Auburn Industry and Labor

I am working with the developers of Museum L/A, a museum of of industry and labor, to document manufacturing spaces in the mills of the twin cities. This is a photographic study of the character of the abandoned mills and the activity of the current businesses that have filled mill spaces. The photographs represent the rich working tradition of the cities with large color prints of desolate landscapes in postindustrial space along side images of contemporary workers crafting specialty goods.

Alison Nestel-Patt '07

Amy Douglass, Psychology

Mood and Magazine Advertising: Does Placement of Advertisements Affect Success?

There is overwhelming support for the effectiveness of advertisements on both brand attitudes and purchase intent (Pollard, 1998). There is research suggesting, however, that the way in which a consumer is persuaded by advertisements could depend on the mood they are in (Kuykendall & Keating, 1990). More specifically positive and negative moods may cue a consumer to follow either the central or the peripheral route of persuasion based on the Elaboration Likelihood Model (ELM) (Petty, Cacioppo, Strathman, & Priester, 1994). The proposed study is a two-part study testing whether moods (happiness or fear/anxiety) elicited by stories in magazines affect consumers' method for determining an ad's effectiveness, either by focusing on peripheral cues or central cues. Results are expected to show that those who read stories that elicit happiness will be more apt to focus on central cues while those who read fear/anxiety stories will be more focused on peripheral cues.

Laura Nichols '07

Rebecca Fraser-Thill, Psychology

A Cross-Sectional Analysis of Gender Role Development in Children: The Implications of Stereotypes in Children's Books and their Effect on Children's Ability to Think outside the Box

Using cognitive developmental theory and gender schema theory as a basis for analysis, the present study examines the effects of gender stereotypes, and specifically the stereotypes reinforced in fairy tales, on children's ability to recognize gender role reversal. A cross-sectional analysis of children's gender role development was conducted in two age groups or developmental stages: the rigidity stage, or ages 5 to 7 years old, in which children develop gender schemata based on stereotypes they have learned and restrict their behavior to these stereotypes; and the flexibility stage, aged 8 and older, in which children have a clearer understanding of gender roles and their inherent flexibility in society. Participants were approximately 60 boys and girls from classrooms in local elementary schools that correspond to the two developmental stages being assessed. Each participant was interviewed individually to determine each child's rigidity/flexibility in interpreting stereotypical behavior and their ability to recall gender role reversal in a traditional fairy tale story. It was predicted that younger children would show more rigid understandings, specifically in the rigidity stage group, and would therefore score lower in flexibility, and lower in recall accuracy of the role reversal presented in a nonstereotypical fairy tale.

Stephanie Nihon-Kufta '07

Susan Langdon, Psychology

Measuring Self-Efficacy and Alpha in Novice Golfers

Sport psychologists can utilize EEG to correlate subjective cognitive states. In this study, novice subjects were assessed for levels of self-efficacy using EEG during a golf putting task. Using a small sample experimental design, half of the participants were trained using neurofeedback techniques to regulate attentional focus. The other half served as the control group. It was hypothesized that improvements in attentional focus and psychological states combined with mastery experiences would induce higher, task specific self-efficacy ratings, better alpha wave control, and performance. The intervention allows for both within subject and between subject comparisons that could effectively decrease self-talk in athletes, creating capabilities to organize and execute actions. Also, the study objectively assesses internal and external awareness to improve personal performance.

G. Carl Noblitt '07

Beverly Johnson, Geology

Stable Carbon Isotopes in Mollusk Tissue and Shell Organic Matter: Potential Tracers of Primary Production in Near-Shore Gulf of Maine

This project evaluates the degree to which sea grass organic matter comprises the diet of mollusks living in Maquoit Bay, located east of Freeport and south of Brunswick, Maine. The carbon and nitrogen isotope composition of muscle tissue and shell organic matter from samples of the soft shelled clam *Mya arenaria* and the quahog *Merceneria mercenaria* were analyzed to determine the degree to which sea grasses were consumed. Isotopic composition of sediment, POC, and sea grasses from Maquoit Bay were also determined. The samples were freeze dried, mechanically and chemically cleaned, and either solvent extracted (for tissues) or acidified (for shells). Following these treatments, they were run on the EA-IRMS. Results included a δ^{13} average of -16.9 ± 0.8 per mil for the sediment sample, -16.5 ± 0.2 per mil for the *Mya arenaria*, -19.6 ± 0.4 per mil for *Merceneria mercenaria*, and -20.7 ± 6.4 per mil for the particulate organic matter. These isotope values suggest that sea grasses are not the dominant food source in Maquoit Bay. Instead, we propose that the sea grasses at Maquoit Bay create a trap for phytoplankton which is then filtered by suspension feeders or incorporated into the sediments. There is a significant difference in the δ^{13} values between *Mya arenaria* and *Merceneria mercenaria*. Possible reasons for this isotopic difference include physiological differences or feeding strategies, and are currently under investigation.

Madeline O'Donnell '07

John Kelsey, Neuroscience

The Ability of a 5HT_{2a} Receptor Antagonist to Attenuate PCP-Induced Cognitive Deficits and the Delayed Non-Match to Sample Task as an Animal Model of Cognitive Deficits Characteristic of Schizophrenia

Schizophrenia is a debilitating chronic disease characterized by a combination of positive, negative, and cognitive symptoms. Recent evidence suggests that it is the cognitive deficits that most hinder normal functioning. The so-called typical antipsychotics, whose relevant pharmacology is to block the dopamine D₂ receptors, are effective in reducing the positive symptoms of schizophrenia, but do little for the cognitive deficits. Conversely, the atypical antipsychotics, which have a lower affinity for D₂ receptors, but block 5HT_{2a} receptors, have been shown to be more effective in treating the cognitive symptoms of schizophrenia. The intent of this study was to develop an animal model of cognitive deficits in schizophrenia to determine if these deficits could be reversed more effectively by atypical than typical antipsychotics and if this difference could be attributed to the ability of the latter drugs to block 5HT_{2A} receptors. Eight male Long Evans rats have been trained on the "delayed non-matched to sample working memory paradigm" that requires the subjects to remember which of 2 levers they pressed over a variable retention interval. Thus far injections of 4 and 5 mg/kg phencyclidine (PCP), which exacerbates all three symptoms in schizophrenic humans, have induced a delay-dependent deficit in this task, while injections of the atypical antipsychotic clozapine (2.5 and 5 mg/kg) have no effect alone. It is predicted that injections of clozapine

prior to PCP injections will block the PCP effect, while injection with the typical antipsychotic raclopride will not. It is also predicted that injection with the 5HT_{2a} antagonist ketanserin prior to PCP injection will block the PCP-induced deficit.

