The Eighth Annual

FRIDAY, 3 APRIL 2009
PETTENGILL HALL
PETTIGREW HALL ~ OLIN ARTS CENTER
SCHAEFFER THEATRE
BATES COLLEGE

Jessica Adelman '09
Patricia Buck, Education
Censoring Culture: A Qualitative Study of Cultural Conflict in the Classroom
How do different stakeholders in education make meaning of the often incongruous nature of what is culturally relevant for students versus what is age-appropriate for classrooms? Developed around family narratives, the researcher collected mothers' oral histories, which were then illustrated by their children, and combined into a children's book. The presence of themes of rape, murder, polygamy, and early marriage makes the acceptance of these children's books questionable in the American classroom. These themes, however, are part of the history and culture of the authors. Thus, an incongruity develops between the desire to teach in a culturally relevant way and the pressure to insure curriculum is deemed appropriate for the classroom. Using interviews, my research investigates opinions and ideas of involved community members, with the hope that this collective understanding will suggest a path toward developing a classroom-appropriate way of addressing potentially controversial cultural themes.

David Asanuma '09
Rebecca Sommer, Biology
Arsenic-induced HKII Protein Expression in Kidneys of Mice
Epidemiological and mechanistic studies in humans and animals have shown that exposure to arsenic in drinking water has been strongly associated with diabetes mellitus, cancer, and hypertension, among numerous other medical conditions. Past epidemiological models have usually involved populations exposed to arsenic beyond levels relevant in the United States. However a recent epidemiological study in the United States has indicated a strong link between environmentally relevant concentrations of arsenic and the prevalence of type II diabetes. Type II diabetes involves the reduction of hexokinase II expression while an increase in hexokinase II expression levels at low level exposure to arsenic in the kidneys is an indicator of tumor formation. We found a decrease in hexokinase II expression in short term, low dose arsenic (50 ppb) and a slight increase in short term, high dose (500 ppb) exposure. Our data suggests that low level exposure to arsenic to be linked to a decrease in hexokinase II expression thus, supporting its potential link to type II diabetes.

Nyan Aung '09
Eric Wollman, Physics
Galactic Dark Matter
Dark matter is hypothetical matter that does not interact with the electromagnetic force, but its presence can be inferred from gravitational effects on visible matter. In this honors thesis, I study the rotational speeds of galaxies as one form of evidence of the presence of dark matter. Using an analytic approach, I have constructed rotation curves for the spheroid and exponential disk model of galactic mass. I demonstrated their poor fit to the observed data. By incorporating a spherical dark halo, I have been able to fit the observed flat rotation curve. I extract and plan to analyze cosmic microwave background data with the idea of looking for any unexpected signatures associated with galactic dark matter.

Sean Auth '12, Arjada Bardhi '12, Melinda Higgons '12, Tasnia Huque '12, Khin Min '12, and Nora Murray '12
Pallavi Jayawant, Mathematics
Applications of Linear Algebra
Linear algebra is a branch of mathematics that is concerned with the study of vector spaces – collections of vectors on which we can perform two operations that satisfy certain properties. Ideas from linear algebra show up in numerous applications in different disciplines, including chemistry, computer science, economics, and physics. In this panel, students discuss applications of concepts from linear algebra to a variety of examples including computer graphics and Fibonacci sequences.

Arjada Bardhi '12
Pallavi Jayawant, Mathematics
Applications of Linear Algebra - See Sean Auth '12 for abstract

Valerie Beckwith '09, Jaclyn Orloff '09, and Shannon Penney '09
Kathryn Low, Psychology
The Association between Testosterone and the "See the Ball" Effect
Varsity basketball players from Bates College will participate in a study that explores the effects of testosterone on their performance and the perceptions of both ball and hoop sizes. Experimenters will tally the shots taken and shots missed for each player during a two-hour regular season practice. Following the practice saliva samples will be collected according to bio-safety protocol. The players will then be asked to choose which ball and hoop they believed was the actual ball and hoop they had used in practice. The differing ball circumferences and hoop diameters will be displayed in an array on posters. Finally, they will answer a question regarding confidence, locus of control, and descriptives such as handedness. We predict the results will show that players who have a higher shot percentage will have the highest salivary testosterone levels and will see both the ball and the hoop as larger than they actually are. The athletes may be highly aroused in competition, resulting in higher levels of testosterone. This in turn, may affect perception.

Brianna Belanger '09
James Hughes, Economics
The Social and Economic Impacts of Slot Machines in Maine: A Case Study on Hollywood Slots in Bangor, ME
This study examines the effects of the Hollywood Slots Racino on the Bangor, Maine, area. The effects of legalized gambling are examined using six measures, including violent and nonviolent crime rates, bankruptcy rates, and employment rates.

Caryn Benisch '09, Corey Pattison '09, Griffin Peterson '09, and Sami Qarmout '09
Eric Hooglund, Politics
Exploring Muslim Politics at Bates and in the Field
This panel discussion considers diverse aspects of politics in Muslim communities. The panelists all wrote their senior thesis on issues pertaining to Muslim politics. Each introduces their research briefly, then they discuss with the audience how their findings can contribute to a more cohesive discourse between Islam and the West in the future. Benisch's thesis examines Israeli-Syrian Druze (a Muslim minority) relations in the occupied Golan Heights. Karmout's thesis analyzes how political competition between Hamas and Fatah affects the Israeli-Palestinian peace process. Pattison's thesis examines the role of liberal Islam in Indonesia. Peterson's thesis analyzes how the Indian political process has excluded the sizable Muslim minority from equal rights.

Christopher Berry '09
Krista Scottham, Psychology
Focus, Flow, and Motivational States
Flow is an intrinsically motivating and positive psychological state traditionally identified with a challenge-skills (CS) balance. The common phrase used to refer to achieving flow is "being in the zone." Although the CS balance has been considered the keystone of flow theory, research shows that focus also plays an important role. The current study seeks to determine the magnitude of focus's role in flow. Additionally, the study investigates whether achievement motivation influences flow. Finally, previous flow research has largely been conducted using correlational techniques; the current project utilized experimental techniques using the paradigm invented by Keller and Bless (2008). A 4x3x2 factorial design was used, in which achievement motivation (performance approach, performance avoidance, mastery approach, and mastery avoidance) was measured; task difficulty (easy, adaptive, or difficult), and

level of distraction (distracted and not distracted) were manipulated. Results and implications are discussed.

Erin Bliss '09
Georgia Nigro, Psychology
Experiences with Patient-Centered Education during Pregnancy and Childbirth
Starting in the 1960s and 1970s, calls for a more natural birthing system in the United States emerged. In spite of some changes, high rates of medical intervention continue, denying women information and agency. In response, there have been calls to make maternity care more patient-centered. Although patient-centered models are not necessarily specific to pregnancy, the core of many such models stresses appropriately educating patients through a positive interaction that provides the patient agency, allows the patient to make informed choices, and gives the patient a sense of preparation, all of which are crucial during pregnancy. To better understand the experiences of patient-centered education during pregnancy and childbirth, I conducted an exploratory study at a certified nurse midwifery office. I conducted semi-structured interviews with twenty-four pregnant and postpartum midwifery patients. Additionally, I performed a content analysis on educational materials from the office and visited a childbirth education class recommended by the office. Results showed that the midwives provided patients with the necessary information to make informed choices. Further, the midwives built positive relationships with the patients and respected and supported the patients' choices. The discussion examines the implications of these findings.

David Bohl '09
J. Thomas Giblin, Physics
End of Inflation Gravity Wave Production from Coupled Fields
Following the Big Bang, the universe underwent a period of near exponential expansion, known as inflation. Observationally motivated by the cosmological principal, which states that the universe on a large scale is both homogenous and isotropic, inflation may be mathematically conceived by the use of a scalar field. Modeling this field, and associated coupled field, as it transitions from inflation to a period known as reheating, data generated from LATTICEEEASY, a program written in c++, is used to study the production of gravity waves.

Erin Bond '09
Nancy Koven, Psychology
Nonsense or Common Sense? A Critical and Realistic Approach to the Current and Future Applications of Neuroscience to Pedagogy
Education is quintessentially a cognitive science. However, the current relationship between cognitive neuroscience and education is fraught with examples of overzealous, well-meaning educators promoting "brain-based" education with little solid, empirical foundation, which undermines the ways neuroscientific findings can accurately and realistically be applied to pedagogy. If ever there is to be a more empirically sound, mutually beneficial relationship between neuroscience and education, we need to enhance bidirectional communication and research reciprocity between the two fields. As a means to that end, an understanding of how teachers currently conceptualize brain research and its role in their classrooms is important. Survey data regarding teachers' knowledge of and interest in neuroscience, and perceived usefulness of applications of neuroscience to education were collected in public schools in Lewiston and Auburn, Maine. Findings are discussed in terms of the nature and limitations of science, comparative philosophies of education, popular media portrayal of neuroscience, and suggestions for how to facilitate a more fruitful union between neuroscience and pedagogy.