Courtney O'Farrell '07

Thomas Wenzel, Chemistry

Tetra-sulfonated Calix[4]resorcarenes as Chiral Solvating Agents in NMR Spectroscopy

A family of hydroxy-prolinylmethyl derivatives of a tetra-sulfonated calix[4]resorcarene (SCR) was synthesized. Their effectiveness as chiral nuclear magnetic resonance (NMR) solvating agents for water-soluble compounds with phenol, pyridyl, or naphthyl rings was determined and compared to that of the previously studied SCR-L-proline. These aromatic substrates form host-guest complexes with the SCR in water, likely promoted by hydrophobic effects. The aromatic resonances of the substrates show large up-field shifts and typically exhibit enantiomeric discrimination in the ¹H NMR spectra. The upfield shifts are due to proton shielding from the aromatic rings of the SCR and the extent of enantiomeric discrimination depends on the interactions of the substrate substituent groups with the hydroxy-prolinylmethyl derivatives of the SCR. The amount of enantiomeric discrimination observed with the *cis*-4-hydroxy-L-proline, *cis*-4-hydroxy-D-proline, *trans*-4-hydroxy-L-proline, and *trans*-3-hydroxy-L-proline derivatives is often greater than with the L-proline derivatized SCR.

Tobechukwu Okoye '07

Bonnie Shulman, Mathematics

Journey to the Promised Land: Finding the Best Home

Honeybees are social insects, and thus every aspect of their colony is well organized. In this project I used Leslie matrices to explore the group decision process that honeybees use in finding a new home. The matrices are used to update the number of scouts dancing for each site from time *t* to time *t*+1. We can then examine the long-term behavior, and see under what conditions the swarm reaches a decision, and chooses a site. My research builds on a mathematical model created by Mary Myerscough, of the University of Sydney, Australia. Like Myerscough's, my project results show that the decision process for finding a new nest site depends on two components, number of waggle-runs (the dance performed by the honeybee scouts on return to the colony after finding a potential site), and the recruitment of new scout honeybees. Whereas Myerscough uses analytic techniques (eigenvalues) to make predictions based on the model, I use MATLAB to run simulations and see the effects of varying different parameters. In addition, whereas Myerscough uses a generic function ($f(Q)\exp(-m/k)$ where $f(Q)$ increases with Q , the quality of the site) to model $W(m)$, the number of waggle runs for the *m*th dance, I experiment with different explicit expressions for $W(m)$ and check the results against data to see which function captures the biological situation.

Zaw Oo '07

Ryan Bavis, Biology

Expression of Hemoglobin in Daphnia magna is Influenced by Interactions between Genetic and Environmental Factors

Daphnia species are known to produce haemoglobin. The production of haemoglobin in *Daphnia* is a plastic trait; they would increase haemoglobin production at low dissolved oxygen concentration. It has been shown that the trait is plastic because it comes at a cost to the individuals producing haemoglobin, and presumably the extent of plasticity also differs among individuals as a result of genetic diversity. In this study, *Daphnia magna* were raised at either normoxia (dissolved oxygen 6.9 mg/l) or hypoxia (D.O. 1.9 ± 0.2 mg/l) to determine the genetic difference in the plasticity in *D. magna*. The result obtained showed that haemoglobin concentration increased 140% from normoxia to hypoxia, but we found no significant effect of genetic variation on the degree of plasticity, although the reaction norm graph generated hinted that there could be some effects of gene x environment interaction.

Michael Palmer '08

Nancy Kleckner, Neuroscience

G-Protein Activated Inward Rectifying Channels within *Helisoma Trivolvis*

Glutamate has been implicated as a critical neurotransmitter within vertebrate and invertebrate species. The role of glutamate transmission within the buccal ganglia of the pond snail *Helisoma trivolvis* is to regulate feeding behavior. Motor neurons of the feeding phase 2 (S2) are excited by glutamate while the neurons of phase 1 (S1) and phase 3 (S3) are inhibited. This purpose of this project was to clarify whether certain G protein activated potassium channels (GIRK 1/4) participate in regulation of the S1 neuron, B5, and S3 motoneuron, B19, by glutamate. Previous preliminary research indicated that administration of tertiapin (GIRK 1/4 antagonist) blocked glutamate hyperpolarizations in isolated B5 neurons, but not in B19. To test the hypothesis that the inhibitory action of glutamate on B5, but not B19, is mediated by the activation of a GIRK subtype Kir 3, intracellular recording techniques were used to examine the effects of glutamate and tertiapin on these cells in intact buccal ganglia of *Helisoma*.

Pritesh Patel '07

Pamela Baker, Biological Chemistry

Chemo-Preventive Effects of Curcumin on Chemically Induced Cell Proliferation

Curcumin, a natural herbal medicine extracted from tropical gingers and turmeric, is a potent inhibitor of tumor promotion. My goal is to examine changes in c-Fos concentration and cell apoptosis in HEL ATCC MRC5 cells after they have been treated with various concentrations of curcumin and then exposed to 12-O-Tetradecanoyl phorbol-13-acetate (TPA), a strong promoter of chemically induced cancer. These changes will be measured by the use of a flow cytometer and two fluorescent tags. A FITC labeled c-Fos antibody will be used to quantitate the c-Fos concentration and PI will be used to stain the intracellular DNA content, an indicator of cell apoptosis.

Amanda Peters '07

Georgia Nigro, Psychology

Ignacio Martín-Baró's Liberation Psychology: The Transformation of Psychology in Latin America and the United States

This project examines the development and foundations of psychologies of liberation, including liberation psychology and community social psychology (CSP) in the contexts of Latin America and in the United States. Psychologies of liberation are transformed versions of psychology that depart from the individualistic and paternalistic nature of contemporary Western psychology. Psychologists of liberation seek to join oppressed communities of the Third World in order to assist them in the processes of regaining their identities, restoring their internal loci of control over their own realities, unlearning their dependency behaviors, and raising their awareness of the dominator-dominated dichotomy as being unnatural and intolerable. The goal of psychologies of liberation is to achieve equality of all humankind by empowering the powerless to resist and overcome the social frameworks that promote hierarchies of power and domination in society. Through my research in El Salvador and the United States I hope to gain a solid understanding of how psychology may be used to ignite social change and better address the basic needs of the majority of the world's population.