Erin Bonney '09
Georgia Nigro, Psychology
Growing Up Somali-American: An Exploration of Somali Immigrant Female Adolescent Identity and Aspirations
Historically, after-school programs for adolescents have focused on problem behaviors such as drug use, sexual activity, and delinquency. In recent years, the focus of these programs has shifted to positive youth development, a shift that recognizes that adolescents have resources and assets to help them navigate adolescence successfully. My thesis involved the organization and implementation of an after-school Aspirations Club for middle-school girls who are first- or second-generation Somali immigrants. The goal of the program is to increase developmental assets, aspirations and goal-setting, and attainment among the participating girls. The study uses qualitative data to examine the unique challenges that these immigrant girls face in adolescence. I explore the ways in which Somali immigrant girls conceptualize their self-identity and think about their future aspirations as they navigate Somali culture and modern American culture.

Ryan Boyer '09
Katherine Mathis, Psychology
The Emotional Content and Arousing Quality of Music as Mediators in Perceived Arousal and Valence of Affective Visual Stimuli
Possessing a powerful ability to evoke emotions, music is a carefully constructed and useful stimulus that we encounter nearly everyday of our lives. Its structural aspects such as mode and tempo can affect arousal, influence emotion, and have been shown to produce analgesic and anxiolytic effects. In an attempt to further understand music's influence on emotion and cognition, the current study examined how the arousing and emotional qualities of hearing music might also affect the perception of visual information. To accomplish this, the study examined the effects of positive and negative music at different levels of valence and arousal on the perception of affective visual stimuli. Participants were one hundred Bates College students (50% male, 50% female), ranging in age from eighteen to twenty-two years old. The experiment tested for effects of musically induced positive and negative emotions and arousal on participants' heart rate and ranking of IAPS (International Affective Picture System) image valence. IAPS provides such studies with an extensive normative set of emotionally evocative, digital color pictures that are rated on affect and arousal.

Cavan Boyle '09
Todd Kahan, Psychology
An Investigation of Automatic-Processing: Extracting Gender and Race Information from Faces Using the Task-Choice Procedure
Automatic mental processes are often characterized as being stimulus initiated, unavoidable, and uninterruptable. This experiment used the task-choice procedure (Besner & Care, 2003) to determine if people automatically extract race and gender information from pictures of faces. This procedure is useful in determining whether mental processes can occur in parallel with other cognitively demanding tasks and has been used to asses aspects of automatic processing. Participants in this experiment responded to pictures of faces that were either shown clearly or were visually degraded by making either a race or a gender decision. The task (race vs. gender) changed on a trial-by-trial basis and the cue indicating what task needed to be performed either appeared with the picture or was presented in advance of the picture. The data were analyzed using two 2x2 ANOVAs to determine whether race and gender are automatically extracted from pictures of faces.

Priya Brandes '09
Nancy Koven, Psychology
Can Music Influence Moral Reasoning?
Recent research in moral decision-making attempts to reconcile the differences between how philosophers and psychologists have understood human morality and moral judgments. One neuroscience model

proposes that moral decisions are the result of competition between a cognitive control brain circuit and an emotion processing brain circuit, both of which are viewed as necessary but competitive. While research has explored the impact of cognitive load on moral decision outcomes, little research has examined the role of mood induction on these same behavioral outcomes. Using positively- and negatively-valenced, arousing music as emotional stimuli, 90 young adults were presented with 25 hypothetical moral dilemmas. It is hypothesized that participants in the high emotional arousal conditions will demonstrate less cognitive reasoning on these moral decision tasks, thus resulting in nonutilitarian choices. Results are contextualized in the larger ongoing debate of whether music is a powerful environmental influence over our moral behavior.

Jonathan Brennan '09
Pamela Baker, Biology
The Role of Scaffolds in Bone and Tissue Repair Using Human Mesenchymal Stem Cells
Human mesenchymal stem cells (MSC) have been used for several decades for bone and tissue therapy. Scaffolds have recently been proposed to facilitate the process of treatment. These three-dimensional structures are implanted in the damaged cartilage or bone and act as a location and support for the MSC to home to and proliferate. These scaffolds made from polymeric biomaterials have been reported to support differentiation of MSC into osteocytes, adipocytes, chondrocytes, skeletal myocytes, and smooth muscle myocytes. However, there is debate on which material and design of scaffold works best in the treatment of affected areas. My thesis examines the published literature of MSC and scaffold material interactions and draws conclusions on which materials function best in bone tissue therapy.

David Brustlin '09
Michael Sargent, Psychology
Self-Complexity and Divorce
Divorce provides a unique experience that could allow children to form more varied selves between parents. This research attempts to discover if this increased self-complexity occurs, and if it is beneficial to the well-being of the children. A survey about individuals' self-concepts with their parents should give insight into this possible occurrence.

Katherine Brustowicz '09
Susan Langdon, Psychology
The Psychological and Emotional Responses of Division III Athletes to Injury
Athletic injuries regrettably plague the lives of countless Division III athletes; these injuries are often traumatic for athletes. The distress of injury cannot be solely attributed to physical pain; it is also associated with numerous psychological and emotional factors such as experiencing feelings of guilt, loss, anger, social stress, changes in self-identity and self-esteem. The current study examined the affective responses and adjustments Division III athletes have to their injuries. 150 participants, all previously or currently injured, ages 17-22, representing 15 club and varsity sports at Bates, Bowdoin, and Colby colleges. A goal of this study was to better understand and more wholly explore the effects of sports injury on athletes, through analysis of modified standardized measures. Gender differences in athletes' reactions were highlighted in the findings along with a general decrease in negative emotions over time and an effect of number of times injured.

Grace Burton '09
Francesco Duina, Sociology
The Legitimacy Craved by Dictatorships
Dictatorships have been a common form of government since the rise of the Roman Empire. The prevalence of dictatorships often leads sociologists to study their nature, origins, and results. A largely ignored aspect of dictatorships is their need to be perceived, and believe themselves to be, legitimate. This paper focuses on three main avenues dictators use to prove their legitimacy: elections, defiant rhetoric,

and brute force. Within each category, this paper gives three examples of dictators who used the tactic to promote legitimacy.

Annie Carlton '10, Harita Dharaneeswaran '10, Emma Posner '11, Scott Sinisgalli '10, and Gabriella Vannoni '09
Karen Palin, Biology
Barriers to Vitamin D Treatment in the Somali Community of Lewiston, ME
In collaboration with the B Street Health Center in Lewiston, Maine, we examined Vitamin D use in the Somali population of Lewiston. Based on 26 home visit interviews with Somali families, we found that while there was general understanding that milk and some other dairy products, as well as sunlight, are good sources of Vitamin D, many families did not understand how to fill their Vitamin D prescriptions or how to take their prescription medications. We are producing a video to address this need and to educate Somali patients about how to use pharmacy services.

Kevin Chambers '10, Timothy Fox '11, Rachael Garbowski '09, Alisa Hamilton '11, Rufat Hasanov '09, Stephany Hernandez '11, Jacob Lewis '09, Mariana Lidofsky '09, Cameron Maxwell '09, Charles Niquette '12, Matthew Paul '09, Matthew Reynolds '10, and Alina Volobuyeva '11
Paul Kuritz, Theater
371 Film Festival
Several student films are featured in this screening. Films include projects from Theater 371 (Acting and Directing for the Camera) and Theater s40 (Digital Video Production), a Short Term unit taught at the Maine Media Workshops in Rockport. Senior thesis films by theater majors Refit Hasanov '09, Rachael Garbowski '09, and Mia Lidofsky '09 are also presented.

Hiu Man Christine Chiu '09
Rebecca Fraser-Thill, Psychology
Holding Back Your Relationship Because You Care Too Much About It? How Delayed Responses in Text Messages Affect Relationships
Previous research offers contradictory evidence that text messaging promotes or hinders relationships. Text messaging allows users to exert control over composition, word choice, and interactivity of the communication because of its asynchronous nature, permitting time for self-reflection and editing. Many texters reported spending time paying attention to the content of their messages and editing them, in order to make an accurate presentation of the self and decrease the likelihood that their messages would be misinterpreted. The current study questioned whether such delayed response to a message would affect the relationship between the receiver and the sender. 192 undergraduate students (96 females and 96 males) read three series of text messages between the participants themselves and three targets (same gender friend, opposite gender friend, and romantic partner) and subsequently rated their relationship satisfaction with them. Participants were expected to rate their relationship satisfaction as lower after reading delayed response than after reading immediate response.

Leah Citrin '09
Georgia Nigro, Psychology
Determining the Function of Aggressive Behaviors: A Case Study
Researchers and practitioners use functional behavior assessments to determine the goal of behaviors. Although typically used with dysfunctional behaviors, functional behavior assessments can be conducted on any behavior. Research has identified four major categories of behavioral function: escape (e.g., when a request or demand is made of the individual), attention (e.g., while people are talking around but not to the person), sensory consequences (e.g., when the individual is left alone), and tangible consequences (e.g., to obtain a toy, food, or activity). Understanding the function of dysfunctional behaviors is important so that interventions can be appropriately directed. My thesis is a case study of a 13-year-old boy who suffered traumatic brain injury at five days old and currently exhibits aggressive behaviors. I

conducted a functional behavior assessment to investigate which situations elicited the aggressive behaviors of punching, attempting to punch, and throwing objects. In determining the function of this boy's aggressive behaviors, the goal is to create effective interventions to aid his academic progress and minimize the disruptions caused by his aggression.