Megan Petry '07

Amy Douglass, Psychology

The Impact of the Lewiston, Maine, Family Treatment Drug Court on Dependency Cases

The current study aims to compare case outcomes of the Lewiston Family Treatment Drug Court to other case outcomes in which the parent is referred to the drug court but declined participation. Lewiston Family Treatment Drug Court case outcomes are also compared to another random selection of dependency cases within the Lewiston District Court, in which substance abuse was not a factor. From the data, a correlational analysis will be performed to determine the impact of the Family Treatment Drug Court on dependency cases as well as other variables that may influence children's placement in foster care. Results will be

analyzed to determine if children whose parents have substance abuse problems have more negative outcomes compared with those children whose parents did not abuse substances.

Mariah Pfeiffer '07 and Michael Wilson '07

David Scobey, American Cultural Studies/Community Partnerships

Oral Histories

This presentation explores the significance of oral histories conducted in Androscoggin County by Bates students. It explores the power and politics of storytelling, the researcher/subject relationship, and the Bates/community relationship, at their intersections. It draws on the two presenters' senior thesis work in the community.

Samantha Piro '07

Ryan Bavis, Biology

Effects of Perinatal Hyperoxia on Ventilation and Carotid Body Growth in Rats

Rats exposed to perinatal hyperoxia (30-60% O₂) exhibit attenuated hypoxic ventilatory responses as adults. In this experiment, rats raised in room air or in 60% O₂ for the first two postnatal weeks were acutely exposed to 21%, 14%, 12%, and 10% O₂ as adults and ventilation and metabolism were measured. Overall, the results showed differences in the hypoxic ventilatory response curves for the two treatment groups, with rats raised in hyperoxia exhibiting attenuated responses compared to controls. Differences were most apparent at 14% and 12% O₂. Carotid body (CB) volumes of adult rats were significantly smaller in hyperoxia-raised rats (~70%). CB volumes of rat pups exposed to 1 to 7 days of hyperoxia were also measured to determine at what point volume differences become apparent.

Politics 253 Class Panel

Eric Hooglund, Politics

Hearings on U.S. Foreign Policy in the Middle East

The students in *U.S. Foreign Policy in the Middle East* (PLTC 253) have prepared a class project to investigate and discuss U.S. policy toward Afghanistan, Iran, Iraq, Israel, Lebanon, and the Palestinians. A panel of 10 Bates "senators" will interrogate a panel of 10 "administration officials" who will try to defend policies. The senators have invited a panel of 10 non-governmental "witnesses" to provide expert testimony that may reinforce some official policies but critique others. The audience will be asked to fill out questionnaires rating the persuasiveness of the various presentations for and against U.S. policies.

Rachael Pool '07

James Swan Tuite, Philosophy

Capabilities Approach to Family Planning in Tamil Nadu, India

My research both in the field and in the library has led me to conclude that current family planning practices in Tamil Nadu create a dynamic that limits true reproductive freedom and equality for women. The Indian Family Welfare Program has succeeded in lowering the national birth rate; however, it has also hindered women's pursuit of gender equality. In my thesis I argue that the use of capabilities as a litmus test for social justice will inevitably lead the global community towards identifying a standard for family planning practices that better achieves gender justice. I further posit that the identification of specific cross-cultural necessary capabilities may serve as the springboard for a more full-bodied understanding of the tools necessary for achieving actual justice within the realm of family planning in Tamil Nadu. Through this analysis I hope to identify useful avenues for achieving family planning equity.

Adam Poplaski '07

Kathryn Graff Low, Psychology

Underprivileged Youth in a School Setting

The purpose of this study was to work with underprivileged youth in a school setting. Students at this school have psychopathologies that do not allow them to progress in public schools. Various psychopa-

thologies exhibited by these students include schizophrenia, oppositional defiant disorder, attention deficit hyperactivity disorder, and learning disorders. Students at this school also have been subjected to abuse and neglect within their households. After observing for several weeks, a topic was developed based on the observations and interactions with a student who has a history of abuse, neglect, and is also oppositional. Research based strategies for addressing specific aspects of problem behaviors will be tested.

Alissa Praggastis '07

T. Glen Lawson, Biological Chemistry

Purification of Encephalomyocarditis Viral Proteins 3CD and 3D RNA Polymerase

Encephalomyocarditis virus (EMCV), a member of the picornavirus family, is agriculturally, medically, and economically important. Most picornaviral research to date has focused on poliovirus, the picornaviral prototype, and knowledge of the (EMCV) lifecycle mechanisms remains sparse. Important to EMCV replication are the viral proteins 3D RNA polymerase and the 3CD diprotein, a variant form of the 3C protease. The 3CD diprotein is also the precursor to the mature 3C protease and 3D RNA polymerase. The 3D RNA polymerase is responsible for replicating the viral genome the host cell. The goal of this project was to purify the 3CD diprotein and the 3D RNA polymerase. The DNA sequences encoding the 3D and 3CD proteins were modified and used to construct a bacterial expression vector encoding these proteins fused to a carboxyl-terminal polyhistidine affinity tag. These proteins, which were expressed and purified using nickel-chelated agarose columns, will be used in kinetic and protein binding assays.

Sami Qarmout '09

Loring Danforth, Anthropology

The Dilemma of a Movie: Paradise Now and Humanizing the Other?

Paradise Now was the first Palestinian film to be nominated for the Academy award for Best Foreign Language Film. The movie which came out September 2005 presents the life of two childhood friends who were recruited to become suicide bombers. The movie was highly criticized in Palestine mainly because it did not emphasize occupation, therefore seemed to minimize the Israeli occupations' role in creating a cult of suicide bombers. Meanwhile supporters of Israel responded very differently, Irit linor, one of Israel's top novelists and screenwriters, wrote that *Paradise Now* is "an exciting, quality Nazi film" and that the clear message of the movie is "if these people can become murderers—than clearly so could I" In this presentation I will offer an analysis of the politics of the film, and try to discuss the different stands on the film.