Kelsey Clements '09
Paula Schlax, Chemistry
Identification of Transcription Start Sites of Ribosomal Protein-Encoding Genes in* Escherichia coli, Borrelia burgdorferi, *and* Synechococcus sp. *WH8102
The way bacteria regulate gene expression is an important function of a cell's survival. Ribosomal protein S4, encoded in the α operon of *Escherichia coli*, acts as its own translational repressor in response to decreased rRNA levels by binding to a pseudoknot structure in the leader of its own RNA. In *E. coli*, the gene encoding r-protein S4 is located in the α operon, and is transcribed along with the genes encoding the r-proteins S13, S11, S4, L17, and the α subunit of RNA polymerase. However, in *Borrelia burgdorferi* and *Synechococcus sp.* WH8102, the gene encoding S4 is located outside of the α operon. How these organisms regulate translation of the α operon genes is unknown. To better understand this system, 5'-Rapid Amplification of cDNA Ends (5'-RACE) was used to map the promoter region of the genes. The bacterial species studied represent a wide represent a diverse range of habitats, life cycles, and chromosome organization and length. *B. burgdorferi*, the agent that causes Lyme disease, and *Synechococcus sp.* WH8102, a photosynthetic cyanobacterium that is abundant in the world's oceans, and both need to adapt to diverse environments and must be able to efficiently regulate gene expression.

Kathryn Conkling '09, Julia McCarrier '09, Ana Nicole Rodriguez '09, and Tamara Wyzanski '09
Rebecca Herzig, Women and Gender Studies
Beyond the Black Binder: The Body as Subject
This presentation of women and gender studies theses explores numerous ways the gendered/racial/classed body interacts with and is received by various institutions. These institutions include the medical profession, the Bates campus, government agencies, the U.S. military, and insurance companies. The goal of the presentation is to share what we have learned, because let's face it: we all struggle with our body image, probably will get an STI, sometimes hate menstruation, have somebody who is important to us give birth, and will be targeted unfairly by the government.

Stephanie Connors '09 and Hannah Giasson '09
Kathryn Low, Psychology
Testing the Effectiveness of Motivational Interviewing as a Primary Weight Reduction Strategy for Obese Cardiac Patients
Since the late 1970s obesity among adults ages 20-74 has risen from 15.0% to 32.9% (CDC, 2007). The prevalence of obesity in the U.S. raises concern because obese individuals are at increased risk for chronic health problems including heart disease, high blood pressure, type II diabetes, arthritis-related disabilities, and some types of cancer. The goal of the current study is to examine the efficacy of Motivational Interviewing (MI) for weight loss in obese cardiac patients in Maine. MI is a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence (Rollnick, Miller, & Butler, 2007). By enabling patients to deal with ambivalence about healthy behavior change, the patient-tailored questions and conversations of MI may be more effective than formal didactic approaches or traditional nutritional education. Participants in the current study include obese cardiac patients ranging in age from 49-72. Participants in the intervention group receive a structured course of MI, while participants in the control group receive the regular course of dietary counseling by a nutritionist. Predicted findings include weight reduction and improvement in metabolic risk factors as a result of the MI intervention. Implications from these findings could inform health care providers attempting to assist cardiac patients with healthy behavior change.

Danielle Cormier '09
Todd Kahan, Psychology
Media Influence on Unhealthy Exercise
This study examined whether unhealthy exercise regiments are viewed positively when expressed by media figures. College men and women participants completed a Societal Attitudes toward Appearance Questionnaire to measure their internalization of society's appearance standards. Participants read sixteen descriptions of females described as either a celebrity or a peer combined with an exercise pattern: nonexerciser, a typical exerciser, or an excessive exerciser, as well as descriptions of ideal female bodies. Participants then rated the target on 12 personality attributes (e.g., friendly/not friendly, sloppy/neat) and 8 physical dimensions (e.g., ugly/good looking, scrawny/muscular). The data were analyzed to determine if targets that are depicted as a celebrity would be rated higher on all attributes compared to those depicted as noncelebrities regardless of exercise behavior.

Mira David, '09
Francesco Duina, Sociology
Breaking Barriers: Parent Educational Involvement and Power-Sharing in Schools
Recent theories have claimed that exposure to social and cultural capital is attributed to high student achievement, which benefits from increased levels of parent involvement in schools. While these ideas have been criticized extensively for their false characterization of cultural attributes and the reproduction of dominant norms, they provide a framework for understanding the way that power is negotiated between school officials and parents within a low-income, high immigrant school community. Using qualitative research methods (specifically interviews with parents and school officials) and the principles of community-based research, my thesis research explores the way parents and school officials perceive parent educational involvement based on an analysis of cultural and social capital and Foucault's theory of power. Foucault's conceptualization of power disrupts the standard dichotomy—between the institution, traditionally viewed as oppressor, and low-income, immigrant parents who are traditionally seen as oppressed—and provides a language through which we can understand parent-school interactions as contextually based and dynamic.

Elizabeth Dengler '10
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Spanning the Colorado Trail with ArcGIS
The Colorado Trail, which spans about 500 miles from Denver to Durango, is broken up into 28 segments and reaches elevations of 12,000 feet. An improved map of the Colorado Trail would provide trail users with a variety of information pertinent to an advanced understanding of the region. The primary map combines aerial views of the trail and land use in the area; it also shows the most frequently used trail sections as well as points of interest in the region. Inset images offer visuals of the trail. Smaller maps set into the final product show other elements of the region that may be of interest, such as wildlife habitats and environments, bedrock and surficial geology, and sections of the trail with maintenance. This work is done in ArcGIS utilizing topographic maps, bedrock profiles, and digital elevation models with the spatial analysis tools available.

Harita Dharaneeswaran '10
Karen Palin, Biology
Barriers to Vitamin D Treatment in the Somali Community of Lewiston, ME – see Annie Carlton '10

Naomi Dimon '09
Nancy Koven, Psychology
The Relationship between Abnormalities of the Anterior Cingulate Gyrus and the Symptomatology of Bipolar Disorder
Bipolar I Disorder (BPD) is a serious mental illness characterized by dramatic mood, ranging from an energetic high to an irritable, hopeless low. Previous literature suggests that abnormalities in a frontal-

subcortical circuit of the brain are primarily responsible for BPD (Drevets et al., 1997; Strakowski et al., 1999). Specifically, Benes et al. (2001) cites reductions in the volume of the anterior cingulate cortex (ACC) as the particular cause. Because previous research has shown the subregions of the ACC have distinct functionality (Davis et al., 1997; Paus et al., 1993), each of the four known subregions were examined independently in the current study. This study used structural MRI to calculate volumetry of the four subregions of the left and right ACC (dorsal, rostral, sucallosal, and subgenual) and the Conners' Continuous Performance Test, Second Edition (CPT-II: Conners, 2000) to index impulse control. Mediation analysis was used to test whether the ACC subregion volumetry mediates the relationship between diagnostic status and impulse control performance.

Kate Doria '10
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Where Do the Children Play? Mapping Childhood Outdoor Play Areas in Lewiston, ME
The landscape in Lewiston continues to develop over the years. These changes shape land use, specifically, where people spend their time. Interviews with youth from various backgrounds and senior citizens provided the data for locating favorite "play" areas in Lewiston. ArcGIS was used to map these areas and compare them to parks specifically constructed for recreation. Spatial analysis is completed to determine differences in choice of "play" areas based on age and cultural background. Patterns, if present, may speak to trends of urbanization, the development of suburbia, and the implications of where youth in the community spend their time.

Danica Doroski '10
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Changes in Vegetation Type and Vegetation Cover in Harvest and Nonharvest Plots, Madawaska, ME
The state of Maine has a longstanding history of timber extraction, especially in northwestern forests. While the immediate visual impacts of timber clear cuts and selective harvests may be easy to see, it is important to understand how these forests recover over time. Specifically, how do the vegetation types and covers in clear cut and selectively harvested forests compare with nonharvested counterparts? Using aerial photography (USGS DEM Aerial Photography, 1982 USGS Aerial Photo Mosaics, and 1972 Aerial Photo Mosaics) with plots from known regions of timber clear cuts, selective harvesting, and nonharvested areas in the region around Madawaska Lake, ME, GIS is used to identify changes in forest dynamics among the three groups. Visual analysis of vegetation cover for the spring and fall of 1991 is used to distinguish between different vegetation types in each of the three plots. Using surface analysis the percentage cover for each plot also is determined.

Lisa D'Oyen '09
Krista Scottham, Psychology
The Coming Out Process and Resiliency Outcomes in Jamaican Gays: An Exploratory Study
Jamaica is an extremely homophobic society as evidenced by homophobic dancehall lyrics, the acceptance of hate speech, killings of gay activists, and a homophobic religious culture rooted in Christianity. This study sought to examine the coming out process and resiliency outcomes of gays in Jamaica. More specifically, it sought to determine to whom they disclosed their sexual identity, what coming out meant for them, the challenges they faced, ways in which they dealt with these challenges, and the impact these challenges had on them. Phone interviews and an online discussion board were used to gain insight into 8 gay participants' experiences. Grounded theory was used to analyze participant narratives. The Jamaican experiences were compared to the existing literature on U.S. experiences. Findings indicated both universal and culturally specific aspects of experiences in Jamaica and the United States Implications of emergent new themes on culturally similar environments in the United States are discussed.