Jessica Ricker '07

John Kelsey, Neuroscience

Caffeine, an Adenosine A1 and A2A Antagonist, Delays the Expression of Nicotine-Induced Locomotor Sensitization in Rats

Caffeine and nicotine are frequently co-administered in the human population, but there is not yet a complete understanding of how their co-administration influences behavior. I chose to investigate the effect caffeine (15 mg/kg) has on the development of nicotine-induced (0.4 mg/kg) locomotor sensitization in rats, a phenomenon indicative of addiction. Mice in which adenosine A2A receptor have been deleted, or knocked out, do not develop sensitization to drugs of abuse. Consequently, I predicted that caffeine, an adenosine A1 and A2A antagonist, will disrupt the development or expression of nicotine sensitization. Data indicate that development of sensitization in rats receiving both nicotine and caffeine was delayed compared to rats only receiving nicotine. Research is ongoing to further validate these findings.

Kyle Rogers '07

Mark Semon, Physics

Optimization of an Ideal Permanent Magnet Synchronous Elevator Motor

Using a theoretical design for a permanent magnet synchronous electric motor a 2-dimensional computer model was created. This model consists of a dual rotor and single stator using 3-phase AC current. The torques on each section of the motor are examined and motor operation is simulated. The effects of dimen-

sional changes of the components are examined in an effort to optimize operation. These results are then applied to the design of an ideal elevator motor.

Sarina Rosenthal '10

Loring Danforth, Anthropology

Bumper Stickers and Popular Music: A Means to Cause Political Changes

Israeli Jews had a violent past with Palestinians and have thus far been unable to resolve their conflict. Unfortunately, this political unrest is often perpetuated by the internal conflict between liberal and conservative Jews. The Israeli hip-hop band, Hadag Nachash, released the song "Shirat Hasticker" to express the political message that Israeli society is too polarized. Their song subverts the meaning of conservative bumper stickers to present a liberal political position in order to advocate for peace. The political conflict in Israel can no longer be looked at as a fight between Arabs and Jews, it must be examined from within first, in order to advance towards peace.

Madelyn Rubin '07

Nancy Koven, Psychology

Volumetric Relationships between Orbitofrontal Cortical Subregions and Verbal Learning and Memory in Obsessive-Compulsive Disorder

Previous research has provided strong evidence that the orbitofrontal cortex (OFC) may be involved in a neuronal circuit that modifies the expression of obsessive-compulsive disorder (OCD). More specifically, it has been postulated that the anterior subregion of the OFC is related to certain cognitive abilities termed executive functions. This study was designed to investigate the volumetric abnormality of the OFC by dividing it into anterior and posterior subregions using 3D magnetic resonance images (MRI). Grey matter volumes of bilateral anterior and posterior subregions in 14 patients with OCD were measured and compared to those of 14 healthy control patients. Clinical and cognitive assessments were employed including the Yale-Brown Obsessive Compulsive Scale (YBOCS) to assess symptom severity, along with the California Verbal Learning Test – Second Edition (CVLT-II) to evaluate verbal learning and verbal long-term memory. It is predicted that there will be a reduction in the left anterior OFC volume of OCD subjects compared to control subjects, which will correlate inversely with symptom severity. In addition, the reduction of OFC volume is hypothesized to correlate with insufficient use of organization strategies on the CVLT-II.

Jenny Sadler '07

Georgia Nigro, Psychology

Communication and Intellectual Disabilities

This service-learning thesis involved a partnership with the Social Learning Center, a community center for adults with severe intellectual disabilities in Lewiston, Maine. I created two projects to find new ways for adults with intellectual disabilities to communicate with the wider community. In the first study, I used a multiple baseline design to assess the effects of a computer-based language learning program for three adults with intellectual disabilities. Participants used the Rosetta Stone computer program for twenty minutes twice per week for between one and four weeks. I used the Slosson Oral Reading Test (SORT-R3) to assess baseline ability for each participant, as well as to monitor ability throughout the treatment condition. In the second study, participants created a photovoice project. Seven participants took digital photographs and discussed the meaning of their photographs with the researcher. Field notes were content analyzed for recurring themes. I discuss the findings of both projects in terms of the literature regarding intellectual disability and current alternative modes of communication.

Lois St. Brice '07

Holly Ewing, Environmental Studies

Chemical Assumptions in Input Designation and Parameter Determination in the DayCent-Chem Model

Ecosystem scientists use computer models to predict the effects of atmospheric deposition on terrestrial and aquatic ecosystems. Models require a set of unique input variables which are used to predict outputs, and the relationship between the two is characterized by various parameters. Many ecological models represent heterogeneous ecosystems as homogeneous entities and so require that simplifying assumptions be made about the ecosystem being studied. Additionally, assumptions are made in determining the parameters that define the relationships between these inputs and outputs. The assumptions made about inputs and parameters affect the degree to which model predictions vary from observed values for variables in the field. Sensitivity analysis seeks to identify and quantify the effects that changes in input variables and model parameters have on model output. In this study, DayCent-Chem (a coupled, non-spatial biogeochemical model) was initialized for Hadlock Brook Watershed in Acadia National Park. Sensitivity analysis was used to explore the relationship between chemical assumptions made, both in the representation of model processes (through parameter determination) and in the designation of the model inputs, on the model's predictive capability.

Allison Sawyer '07

John Kelsey, Neuroscience

The Role of Dynorphin in Morphine Withdrawal

The endogenous opiate dynorphin, a kappa opioid receptor agonist, is assumed to mediate the aversive effects of stress and to counter the rewarding effects of addictive drugs. However, its role in drug withdrawal remains to be understood. Due to its aversive nature, it was hypothesized that blocking dynorphin's action during morphine withdrawal would attenuate the withdrawal symptoms and reduce their aversive consequences. As predicted, systemic injections of 20 mg/kg of the potent and selective kappa-opioid receptor antagonist nor-binaltorphamine (norBNI) decreased many of the symptoms of morphine withdrawal in rats and decreased the subsequent aversion for the place where withdrawal occurred (conditioned place aversion). Indicating that these effects reflected a reduction of the aversive consequences of withdrawal, nor-BNI did not produce these effects when given after withdrawal and before conditioned place aversion testing. This implicates dynorphin as a possible key mediator of the effects of opiate withdrawal, and as a possible mediator of drug relapse.