Allison Earon '09
Nancy Koven, Psychology
Utilitarian Moral Reasoning Style in Psychopathy and Alexithymia
Moral reasoning is the result of both cognitive and emotional processing. Decisions made in moral dilemmas are typically of two types: utilitarian and deontological. It has been suggested that the utilitarian style of moral reasoning is the result of cognitive processing in which emotional response plays little or no role. Under this model, it is hypothesized that people who exhibit alexithymia and/or psychopathy, which are both associated with impaired emotion processing, tend toward a utilitarian moral reasoning style. Frontal lobe structures are implicated in both pathologies, and alexithymic and psychopathic individuals demonstrate deficits in executive function. In this study, a large sample of adults was recruited to complete several self-report surveys designed to assess alexithymia, psychopathy, executive functioning, and moral reasoning style to establish a potential relationship between impaired emotion processing and utilitarianism.

Julie Farugia '09
Nancy Koven, Psychology
Emotional Reactivity to Negatively Valenced Stimuli in Alexithymic and Schizotypic Individuals: A Multi-Analysis Approach
Emotional disturbances are common in people at risk for developing psychosis, contributing to interpersonal deficits and social withdrawal. Alexithymic individuals face similar social problems due to their inability to express and interpret emotion and, thus, are at higher risk for mental illness and mortality of all causes. This study investigates emotional reactivity to negative stimuli in schizotypic and alexithymic people using three levels of analysis: subjective emotional response as measured by self-report questionnaires, behavioral response as measured by facial expressivity, and physiological response as measured by changes in salivary cortisol. No study to date has compared patterns of emotional reactivity in these two populations to examine the underlying neurobiological mechanisms in each disorder. Results are discussed in the context of clinical applications for early detection and intervention of these two conditions.

William Field '10
Hilmar Jensen, History
***Film:* What Runs In Our Veins: The Story of a Family, Incarcerated**
Filmmakers William Field '10 and Gabriel Gelbtuch (University of Michigan '10) investigated families living in a womens' penitentiary in Cochabamba, Bolivia. The students produced a twelve-minute documentary film that explores the cooperative jail system in which inmates work for their room and board and reduce their sentences through workstudy and service programs. The film paints an intimate portrait of Doña Martha, a woman serving a sentence for fraud, and her young sons as they work to make ends meet and keep their family in tact in the face of utmost adversity.

Jennifer Foster '09
Michael Burman, Psychology
The Emergence of Hippocampal Function in Contextual Fear Conditioning in a Rodent Model
Learning to fear a general environment (contextual fear conditioning) emerges later in development (postnatal day [PND] 23) than learning to fear specific stimuli (PND 17). As only contextual fear conditioning relies on the hippocampus, it has been suggested that the hippocampus is not fully developed until PND 23. The current experiments further investigate hippocampus development by separating the phases of contextual fear conditioning, allowing rats to learn about the context, a hippocampus-dependent task, on one day and to form the fearful association, which relies on both the hippocampus and amygdala, on another day. In Experiment 1, rats exposed the context on PND 17 exhibited significant fear only when trained and tested a week later (PND 23, 24), but not when trained and tested on consecutive days (PND 18, 19). This demonstrates that rats can learn about a context as early as PND 17. In Experiment 2, the hippocampus was lesioned prior to training to ensure the task depends on the hippocampus at these ages.

These data are among the first to provide compelling evidence that the hippocampus is functional as early as PND 17, however its connection to the amygdala or other relevant brain structures may not yet be fully developed.

Timothy Fox '11
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Miranda Gallo '09
Nancy Kleckner, Biology
***Characterization of Novel GluR5/6/7-immunoreactive Cell Group in the Buccal Ganglia of the Pond Snail* Helisoma trivolvis**
A modifiable central pattern generator (CPG) composed of neurons divided into three distinct subunits controls the three-part motor feeding behavior of *Helisoma trivolvis*. The subunits S1, S2, and S3 correspond to protraction, retraction, and hyperretraction, respectively, of the dentated radula. The subunits interact as independent conditional oscillators, becoming active when released from inhibition or when directly stimulated, and thus producing a cyclic feeding pattern. Glutamate is known to control the CPG through inhibition of phase 1 and 3 subunits during excitation of S2. This indicates that distinct glutamate receptors must be present to provide for the divergent responses to glutamate. Glutamate receptor antibodies provide a method to assess which glutamate receptors are present in the network. Probing with an antibody that recognizes GluR5/6/7 subunits revealed cells whose involvement with the feeding circuitry has not yet been characterized. The goal of this study is to characterize these GluR5/6/7 immunoreactive (IR) cells with respect to physiology, pharmacology, and involvement with the feeding CPG. Further immunocytochemistry with a different antibody that recognizes GluR6/7 subunits stained a subset of the GluR5/6/7 IR cells, lending support to the binding specificity of the GluR5/6/7 antibody. Electrophysiological recordings were made from cells within the GluR5/6/7 IR group to characterize their pharmacology and involvement with the CPG. Targeting accuracy was ensured by double staining for a back-fill fluorescent tracer in the targeted cell and the GluR5/6/7 antibody. Sub-threshold slow excitatory post-synaptic potentials (EPSPs) were measured in response to exposure to glutamate and kainate. Simultaneous electrophysiological recording indicates that the slow excitatory post-synaptic potentials of the GluR5/6/7 IR cells correspond with excitation of known S2 motor neurons and S2 stimulated hyperpolarizations of S3 motor neurons. These preliminary data suggest a possible modulatory role of GluR5/6/7 IR neurons in the feeding CPG.

Rachael Garbowski '09
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Timothy Gay '09
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
GIS Approach to Eminent Domain
By utilizing the GIS mapping program, ArcGIS, I demonstrate the relationship between the positioning of utilities and the location of residences of lower income families. It is common knowledge that through the process of eminent domain, utilities tend to position systems and equipment closer to residences of lower income families than those of higher income families. By creating maps of the median family income through census data in relation to the proximity of utilities, this relationship can be more closely examined. To identify lower, middle, and upper classes, I used SQL functions within the GIS program, displaying these classes in an organized, clearly visible way on maps. The area of focus is in the north shore region of Massachusetts, where there are several socioeconomic classes residing within a small area. Once the classes were mapped, I displayed utilities such as railroads, pipelines, and power in proximity to residences. A second map shows the inverse relationship: few utilities surrounding the homes of higher income families.

Megan Gentile '09
Katherine Mathis, Psychology
Think You're Stressed? Your Dog Probably Is Too: The Emotional Connection between Owners and Their Dogs
The purpose of this study was to explore the relationship between dog-owner-reported anxiety and subsequent dog anxiety behavior while at a veterinary hospital. Specifically, the study examined the degree to which dogs were able to assess their owner's level of stress during a veterinary exam and whether increased owner anxiety was related to an increase in dog anxiety. Participants were from a convenience sample obtained at the Falmouth Veterinary Clinic in Falmouth, Maine. While in the exam room, dog owners (N = 30) completed the State-Trait Anxiety Inventory (STAI) which measured their current anxiety (state) and general anxiety (trait) levels. Dog (N= 30) anxiety behavior was observed throughout the exam and twelve specific behaviors were later assessed on Likert scales. Results indicated a significant relationship between owner state anxiety scores, trait anxiety scores, and dog behavior scores. Namely, as owner anxiety increased, anxious behavior demonstrated by the dog increased as well. This study supports previous research that owner personality and the expression of canine behavior may be related. Due to the dog's unique ability to read human behavior, it appears that they may be able to embody human emotions and reactions as well.

Hannah Giasson '09
Kathryn Low, Psychology
Testing the Effectiveness of Motivational Interviewing as a Primary Weight Reduction Strategy for Obese Cardiac Patients – see Stephanie Connors '09 for abstract

Hilary Ginsburg '09
Rachel Austin, Chemistry
The Societal and Scientific Aspects of Lead Exposure and the Role of Metallothioneine-1 as a Potential Protector Against Human Lead Toxicity
Lead poisoning still remains a widespread public health concern in the United States despite years of national efforts to curtail the use of products containing lead and to minimize individuals' exposure to lead in the environment. When humans are exposed to lead metal, unlike for other toxic metals the body does not have a mechanism by which it can sequester and excrete the substance before it causes toxic effects, mostly neurological and cognitive in nature. Metallothioneins (MTs) are a family of proteins rich in cysteines that are known for their tendency to bind to heavy metals and thus prevent metal toxicity in the body. Based on lead's similarity to other metals that bind to MT, it has been proposed that lead binds to MT. In this research, lead metal titration experiments were conducted to examine lead binding to metallothionein-1 and to observe the stability of Pb-MT-1 complexes. Binding was monitored using UV spectroscopy to detect the lead-thiosulfate charge-transfer bands. The results of this study will expand the understanding of metal-protein binding and, depending on the extent to which MT-1 binds lead, will help shape future investigation of lead binding preferences and the ability of MTs to help prevent lead toxicity in the body.

Emily Grant '09
Lee Abrahamsen, Biology
MRSA in Local Horses
Staphylococcus aureus is an opportunistic human and animal bacterial pathogen that can cause severe soft tissue infections, especially in wounds or surgical incisions, and in some cases pneumonia. Methicillin-resistant *S. aureus* (MRSA) are bacteria that have developed resistance to all of the β-lactam antibiotics, which include penicillin and all of the penicillin derivatives. Unfortunately, these are the antibiotics of choice to treat nonresistant infections. Although historically associated with hospitalization, MRSA is rapidly becoming a public health concern due to the emergence of community-acquired strains that infect individuals with none of the classic risk factors. Speculation about how community-acquired strains spread has centered around the role that pet animals might play, and my research has focused on the

prevalence of MRSA in the local horse population. I have collected samples from several farms around Lewiston to screen for the presence of MRSA and I have begun to analyze which factors might make a horse more likely to carry the bacteria.

Gretchen Grebe '09
Paul Heroux, Art and Visual Culture
Mesoamerican Ceramics
I undertook an independent study in Mesoamerican ceramics in the winter 2009 semester. This involves creating three-dimensional clay vessels that correspond to the particular forms and glazing style found historically in the region. Incorporating this style into my work has challenged me to experiment with alternative throwing and hand-building techniques while supplementing my interdisciplinary major in environmental studies in Latin America. I am particularly interested in the intersection of culture and place, which people often choose to represent through artwork and design. Ceramic works are especially representative of the way a community relates to its land because many clays and materials to make glazes were, in the past and sometimes still today, extracted from local sources.

Amelia Hagen-Dillon '09
Holly Ewing, Environmental Studies
Temporal Change in Algal and Nutrient Abundance in Seven Lakes in South-Central Maine in Fall 2008
In my thesis I examine the temporal change of *Gloeotrichia echinulata* blooms and nutrient levels in seven different lakes in south-central Maine. *G. echinulata,* a mildly toxic cyanobacteria, has recently been documented in oligotrophic and mesotrophic (low nutrient level) lakes in Maine and New Hampshire instead of only in eutrophic (high-nutrient) lakes, where it has typically been documented. Very little is known about the bloom dynamics of this algae, so I sampled seven lakes in south-central Maine weekly for water nutrient and colony abundance analysis to see what I could learn about how surface populations fluctuate and if fluctuations correlate with changes in nitrogen and phosphorous (essential nutrients that cause eutrophication in excess) levels. Preliminary results suggest that algae abundance and phosphorous concentrations vary significantly temporally and among lakes. Especially high algae abundance was observed in Lake Auburn, which is of interest since it is the drinking water source for Lewiston and Auburn.

Amelia Hagen-Dillon '09
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Possible Influence of Land Use on Water Nutrients and Trophic Status of Lake Auburn, ME
Water nutrient levels in lakes are influenced by land use around each water body and its inlets. Water bodies are given a trophic status based on nutrient (usually phosphorous) levels in the water. Specific land uses such as agriculture or urban development are often targeted as means of change in trophic status of waterbodies. Eutrophication, or an excess of nutrients, can cause algae blooms, can fish kill, and can decrease in water oxygen, among other problems. During summer 2008 algae blooms were observed in Lake Auburn, the drinking water source for Lewiston and Auburn. In this project a map of Lake Auburn showing trophic status and areas of potentially trophic-status-altering land uses was created and the proportion of the watershed in those land use types was correlated to trophic status to see if there is a relationship.

Emma Halas-O'Connor '09
David Scobey, History
Creating YADA in Lewiston, Maine: A History of Rising Youth Civic Engagement in American Communities
In 2006, a diverse group of youth and adults from Lewiston and Auburn, Maine joined together to discuss how they could make their communities more accessible and appealing to young people. Their dialogue sessions and action groups ultimately formed an organization, YADA, or "Youth + Adults + Dialogue =

Action," which has creatively responded to the need for more youth opportunities. YADA represents the culmination of over 15 years of steadily increasing civic engagement in the Lewiston area. The creation of YADA reflected a nationwide trend of stronger communities and increased youth civic engagement in the late twentieth century, during a time when Americans (particularly youth) appeared apathetic toward public life. Considering the importance of social capital outlined by Robert Putnam, and Peter Levine's arguments for a greater emphasis on youth civic engagement, this thesis studies local youth involvement, from the 1960s through 2008. Using community-based research, I document three historical narratives that set the stage for YADA: increasing community collaboration, changing attitudes toward young people, and heightening youth agency, all of which serve to illuminate how youth civic engagement has flourished in the early twenty-first century.

Alisa Hamilton '11
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Rufat Hasanov '09
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Alexander Hernandez '09
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Changes in* Salmonid *and Char Species Distribution in Southern Maine Waterways 1800s to Present
Since the early 1800's, the ranges and numbers of *Salmonid* and char species in the waterways of southern Maine have decreased dramatically due to industrialization, extensive damming, and over-fishing. This study examines these changes in detail, and focuses on the population of the native species of Atlantic salmon (*Salmo Salar*), and brook trout (*Salvelinus fontinalis*), and major anthropogenic changes to the waterways in which they reside. Research is presented visually, emphasizing the changes in fish population and distribution in the major rivers and streams of southern Maine, comparing historical data and current surveys. Data is visualized through GIS software, and presented in map form, highlighting changes, and providing a background to current issues through historical context.

Stephany Hernandez '11
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Melinda Higgons '12
Pallavi Jayawant, Mathematics
Applications of Linear Algebra - See Sean Auth '12 for abstract

Tasnia Huque '12
Pallavi Jayawant, Mathematics
Applications of Linear Algebra - See Sean Auth '12 for abstract

Sarah Jordan '09
Amy Douglass, Psychology
From "Not Sure" to "Positive:" Jurors' Perceptions of Eyewitnesses' Confidence Inflation
The current study examines jurors' perceptions of changes in an eyewitness's confidence (i.e., confidence inflation). Participants read one of four fictitious trial transcripts and completed a questionnaire evaluating their perceptions of the defendant and eyewitness. The study manipulates two independent variables: witness confidence (same vs. inflated) and witness attitude toward the defendant's social group (negative vs. neutral). When the eyewitness has neutral attitudes, confidence inflation matters: jurors view the defendant as less guilty when the witness's confidence is inflated. However, in the negative-witness-

attitude condition, confidence inflation is irrelevant: jurors view the defendant as equally guilty, regardless of whether the witness's confidence has inflated. A careful look at variables affecting jurors' perceptions of witnesses is necessary in order to implement effective safeguard strategies to combat wrongful convictions.

Alexander Kapelman '09
Francesco Duina, Sociology
How Local Actors Mediated U.S. Influence in the Transition to Neoliberalism in Nicaragua
Nicaragua has been affected throughout its history by U.S. hegemonic influence. Recently, the United States played an enormous part in facilitating and implementing the shift to neoliberalism in Nicaragua. However, U.S. influence was not absolute in shaping domestic policy. Local actors played a role in the implementation of neoliberalism in the country. My thesis investigates how local actors mediated U.S. influence in the transition to neoliberalism in Nicaragua. I look at specific cases of mediation in order to determine the common methods employed by local actors. My evidence is composed of primary sources (i.e., documents from governmental and intergovernmental institutions, newspapers, and press releases) and secondary sources (i.e., academic articles and books). I hope to find cases of resistance to U.S. influence, but I also expect to find cases in which local actors helped implement U.S.-sanctioned policies. My goal is to reveal the importance of local actors in shaping domestic policy in the face of U.S. hegemony.

Samuel Kaplan '09
Susan Langdon, Psychology
Market Analysis: Globalization of American Professional Sports toward China
Over the past decade American professional sports entities have invested money and resources into marketing their leagues and events overseas. China, the largest market in the world with more than one billion citizens, has been the target of many of these American organizations. It is important to establish whether or not a market actually exists in China for American professional sports. This requires a comprehensive understanding of how the globalization of American professional sports might impact American and Chinese fans, as fans are the economic backbone for any successful professional sport. Through a bilingual survey (English and Mandarin), 269 American participants and 250 Chinese participants helped establish, from a fan perspective, whether or not a market actually exists in China for American professional sports.

Madison Kilbride '10
David Cummiskey, Philosophy
The Problem of Speech Perception from a Philosophical Perspective
The central problem of speech perception is the physical-perceptual disconnect between features of the stimulus and those of our experience. In listening to speech, we hear discrete segments that are perceived as invariant across phonetic contexts. This is to say that we hear a [d] as a [d] regardless of whether it is heard in the word "dig" or in the word "dirt." Yet strangely, the acoustic stream as it is represented in spectrographic displays reveals a lack of acoustic segmentation corresponding to phonetic units, as well as a lack of invariance for the cues that specify a particular phoneme. To make the problem explicit, the acoustic cue for [d] in the syllable [di] is specified by a rising frequency modulation cue, whereas the [d] in [du] is marked by a falling frequency. Though speech perception theorists acknowledge these problems, most continue to search for invariant phonemic units, positing the existence of entities outside the acoustic stream that bear the properties we experience speech to have, such as articulatory gestures. Others have endorsed mentalist theories of speech perception and have argued that phonemic segments are internally generated and lack properties that exist in space-time. I reject these approaches on a number of grounds. In thinking about and approaching speech from a philosophical perspective, I examine the problems it poses from within a framework of theorizing about perception more broadly and by looking at ways in which speech might be similar to other perceptual experiences, such as color perception.