Elizabeth Scannell '07

Nancy Kleckner, Neuroscience

Pharmacological Characterization of Excitatory and Inhibitory Glutamate Receptors in Buccal Neurons B5, B19, and B27 in *Helisoma trivolvis*

Glutamate is the primary neurotransmitter responsible for regulating the triphasic feeding central pattern generator in the neurons of the buccal ganglia in the pond snail, *Helisoma trivolvis*. Electrophysiological recordings from three buccal neurons, B5, B19, and B27, were taken during the perfusion of isolated buccal ganglia with various agonists that are selective for different types of glutamate receptors. Preliminary data show inhibition of neuronal firing rate in all three neurons in response to quisqualate, a metabotropic glutamate receptor agonist, and excitation in B19 and B27 in response to kainate, an ionotropic glutamate receptor agonist. Experiments are being conducted using even more selective glutamate agonists to further characterize the excitatory and inhibitory receptor subtypes present on the buccal neurons.

Nina Schwabe '08

Kimberly Ruffin, English

Reading New Orleans Post-Katrina

I have studied literature that has been incited or inspired by Hurricane Katrina and the post-disaster context in New Orleans. My presentation focuses on the evaluation of this literature as a tool for protest, commu-

nity revitalization, and post-traumatic therapy. Song lyricism will also be explored as an integral form of literature emerging out of the post-Katrina experience, especially as it relates to the practice of oral history in African American communities.

Alison Schwartz '08

Dolores O'Higgins, Classical and Medieval Studies

Looking at Aeneas

I investigate certain icons of the Augustan era and their possible relationship with the *Aeneid*. I focus on the *Ara Pacis*. Augustus' aspiration to be the father of his country, evinced in the *Res Gestae* finds complex expressions in the poem and the visual culture.

Julia Shelkey '07

Karen Palin, Biology

The Effect of Cranberry Juice on the 160kDa Hemagglutinin of Staphylococcus saprophyticus

The aim of this study is to investigate the inhibitory effect of cranberry juice on the 160kDa hemagglutinin of *Staphylococcus saprophyticus*. *S. saprophyticus* isolates were obtained from women with urinary tract infection (UTI) and were assayed for hemagglutination. Bacterial colonies were isolated on nutrient agar and samples were incubated with sheep erythrocytes to detect hemagglutination. Hemagglutination inhibition (HI) studies were conducted by incubating isolates in nutrient broth supplemented with 0.1%, 0.25%, 0.5%, and 1% cranberry juice. All UTI isolates examined show evidence of hemagglutination. HI and visualization of the 160kDa hemagglutinin are currently under investigation.

Adam Shulman '07

Amy Douglass, Psychology

The Effect of Scientific Training on Reactions to Defenses in Which Schizophrenia or Antisocial Personality Disorder Absolves the Defendant of Responsibility

This experiment was designed to examine attitudes towards defenses provided in a trial in which the defendant pleads not guilty by reason of insanity. The defenses provided were founded in one of two psychological disorders: schizophrenia or antisocial personality disorder. Schizophrenia is a DSM-IV Axis I disorder, while antisocial personality disorder is a DSM-IV Axis II disorder. The DSM-IV Axis I consists of major mental disorders, or clinical disorders. The DSM-IV Axis II consists of underlying pervasive or personality conditions, developmental disorders and learning disabilities, as well as mental retardation. Usually, Axis I diseases can only be used in an insanity defense. If an Axis II disorder is used, it must be paired with an Axis I disease. This dual-diagnosis makes it difficult to determine what exactly is causing a defendant to act "insane." The purpose of this study was to separate the two diagnoses to see if people would be willing to consider a person not guilty by reason of insanity whose only diagnosis was antisocial personality disorder. Recent research has shown that individuals who have deficient MAOA activity and who were abused as children are unable to control their actions in response to a threat. This implicates a key element of the insanity defense: lack of control at the time of the crime. The mitigating evidence for the schizophrenia defense centered on the defendant's inability to distinguish right from wrong at the time of the crime, a different key element of the insanity defense. It was predicted that those with an established scientific background (biology, neuroscience, and psychology majors) would be willing to consider the mitigating evidence in the antisocial personality condition case as absolving the defendant of responsibility at a greater rate than those without an established scientific background (nonscience majors).

Aubrey Smith '09

Nancy Kleckner, Biology

Cloning of Glutamate Receptors in the Pond Snail Biomphalaria glabrata

Glutamate is a neurotransmitter in vertebrate and invertebrate animals. In the pond snail *Helisoma trivolvis* glutamate regulates feeding behavior by activating both excitatory and inhibitory glutamate receptors. Less is known about feeding behavior and glutamate receptors in a related species, *Biomphalaria glabrata*. This

species is the intermediate host of the blood fluke parasite that causes schistosomiasis in humans, so information about feeding regulation in this species is desirable. DNA sequences coding for glutamate receptors from *Biomphalaria glabrata* will be determined using PCR and primers designed from similar known sequences in *Helisoma trivolvis*. This information will allow further understanding about how glutamate affects the feeding cycles of *Biomphalaria glabrata*.

Sociology Thesis Panel

Emily Kane, Sociology

Contemporary Social Issues: Sociological Perspectives

In this panel, sociology thesis researchers address a variety of contemporary social issues: welfare, queer activism, immigration, popular culture, and youth opportunity. These issues are explored in the context of their connections to key social institutions including media, education, law, employment structures, the family, public policy, and inequalities of gender, race, class, sexuality, and nation.

- 1) **Melissa Baker '07: *Controversial Education Methods for English Learners: A Content Analysis of California-Based Newspaper Articles***
- 2) **Kristin Barber '07: *Redefining U.S. Immigration Policy in the Global Community***
- 3) **Adrian Cohen '07: *Motherhood as Work: An Analysis of Maine's Parents as Scholars Program***
- 4) **Lauren Gold '07: *Social Experiences and Identity Questioning of Nontraditional Students at Elite Preparatory Schools***
- 5) **Bridget Harr '07: *Race, Intersectionality, and Queer Student Organizations: Assessing the Utilization of Queer Politics***
- 6) **Kelly Turpin '07: *"What's Love Got to Do With It?": An Analysis of Ethnicity, Class, Gender, and Sexual Relations in Harlequin Romance Novels***

Ann Speers '07

William Ambrose, Biology

The Long- and Short-Term Effects of Baitworm *Glycera dibranchiata* Digging on Nutrient Cycling in the Intertidal Flats of Maine, USA

Previous long-term research has indicated that the commercial harvest of intertidal benthic marine invertebrates affects a broad range of community parameters. In Maine, baitworm *Glycera dibranchiata* digging is a largely unregulated \$7.5-million-dollar industry. No study has compared the state's only protected flat to the numerous annually dug flats. My study examined baitworm digging's effects on the nutrient cycling, pigment distribution, and sediment characteristics in intertidal flats in midcoast Maine. Long- and short-term seasonal experiments (July-December 2006) were conducted at the protected flat (the Wiscasset Worm Conservation Area) and four historically dug flats. Aerobic respiration significantly decreased by roughly 25% two (64.4 ± 4.2 to 50.2 ± 2.9 mg O₂-/m²/hr) and five (64.8 ± 2.2 to 47.9 ± 2.6 mg O₂-/m²/hr) days after digging at the WCA but was not affected at historically dug sites. Greater concentrations of sediment ammonia at depth indicate an outward flux, which increases within the week following digging at the WCA. Because they respond differently to digging than the protected flat, heavily dug flats may represent structurally and functionally altered ecosystems.

Nicholas Swerdlow '09

Paula Schlax, Biological Chemistry

The Effect of Environmental Stress on Gene Expression in *S. cerevisiae* and *E. coli*

Environmental stressors have the ability to up- or down-regulate the expression of various genes in an organism changing its overall gene expression. DNA microarrays can be used to visualize the changes to an entire genome after exposure to a specific stressor. Total RNA was isolated from *S. cerevisiae* and *E. coli* after growth in the presence of particular environmental stressors. Cultures of *S. cerevisiae* and *E. coli* were exposed to various conditions including the presence of dimethyl sulfoxide, varying osmotic pressure, and varying temperature. cDNA was then synthesized and fluorescently labeled for use in DNA microarray

hybridization. The microarrays were obtained and read by the Genome Consortium for Active Teaching, a program designed to bring microarray technology to undergraduates. Through this experiment, I hope to find patterns of genes that respond in similar ways to environmental stress.

Jaleh Taheri '07

Eric Hooglund, Politics

The Martyrdom of Imam Hussein and Iran's Quest for Nuclear Energy

I discuss the psychology and political significance of the commemoration of Imam Hussein in Iran and should how this event/ideology is prevalent in President Ahmadinejad's speeches regarding nuclear power. The mass demonstrations on Aushura carry a prevalent theme of "human rights" that is easily applied to Iranian international relations.

Samuel Taylor '07

Holly Ewing, Environmental Studies

Modeled Patterns of Atmospheric Deposition as Seen through Metal Concentrations in the Organic Soil Horizons of Acadia National Park, ME

Atmospheric deposition is the process through which humanly generated substances are emitted into the atmosphere and redeposited onto the landscape through precipitation, fog, or particulate matter. This study examines metal concentrations in soils and their relationship to modeled patterns of atmospheric deposition in Acadia National Park. In particular, concentrations of lead and vanadium are examined as potential indicators of deposition rates and compared to the micronutrients copper and zinc, which are more biologically active within the soil profile. This study provides information about deposition levels within the park and draws a comparison between lead and vanadium as potential indicators of deposition and copper and zinc, which have greater mobility within the system. The ultimate goals of this study are to see if researchers can use vanadium, like lead, as an indicator of deposition rates, and to understand the impact created by heavy metals that are more prone to uptake by biological organisms within the park.

Christopher Theile '07

Jennifer Koviach, Chemistry

Synthesis of a Spiroketal Enol Ether Natural Product

The goal of this project is to successfully synthesize a spiroketal enol ether molecule that was originally isolated from the Japanese chrysanthemum species *Chrysanthemum boreale*. Once the synthesis is completed several analogs of the spiroketal will be formed by adding oxidation to the molecule's six-membered ring. The long-term goal of this project is to test the spiroketal and its analogs for anti-tumor activity, which was been exhibited by similar molecules.

Marybeth Tong '07

Susan Langdon, Psychology

Knowledge of Emergency Contraception in College Students

The FDA's recent approval of the "morning-after" pill as an over-the-counter drug motivated the researcher to conduct this study. The study used a pre- and post-test design that was intervened by a knowledge campaign that informed Bates women of the FDA's recent decision. While examining the effectiveness of the intervention, the study focused on the relationship between knowledge of the drug and a woman's willingness to buy the drug over the counter. The purpose of this study was to examine college women's health knowledge in regard to the morning-after pill. This study also assessed whether greater knowledge of the drug affects their willingness to obtain the morning-after pill over the counter. It was hypothesized that participants showing an increased level of knowledge of the drug will have an effect on a woman's decision to obtain the drug over the counter. This study hopes to inform more women about the risks and benefits of the morning-after pill and to encourage more information to be made available.

Christina Towne '07

Christopher Beam, History

The Strike Logistics of the Fisher Body Plant #1 Sit-Down, Flint, Michigan, 1936-1937

The Flint Sit-down Strike was one of the most important labor actions in the history of the United States. Over the course of one year, the United Auto Workers, a CIO-affiliated industrial union, developed from a small faction to a formidable organization that drove the largest corporation in the United States to accept modern collective bargaining. Using the tactic of a massive sit-down strike to stop General Motors' entire production chain, the UAW won recognition from the company, validated the constitutionality of the Wagner Act, and generated much public sympathy and solidarity, resulting in a growing demand for representation by the industrial working class. While the confrontation between the UAW and GM was dramatic, another dimension of the sit-down warrants attention: the logistics of strike support for the nearly 5,000 workers who occupied the Fisher #1 plant for six weeks just after Christmas of 1936. To sustain this effort, the UAW and CIO mobilized and coordinated picket line activity inside and outside the plant to keep the striking workers fed, clean, warm, and engaged despite GM's considerable efforts to break the will of the union.

Kaitlyn Tucker '10

Jane Costlow, Russian

Nature in Russian Culture

I examine the correlation between traditional Russian gender roles and perceptions of nature. Examples of these correlations include how the concept of "motherland" influences femininity in Russian culture, the femininity of the universal witch "Baba Yaga," and how the traditional forest spirit—the *leishii*—reflects and defines masculine gender roles.

Stephen Tyler '07

Pallavi Jayawant, Mathematics

It's a Small World After All: Analyzing Small-World Networks to Understand Real World Phenomena

Many real world networks (e.g., the World Wide Web or the social network of friendships) are in fact small-world networks. A small-world network is one in which every node can be reached from any other node by a relatively small number of connections. Understanding how these networks form and how they function can help us generate an accurate model for more complex real world networks. This thesis applies concepts from graph theory to explore the structure and properties of small-world networks and compare various efficiency metrics on randomly-generated model networks. Through analysis of these results it is possible to draw further conclusions about the attributes of small-world networks, as well as propose improved models that better capture these properties.