Additionally, I try and offer a theory of speech perception that encompasses sign language as well, which interestingly is faced with many of the same problems as its spoken counterpart.

Brian Klein '09
Pamela Baker, Biology
Antibacterial Properties of Tea on Oral Pathogens
Consumption of extracts and infusions from the tea plant, *Camellia sinensis,* has been found to have many positive health effects. Of these health effects, anti-inflammatory, antioxidant, blood pressure regulating, antimicrobial, and cardiovascular properties are key. The four main types of tea include black, oolong, green, and white. All of the four main types of tea come from the same plant, yet they gain their specific chemical properties, which lead to taste and subsequent health effects, during the fermentation and oxidation processes following harvesting. New research has been providing information that specific bacteria can be killed, or have their growth inhibited, by whole tea extracts or certain fractions. The purpose of this study is to determine the antibacterial effects of two types of tea on bacteria known to cause diseases in human populations: *Porphyromonas gingivalis, Aggregatibacter actinomycetemcomitans*, *Escherichia coli*, and *Staphylococcus aureus*. In the study I aim to determine whether black or white teas more effectively inhibit the bacteria, whether the teas are bacteriostatic or bacteriocidal, and what volumes or concentrations of tea are necessary to produce a desired effect.

Christopher Knox '09
Todd Kahan, Psychology
The Effects of Aesthetic Visual Design Symmetry on Anxiety
The current study attempted to determine the effects of aesthetic design symmetry on anxiety. All participants were between 17 and 22 years of age and had normal or corrected-to-normal visual acuity. Participants were made slightly anxious with an arithmetic test after which they were presented with several visual stimuli from one of six aesthetic design scenarios whose dimensions were varied in terms of asymmetry direction (vertical vs. horizontal) and degree (high vs. low vs. symmetric). Heart rate was recorded throughout and two self-report surveys were completed: the State-Trait Anxiety Inventory-State Self-Evaluation Questionnaire, and the Obsessive-Compulsive Inventory-Revised. The data were analyzed to determine if aesthetic design symmetry affects anxiety levels.

Christina Kratzman '11
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
The Evolution of Maine's Population Documented with GIS Models
Within the past decade, there has been an increase in the Somali population in Lewiston, Maine, dramatically changing the city's demographics. While changes in population and immigration are patterns typically associated with history and past events, they clearly still occur today. Through the use of GIS and US census data from 1860 to 2000, the evolution of Maine's population can be seen and analyzed by tracking population growth as well as social and demographic changes. Maps illustrate intervals of 20 years, with each map showing a specific change such as population, employment, gender, and ethnicity/race. Each map will also display the cities used to evaluate the change: Augusta, Bangor, Lewiston/Auburn, and Portland. This information not only gives a historical analysis of Maine's cities, but also helps to predict future growth and changes in these cities.

Molly Ladd '09
Robert Thomas, Biology
Water Stress Responses in* Pinus edulis *and* Juniperus monosperma, *Co-dominant Species in the Los Piños Mountain Woodlands, NM
Piñon pine (*Pinus edulis*) and juniper (*Juniperus monosperma*) are two co-dominant tree species composing expansive woodlands across much of the American southwest. They depend on short pulses of summer monsoon seasonal rainfall for the majority of their yearly water, but have adapted different methods of utilizing precipitation. To better understand differences in hydraulic strategies between the

two tree species in times of drought and rain, three piñon and three juniper trees were instrumented with *in situ* stem psychrometers and sap flow probes on below-ground roots. Study trees were exposed to natural rainfall in addition to several irrigations. Continuous data were collected for approximately six weeks. In addition, pre-dawn and midday water potential was taken from twig samples using a pressure chamber on at least six different occasions to check the accuracy of the stem psychrometers. Differences in observed responses may provide insight about present and future ecological changes in these woodlands associated with climate change.

Michelle Ladonne '09
Shuhui Yang, Chinese
The Naxi Culture: A Paradise Lost or Regained by Ethnic Tourism?
Globalization has revolutionized tourism, prompting it to become one of the world's fastest growing industries and one of the largest economic sectors. My thesis explores the Naxi minority of China's southwest, in the city of Lijiang. Since the early 1990s, Lijiang has emerged as an important ethnic tourism destination. In the past decade, the tourism industry has prompted a significant decline in the region's elite Dongba culture. Dongba is the world's only actively-used pictographic language, and represents a rich religious and cultural tradition, although with under a hundred active practitioners, this culture is in danger of dying out. Does the power of ethnic tourism accelerate the decline of local culture, or does it seek to preserve once lost traditions? What do cultural "preservation" and "authenticity" entail, and are they desirable outcomes? Answers to these questions will help to define an ideal for ethnic tourism, both in China and internationally.

Michelle Ladonne '09
Baltasar Fra-Molinero, Spanish
Authority, Identity, and Power: The Third Gender in Sixteenth-Century Spanish Mysticism
How did the Spanish Inquisition distinguish genuine mystical experiences of union with God from demonically inspired contact? How did Catholic society of the sixteenth century separate authentic saints from the counterfeit? Throughout the Inquisition, mystics and religious visionaries claimed to have experienced personal contact with the divine, inspiring new reforms and ideologies. Some of these mystics, including Saint Teresa of Avila, were successful, while others were relentlessly persecuted and discredited by the Inquisition. How did Teresa escape the watchful gaze of Inquisitional prosecutors and censors, while challenging basic constructs of her society? In her autobiography written in sixteenth-century Spain, Teresa of Avila confronts the multiple limitations of her identity as a female with Jewish ancestry and a lack of formal education. Utilizing Catholic mysticism as her great equalizer, Teresa challenged the traditional power of the educated masculine hierarchy, thus subverting the constraints of her gender and background.

Joshua Lake '09
David Scobey, History
Senior Thesis on Bates Housing
My presentation focuses on many aspects of Bates College housing through history. Examining the origins of coeducational living, the ending of parietal rules, student subcultures, and room selection, I examine the ways that changes in Bates housing are indicative of the larger social changes the College experienced throughout the twentieth century. The poster charts Bates' progress and development as its housing policies shift during periods of growth and change.

Benjamin Levin '09
William Ambrose, Biology
Geographic Variation in Growth of the Greenland Cockle (*Serripes groenlandicus*) around Svalbard: Influence of Water Column Properties and Regional Climate Indices
We used external annual growth lines to measure the growth of 178 Greenland cockles (*Serripes groenlandicus*) from nine sites surrounding Svalbard. Individual cockles held on oceanographic moorings

in Kongsfjord and Rijpfjord for a year validated the annuality of the growth lines and the timing of their growth suggested that food was more important than temperature for growth. Using a growth index that was corrected for ontogenetic changes in growth, we found significant relationships at eight sites between growth and environmental variables. Growth at High-Arctic (Rijpfjord, Smeerenburg) sites was correlated to the Arctic Climate Regime Index, while growth at sites located further south (Kongsfjord, Storfjorden, Hopen Bank) was correlated to average yearly sea temperature along the Kola Transect. Growth at sites on the west coast of Spitsbergen was 81% higher than at all other sites. Cockles at West Spitsbergen sites experience a longer period of primary production than more northern and southern individuals due to high levels of nutrient advection from the West Spitsbergen current. Our understanding of the link between the benthic ecosystem and environmental conditions affecting primary production allows for predictions about the response of the benthos to the rapid climate change that is occurring in the Arctic.

Jacob Lewis '09
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Julie Libin '09
Kathryn Low, Psychology
The Effect of Exposure to Forms of Breast Cancer Media on College Students' Perception of Body Image
A great deal of research has been done regarding the impact of breast cancer diagnosis on a patient's body image. Further, studies have shown that diagnosis impacts body image more in younger patients than in older breast cancer patients (50+ years of age). In addition, if a person is more invested in her appearance, perception of body image is more affected by a breast cancer diagnosis. However, little is known about the impact of breast cancer on the body image of females close to those receiving the diagnosis. The current study will examine how exposure and nonexposure to breast cancer media affects body image ratings in women with and without first degree relatives with breast cancer. There are approximately 50 female participants in this study, all of whom are undergraduates aged 18-23. Participants are randomized to either the breast cancer media group and complete two post-intervention surveys, or to the control group and complete the same two surveys. It is predicted that participants with first-degree relatives with breast cancer who are exposed to breast cancer media have more body image concerns than participants in the neutral media condition or than those with no first-degree relatives with breast cancer. In addition, the study explores the role of appearance sensitivity in responses to scenarios.

Rachael Lichter '09
Susan Langdon, Psychology
Nonmedical Prescription Drug Use in College Recreational Settings: Prevalence, Quantities, and Dosages
Research suggests that nonmedical prescription drug abuse is on the rise at colleges across the nation. This was especially worrisome since co-intoxication with alcohol seemed frequent and drug overdoses were often due to a mix of drugs and alcohol. In the current study, I examined the prevalence, quantity, and dosage amounts of prescription drugs used for recreational purposes and the motivations of users to take them. One survey was administered to the entire college population via email and roughly 200 participants participated in the study. Predicted results included higher prevalence rates for this small college population, among males and among students living off-campus. Most important, this survey gives researchers an idea of the estimated amount of prescription drugs that college students consume recreationally on a regular basis.