Benjamin Umiker '07

Pamela Baker, Biology

Membrane Proteins of Trypanosoma brucei in Tsetse Fly Host

Trypanosoma brucei causes African sleeping sickness in humans. The purpose of this investigation is to characterize a putative membrane protein named Papegei, which is thought to be expressed during the parasite's lifecycle within the tsetse fly vector. Aspects of the life cycle of the *T. brucei* within the fly vector are less understood than biological aspects of the cycle during the time which the parasite spends in its mammalian host. However, it is clear in both cases that the expressed membrane protein coats play the most important role in any host parasite relationships. This is especially true in the parasites ability to evade immune responses.

Aubrey Van Kirk '07

Karen Palin, Biological Chemistry

Metabolism of 1,4-butanediol, a GHB Analog, Using a Rat Model

Over the past fifteen years, use of gamma-hydroxybutyrate (GHB) in the club scene and in drug-facilitated sexual assaults has skyrocketed. Four known analogs whose action in the body can mimic that of GHB are

available on the market, their sale unregulated by the government. The purpose of this study was to examine one of the more common analogs, 1,4-butanediol 1) to see if it can be absorbed through the skin and 2) to determine the effect of a common diuretic, caffeine, on the rate at which 1,4-butanediol is excreted from the body. Adult, male Sprague-Dawley rats were given 300 mg/ kg bw topically or by oral gavage. Urine was collected over a period of eight hours and analyzed for presence of GHB using a qualitative colorimetric assay.

James Walker '07

Pamela Baker, Biology

Wetland Management is an Effective Strategy in Reducing the Public Health Threats of Elevated Lead Levels in New Orleans, LA

In the wake of hurricanes Katrina and Rita in the fall of 2005, numerous sources documented elevated levels of lead in different sediment and water samples from the New Orleans, Louisiana, area. The purpose of this investigation was to assess the possible public health threats posed by these elevated levels of lead, and seek to display that a proper wetland management program for the city of New Orleans would help in the reduction of these threats. It has long been known that wetlands act as biological filters to improve water quality and reduce levels of heavy metals. However, the current situation in New Orleans suffers from severe loss of wetland area due to the civil engineering strategies in practice. While it is not economically feasible to implement a complete wetlands reconstruction, a wetlands management program would help reduce the public health risks of elevated lead.

Sidney Walker '07

Arlene MacLeod, Politics

Identity and the Hawaiian Sovereignty Movement

The Hawaiian sovereignty movement gained substantial momentum beginning in the 1970s. Within the Hawaiian community there has been considerable debate as to how to achieve meaningful autonomy. The population of Native Hawaiians continues to decline and political action on the part of indigenous Hawaiians continues to construct the boundaries of inclusion and exclusion. While some groups, such as Ka Lahui and the Office of Hawaiian Affairs, opt for compromise with the United State government, others want complete secession based on international law. I discuss these developments, as well as cultural education groups' methods in achieving autonomy outside the constructions of nationalism and law. My thesis explores how political action has worked to constitute and define "Hawaiianess" in different ways and the political, legal, cultural implications these political actions have towards achieving meaningful autonomy.

Leyi Wang '07

Matthew Côté, Chemistry

Characterizing Nanostructures with Tip-Enhanced Raman Spectroscopy (TERS)

Nanoscience and nanotechnology are quickly merging with other disciplines such as molecular biology to provide exciting discoveries, new techniques, and powerful devices. In order to study systems on a nanometer scale, various new technologies have been developed to overcome the limitation of traditional techniques in studying these extremely small objects. This project aims at combining scanning probe microscopy (SPM) and tip-enhanced raman spectroscopy (TERS) as a way to observe, characterize and ultimately manipulate nanostructures. We also employ a variety of techniques, such as Atomic Layer Deposition (ALD) to fabricate different nanostructures as our sample for spectroscopy.

Qinglan Wang '10

Jonathan Skinner, Environmental Studies

Aloha, Hawaii

I wrote a collection of poems about the many facets of my life in Hawaii. My overlapping title "Aloha, Hawaii" is meant to show the different levels of relationship I have with Hawaii. There are many definitions for the term "Aloha," most of which are dependent on the context. Aloha can mean hello or welcome – this

is the general propagandized idea of the word as people are greeted with "Aloha" when they first arrive upon the island. Aloha can also be used as a farewell or goodbye when people leave the island. Most strongly of all, the word "Aloha" means love. One gives Aloha to arrivals and Aloha is given to those who leave because it's an idea of the island spirit or love being with them forever. Therefore, in my poems, I am saying goodbye, hello, and I love you to Hawaii all at once.

Joseph Warren '07

William Ambrose, Biology

Harvest Size, Growth, and Harvest Efficiency of the Bloodworm *Glycera dibranchiata* from Intertidal Mudflats in Midcoast Maine

Maine's intertidal mud and sand flats support several commercially important species. *Mya arenaria* (soft-shelled clam), *Nereis virens* (sandworm), and *Glycera dibranchiata* (bloodworm) are all harvested by both commercial and recreational diggers. Of particular interest is Maine's bloodworm industry because of its high value, \$6 million generated in 2005, and its loosely regulated management. Despite its economic importance, there presently exists no information on the sustainability of the commercial bloodworm industry in Maine. My study seeks to meet the need for essential bloodworm fishery statistics such as harvesting efficiency, worm growth, and the size of harvested worms. Growth rates were determined by means of a mark and recapture experiment, in which 440 bloodworms were weighed, tagged, returned to 3 sites in June 2006, and recollected in December 2006. Bloodworms planted in Woolwich and Rockland generated mean percent growth of 38.5 % (4.5 SE, N=10) and 64.1 % (16.07, N=2). Mark and recapture experiments were also used to determine harvesting efficiency. Professional diggers were employed to dig up experimental plots that had been seeded with tagged worms. Results indicate average harvesting efficiency is 50.9% (7.2, N=9) and ranges from 30 to 70%. Efficiency also varies among diggers. Harvest size surveys performed at Phil Harrington Bait yield a mean worm weight of 3.6 g (0.2 g, N=290). As the State of Maine evaluates and, if necessary, manages the bloodworm fishery, these data are critically important.