Mariana Lidofsky '09
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Jennifer Lindelof '12
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Prediction of Shoreline Variation Due to Erosion from Camp Ellis, ME, to Pine Point, ME, Using a GIS Model
Since the installation of a jetty constructed in 1867 by the U.S. Army Corps of Engineers to preserve commercial shipping out of the Saco River, the shoreline of Saco Bay has not been the same. Camp Ellis, situated adjacent to the jetty, has experienced severe erosion, while Pine Point, located ten miles up the coast, has dealt with significant accretion. GIS is used in an analysis of historic rates of loss or accumulation of beach sand over time in the two locations. Historic aerial photos of the area used for this analysis were obtained from Earth Explorer. Analysis of property loss and gain in the area due to erosion, seen from ortho1f tiles (aerial photographs) are be incorporated. ArcGlobe is utilized to create a three-dimensional map of the coastline.

Jennifer Marino '09
Matthew Côté, Chemistry
Raman Spectroscopy and Atomic Force Microscopy
My research focuses on improving raman spectroscopy and atomic force microscopy techniques in order to combine the two to perform tip-enhanced raman spectroscopy. raman spectra of tungsten oxide, silica wafers, and carbon nanotubes were obtained using the raman spectroscopy set up. atomic force microscopy probing tips were manufactured by gluing tungsten wire onto quartz tuning forks, and electrochemically etching the wire to produce a sharp tip. Gold-coated silica nanospheres were imaged using atomic force microscopy techniques. The frequencies of the tuning forks were monitored while the tips scanned the sample to control tip height. An attempt will be made in the near future to successfully perform tip-enhanced raman spectroscopy using gold probing tips that support plasmon oscillations on quartz tuning forks.

Elissa Maunus '09
Michael Burman, Psychology
Effects of Chlordiazepoxide on Animal Models of Anxiety
Knowledge of the exact physiological mechanisms that create states of anxiety in humans is incomplete. Although it is accepted that animal models are reliable measures of anxiety, it is unclear whether different behavioral tasks assess the same or distinct aspects of anxiety. To validate these measures this experiment compares the effects of two doses of chlordiazepoxide, a common benzodiazepine, on rats' behavior on an elevated plus maze, a successive alleys test, and a hyponeophagia task. Data were analyzed to determine whether these tasks were equivalently affected by a treatment known to reduce anxiety in humans. Locomotion was also measured to ensure that it was not a confounding side effect of the drug. The aim of this experiment is to increase knowledge about the various animal models used to measure anxiety with the eventual goal that this may lead to more successful treatment to mediate the symptoms of various anxiety disorders.

Cameron Maxwell '09
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Julia McCarrier '09
Rebecca Herzig, Women and Gender Studies
Beyond the Black Binder: The Body as Subject – see Kathryn Conkling '09 for abstract

Caitlin McMahon '09
William Ambrose, Biology
Long- and Short-Term Effects of Baitworm Digging on the Feeding Behavior of Ring-Billed Gulls (*Larus delawarensis*) on Mudflats in Maine

Immediate and long-term effects of baitworm digging on the feeding behavior of ring-billed gulls (*Larus delawarensis*) were examined on two intertidal mudflats in Maine. One of the mudflats has an extensive history of baitworm digging while the other is protected from digging. From one hour preceding to approximately one hour following low tide, gull densities, time individual gulls spent on flats, interfood intervals, and rate of prey consumption were measured for both flats. Thirty fecal samples were also collected and analyzed for the types of prey consumed. In addition, short-term effects of baitworm digging were investigated using observations made following digging of eight 10m x 1.5m plots. Observations from 2008-2009 were compared with data from 1980, 2005, and 2007, investigating the long-term changes in gull density and feeding behavior. The number of worms removed decreased as temperature decreased. There were no significant differences in the average time gulls spent on a flat between dug (5.9 min/gull) and undug (7.2 min/gull) flats. There was also no significant difference in the interfood interval between the two flats (dug = 1.7 min/gull, undug = 2.03 min/gull). Finally, there were no significant differences in the immediate effects of digging experimental plots on gull density or feeding behavior.

Anna Meader '09
Matthew Côté, Chemistry
Plasmonics and Developing Nanotechnology
Plasmonics is a rapidly developing technology focused on the application of light waves onto the interface between a metal and a dielectric. Under the correct circumstances, this application of light can induce movement, referred to as plasma oscillation, among the electrons of a conduction metal. This project utilizes the attributes of plasmonics to develop nanomaterials for study and use in various optical applications.

Kristen Meyers '09
Ryan Bavis, Biology
Exercise Performance in Moderate Hypoxia in Rats with Impaired Carotid Bodies
A positive correlation between the resting hypoxic ventilatory response (HVR) and exercise at altitude has been found to exist in humans. Exposure to perinatal hyperoxia attenuates this hypoxic ventilatory response in mammals by impairing development of the carotid body, which is the main peripheral chemoreceptor responsible for sensing changes in oxygen levels. We used a rodent model to experimentally test the relationship between the HVR and exercise in the presence of carotid body impairment. Rats were exposed to 60% O_2 for the first two postnatal weeks. Adult rats (2-4 months) were run on a treadmill at various work intensities in both room air and moderate hypoxia to assess endurance (time to exhaustion at 20 m/min, 5˚ incline) and maximal rates of oxygen consumption (VO_2,max). Running times and VO_2,max were reduced by hypoxia in both control and hyperoxia-treated rats ($p< 0.001$). Hyperoxia treated rats displayed somewhat shorter times to exhaustion in moderate hypoxia than did controls (21± 2(SEM) vs. 29± 2min; $P<0.01$). However, VO_2,max measurements in hypoxia did not differ between treatment groups. Histology confirmed a significant reduction in carotid body volume of hyperoxia-treated rats ($P<0.01$). Results indicate that HVR and/or carotid body size may have modest effects on exercise performance in rats. This research is supported by NIH grant P20 RR-016463 (Maine INBRE).

Sabrina Miess '09
Georgia Nigro, Psychology
Anti-Tobacco Social Marketing Campaign: Meeting the Needs of Young Adults
A recent convenience sample of 18-24-year old young adults in Lewiston-Auburn revealed that 60% had used tobacco products within the past 30 days. Healthy Androscoggin (HA) seeks to provide better services to this particularly vulnerable age group, which is heavily targeted by the tobacco industry. The purpose of my service-learning study was to examine through which media this age range can be reached most effectively, which is the first step of the social marketing campaign HA is launching. In collaboration with HA, I designed a questionnaire and distributed it to the target group in Androscoggin

County. The measure addresses perceived benefits and costs of tobacco use, media accessed by young adults, and what support participants would consider helpful if they wished to quit their tobacco use. The results will empower HA to better serve the 18-24-year old community by meeting their potentially unique and specific needs.

Julie Miller-Hendry '09
Rebecca Fraser-Thill, Psychology
A Service-Learning Experience at the Cancer Resource Center at St. Mary's Regional Medical Center
The Cancer Resource Center at St. Mary's Regional Medical Center is run though a partnership with the American Cancer Society. The primary goal of the center is to provide patient education and referral to programs and services to any community member. The Resource Center has books, videos, and pamphlets available, as well as wigs and hats. The center also offers various programs, such as a monthly support group. Grants from the Avon Foundation and the Lance Armstrong Foundation have helped to increase the supplies and support staff for the center. Over the course of the semester, I spent a total of fifty hours volunteering at the Cancer Resource Center. By spending time at the organization, I was not only able to help the hospital, but also familiarize myself with the center and focus on research questions and projects for the benefit of patients. Volunteers are responsible for various office tasks, and are available for patients that are in need of information, visiting patients when permitted by the nursing staff, and informing patients and their families about the presence and the resources of the center. Beyond serving in a volunteer position, I worked closely with the American Cancer Society's representative, nurses, and the oncology social worker to determine and develop other projects.

Khin Min '12
Pallavi Jayawant, Mathematics
Applications of Linear Algebra – see Sean Auth '12 for abstract

Dylan Mogk '09
David Haines, Mathematics
Evolutionary Algorithms: An Introduction to Multi-Objective Problem Solving
Many real world problems involve multiple measures of performance that require simultaneous optimization. It is often the nature of these problems to have several conflicting objectives. When optimized simultaneously these competing objectives produce a family of solutions that individually would be considered sub-optimal, but as a group must be considered equivalent. The insight gleaned from the solution sets has proven to be valuable in many genres. One direct application is in the medical field. Multi-objective problem solving is used in combination with magnetoencephalography (MEG) to locate abnormalities in neural output in the human brain. Possibly the best means to find solution sets is through a search algorithm based of the principles of evolution, aptly called evolutionary algorithms.

Emily Morrill '09
Stephanie Richards, Biology
The Genetics of Autism Spectrum Disorders: Investigating ERK1 Dosage Effects
Autism spectrum disorders are more prevalent among young children than spina bifida, diabetes, cancer, and Down syndrome (Filipek et al., 1999). Since autism was first characterized in 1943, multiple studies have been launched to pinpoint its etiology. Copy number variance studies have discovered a microdeletion and reciprocal duplication of the 11.2 region on the short arm of chromosome 16 in as many as 1% of autism cases. ERK1 is one of the 25 genes within this deletion that is expressed in the brain and plays a role in neurodevelopment. This thesis researched the potential connection between abnormal ERK1 dosage and the phenotypes associated with autism. A review of the characteristics of ERK1-/- mice was provided and experiments utilizing similar transgenic mice were proposed to investigate the effects of abnormal ERK dosage on animal behaviors. Possible correlations between the behaviors of the transgenic mice and those of autistic individuals are discussed.