Carine Warsawski '07

Loring Danforth, Anthropology

Happy Birthday, Herzl: The Construction of Civil Religion in Israel

In 2004 the Israeli parliament added a new holiday to the Jewish calendar called Herzl Day, commemorating Theodor Herzl (1860-1904), the acclaimed visionary of the State of Israel and founder of the modern Zionist movement. Herzl Day is a component of Israel's civil religion, which is a political and sociological phenomenon that nations and states use to integrate, legitimize, and mobilize their societies. This thesis explores how the holiday realizes its legislated goals and applies theories of civil religion, nationalism, and collective identities in order to fully understand the cultural and educational implications of the holiday. My analysis is based on fieldwork in Israel that included personal interviews with scholars, educators, politicians, and the general public, and cultural artifacts collected from museum visits and publications such as newspapers and government documents. My research examines the role of Herzl Day in response to the changing social discourse of Zionism in contemporary Israeli society.

Leonard White '07

Helen Boucher, Psychology

Place and Identity: How We Respond to Threats to Place-Related Social Identity

This study examines how threats to place-related social identity (PRSI) impact environmental attitudes, perceptions, and behaviors. It was hypothesized that participants with high levels of Maine PRSI will respond to threats to the Maine coast in a manner consistent with Social Identity Theory (e.g., by attempting to positively distinguish their group from other groups, by showing higher willingness-to-pay to protect the coast, etc.). Low-PRSI participants are not predicted to demonstrate these effects. Additionally, proposed development by a non-local company (i.e., an outgroup) is predicted to be more threatening to high-PRSI participants than that by a local company (i.e., an ingroup). Participants will be Bates students and community members. A 2 (high-PRSI vs. low-PRSI) x 2 (threat vs. status quo) x 2 (ingroup vs. outgroup)

ANOVA will be conducted to test for the predicted main effects and interactions. Implications for both the related literature and society at large will be discussed.

Rebecca White '07

Nancy Kleckner, Biological Chemistry

The Potential of ROS as Therapeutic Agents in the Treatment of Cancer

Reactive oxygen species (ROS), such as hydrogen peroxide (H_2O_2) and the superoxide anion (O_2^-), are a necessary by product of oxygen respiration. ROS are highly reactive, accounting for approximately 50% of all cancers. The purpose of this study was to examine the role of ROS in the body, and the potential for ROS to act as therapeutic agents. I investigated a current pseudoscience being promoted on the Internet, in which direct ingestion of H_2O_2 is promoted. H_2O_2 is toxic to the body when administered orally or intravenously, but the potential toxicity of H_2O_2 on cancerous cells leads to a novel cancer therapy, Photodynamic Therapy (PDT). PDT selectively activates H_2O_2 through the use of a photosensitizing dye and laser light from the visible spectrum, thus showing the potential for ROS to be used in the treatment of cancer.

Emily Williams '07

Kathryn Graff Low, Psychology

Vaginal Birth or Cesarean Section? Preference and Reasoning

The rate of delivery by Cesarean section has increased dramatically in the United States over the past 30 years. The present study explored the perspectives of women and men in order to understand their attitudes and knowledge about C-sections, and how those factors might differ depending on age. This study also examined decisions to deliver by Cesarean section to evaluate common reasons for the procedure. A questionnaire including demographics, birth scenarios, measures of attitude and knowledge, and questions about the decision making process was administered online to 365 participants from the New England area. Analysis revealed differences in opinion and knowledge depending on age group and gender, with younger participants and male participants choosing more C-sections than their counterparts. Content analysis of open ended responses within the survey showed that participants in this study viewed Cesarean sections as a last resort, and that birth should proceed naturally unless a medical emergency arises.

Christine Woll '07

William Ambrose, Biology

Effects of Baitworm *Glycera dibranchiata* Harvesting on Infaunal Density and Diversity on Two Intertidal Mudflats in Midcoast Maine

The baitworm *Glycera dibranchiata* is a commercially important species in Maine. This fishery is currently unregulated, and little is known about the possible effects of turning over 10-15 cm of sediment during harvesting. My study focused on the effects of digging on the density and diversity of infauna (organisms living in the sediment). Plots were established at two separate intertidal mudflats in midcoast Maine, and professional diggers harvested *Glycera dibranchiata* from half of the plots. Digging took place during three separate seasons, and sediment samples were taken at 0, 2, 4, and 8 weeks after digging. Initial results comparing density and diversity of infauna between dug and undug plots suggest that digging is having little to no effect on infaunal community structure, most likely because these sites have been dug historically and because estuarine intertidal areas are subjected to a variety of disturbance.

Mari Wright '07

Lavina Shankar, English

Not Feminist or Anti-Feminist, but Igbo: Unearthing and Understanding the Cultural Roots of Buchi Emecheta's and Flora Nwapa's Literature

This presentation emphasizes the importance of applying accurate historical and anthropological knowledge when reading the texts of Buchi Emecheta and Flora Nwapa, two pioneering women in the postcolonial Nigerian literary movement. I discuss the critical academic and philosophical problems caused by the application of certain Western feminist discourses to the literature of Nwapa and Emecheta as Igbo

women, and explain why scholars are misinformed in their dealings with this literature. The core of this dilemma is a lack of knowledge by Western feminists concerning the history and development of the Igbo people of Nigeria, which has led feminist scholars to generalize that the plight of women across cultural boundaries is universally similar. I disagree with this theory of feminist universalism and will argue instead that a firm knowledge of Igbo culture must be achieved to understand this literature and the problems facing Igbo women in modern Nigeria.

Weili Zhang '07

Lee Abrahamsen, Biological Chemistry

Pathogenic Differences between Ebola-Zaire and Ebola-Reston Due to Genomic Variation in Viral Glycoprotein

Ebola is a virus that causes hemorrhagic fever in humans and nonhuman primates. There are four subtypes, which are associated with different levels of human pathogenesis ranging from 0% to almost 90%. My library thesis considered one possible viral component (a surface protein) that could explain why Ebola-Reston and Ebola-Zaire exhibit such different levels of pathogenesis in humans despite the fact that their genomes are quite similar. The genomic sequence of the surface protein of the Ebola subtypes could have adapted shapes that contributed to differing pathogenesis due to varying environmental pressure from their niche.