Nora Murray '12
Pallavi Jayawant, Mathematics
Applications of Linear Algebra – see Sean Auth '12 for abstract

Timothy Natriello '09 and Winthrop Rodgers '09
William Corlett, Politics
Civic Activism: Between the State and Society
This discussion on the role of civic activism is based on the intersection of Rodgers's thesis, "Reassessing Power Sharing: Theories of Democracy in Post Conflict Society," and Natriello's thesis, "Grounding Administration in Communication." Natriello and Rodgers are presenting their work in deliberative democratic theory. A discussion follows among the presenters, civic activists, and audience members regarding the practicality of deliberative theory and the prospects for democracy.

Mbali Ndlovu '09
Sue Houchins, African American Studies
The Underrepresentation of Black Women in Fashion
My study is based on the belief that media images (in print or on television) are powerful and reflect dominant societal values. Constructions of social categories (e.g., gender and race) can take visual form. Keeping this belief in mind, we can chart how notions of femininity and Blackness are visualized in the media. What does it mean, then, when a certain group is not visualized, or consistently depicted in a skewed manner? Due to the importance of the media in shaping our beliefs, social researchers George Gerbner and Gaye Tuchman believe that if a group is not represented in the media, its members are symbolically erased from existence. Based on the ideas outlined above, the apparent lack and misrepresentation of Black women in runway shows and magazines suggest that the power players of the fashion and beauty industries do not view Black women as integral subjects. Some questions that guided my thesis research are: What are the implications of such a lack? What does it mean that Black female models are consistently absent from fashion/beauty magazines? What does this lack reveal about beauty standards in the United States? Does this lack affect the way Black women think about beauty? To answer these questions, I use various methodologies: I perform content analysis of the advertisements in the magazines, as well as use one-on-one interviews of Black women students on campus to examine their reactions to the images in magazines.

Lucy Neely '09
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Mapping Food Security in Lewiston Using GIS
Many residents of Lewiston are subject to poverty, disability, and other factors that prevent them from having the security of adequate, available, accessible, and appropriate food. A team of researchers at the Lewiston-Auburn Campus of USM has been conducting a Community Food Assessment of Lewiston and using GIS to map food security, with the goal of identifying what populations are vulnerable to food insecurity and what changes in the city's food sources can be made to improve community food security. This project contributes two maps to that effort. One shows the distribution of Lewiston residents who qualify for food stamps compared to the location of stores that accept food stamps, and to the health and price level of those stores. The second shows the distribution of the African immigrant population in Lewiston and the location of stores that offer Halal meats.

Cody Newman '11
Meredith Greer, Mathematics
Chaos in Population Modeling
Chaos has been observed in many scientific fields for centuries, but has only recently been recognized as a mathematical property intrinsic to certain types of equations. In the rapidly advancing field of biological mathematics, equations that are susceptible to choas are often used to model populations. Classic population data sets such as May's temperate zone insects and Schaffer's Canadian lynxes can be

reanalyzed from a chaotic perspective to reveal a deeper understanding and justification of unusual results.

Charles Niquette '12
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Carolyn Nye '09
Michael Burman, Psychology
Involvement of Prefrontal Cortex and Dorsal Hippocampus in Fear Conditioning in a Rodent Model
If a previously neutral stimulus reliably precedes and predicts an aversive stimulus, an association is formed between the two in a process called classical fear conditioning. When the two stimuli overlap, a neural circuit involving the amygdala, required for emotion, is sufficient to support this association. However, if the two stimuli are separated in time, additional brain structures required for conscious memory formation are recruited. The current experiments seek to clarify this additional neural circuitry by training rats to associate a tone and a mild footshock that are separated by either 2 or 10 seconds. Previous work has suggested that the hippocampus may be preferentially required for forming aversive associations across the long temporal gap. In the current experiments we compare the effects of damage to the hippocampus alone with damage to the hippocampus and medial prefrontal cortex in forming associations across shorter or longer temporal gaps.

Kelley O'Connor '09
Katherine Mathis, Psychology
Predictors of a Termination of Parental Rights (TPR)
The purposes of this study were first, to determine the current predictors of a termination of parental rights case (TPR) and second, to examine if a significant difference exists between the number of termination of parental rights cases involving substance abuse before and after the establishment of the Lewiston Family Drug Court. Previous research indicates that over 70% of protective custody cases prior to the creation of the Lewiston Family Drug Court were drug related (Beliveau & Camire, 2007). Research also indicates the leading predictors of TPR are the length of a child's stay in foster care, a parent's continued drug use, and parent's failure to adhere to the court's reunification plan (State of Maine, 2003). An archival analysis was conducted on TPR cases two years before and after the founding of the Lewiston Family Drug Court. Results were analyzed in a series of regression, cluster, and chi-square analyses. Results will be used to improve interventions and promote parent awareness of their probability of facing a TPR. Understanding the predictors of a TPR and the effect of interventions, such as the Lewiston Family Drug Court, may help to reduce the overall occurrence of TPRs. This is critical in protecting more children and reunifying families that have been involved in protective custody cases.

Rachel Ogilvie '09
Susan Langdon, Psychology
The Effect of a Cognitive Dissonance Intervention on Maladaptive Body Attitudes
Research suggests that college-age females possess maladaptive eating attitudes that can be successfully reduced through cognitive dissonance interventions. However, no identified studies have measured cognitive dissonance or completed the dissonance intervention online. The current study used an online cognitive dissonance intervention to reduce maladaptive eating attitudes and behavior, while also taking psychological and physiological measures of the dissonance. The sample consisted of 65 female undergraduates who were randomly assigned to an online cognitive dissonance, online expressive writing, or online control condition. Each participant completed eating attitude and behavior measures as well as psychological and physiological dissonance measures at pre-test, post-test, and four week follow-up. Eating attitudes, and psychological and physiological measures were assessed in all three conditions. Implications for these findings provide information on eating interventions in the sphere of public health.

Eliza O'Neil '09
Heidi Chirayath, Sociology
Nurse-Doctor Relationships in Lewiston Hospitals
Stereotypes associated with nursing have endured in the medical profession for years. Through media depictions of nurses, American culture has skewed the image of nursing, devaluing and often fantasizing about the predominantly female-occupied profession. With a history of subordination stemming from the origin of the nursing profession, researchers unsurprisingly continue to cite instances of disrespect and intense subordination among nurses by doctors today. Furthermore, research shows many instances of nurses perpetuating this poor treatment by keeping frustration and anger about abuses to themselves. By conducting in-depth qualitative interviews with ten nurses in a small New England city, I address the question of the existence of nurse discrimination by doctors today, and explore contributing factors to these results.

Jaclyn Orloff '09
Kathryn Low, Psychology
The Association between Testosterone and the "See the Ball" Effect - see Valerie Beckwith '09 for abstract

Corey Pattison '09
Eric Hooglund, Politics
Exploring Muslim Politics at Bates and in the Field – see Caryn Benisch '09 for abstract

Matthew Paul '09
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Shannon Penney '09
Kathryn Low, Psychology
The Association between Testosterone and the "See the Ball" Effect - see Valerie Beckwith '09 for abstract

Erica Perlman-Hensen '09
Pamela Baker, Biology
Medicine, Law, and Physician-Assisted Suicide: Two Arguments in Support of Physician-Assisted Suicide and the Impact of the American Medical System on Its Legalization
This thesis addresses physician-assisted suicide (PAS) in America by discussing the relationship between PAS and the American medical system, and postulating reasons for PAS's lack of broader national support and acceptance. I make two major arguments in favor of legalizing PAS, one focusing on the positive consequentialist outcomes of PAS and the other concerning the deontological issues of autonomy and human rights relating to PAS. Additionally, I argue that the current American medical system's inadequacies contribute to the lack of wider legalization and support for PAS. I utilize statistical data collected by the State of Oregon since the legalization of PAS in 1997 and other sociological studies of healthcare perceptions to evaluate these bioethical arguments.

Griffin Peterson '09
Eric Hooglund, Politics
Exploring Muslim Politics at Bates and in the Field – see Caryn Benisch '09 for abstract

Michael Petrick '09
Diane Haughney, Politics
The Political Effects of Migrant Remittances in Latin America

This thesis investigates the political effects of migrant remittances in high migration areas of Mexico and Ecuador. Remittances have created an economic force that has grown in size and importance every year since 1980. Today, migrant workers send fifty billion dollars home to their families in Latin America. Of that fifty billion, over sixteen billion goes to families in Mexico and four billion to Ecuador. Much is known about the profound economic and social impact of remittances in these sending communities. Less is known, however, about their political impact in these communities. I investigate the link between high levels of remittances and changes in political participation. In order to measure any changes that remittances have on political behavior. I consider three different forms of participation: voter turnout rates in federal elections, political protests, and attendance and participation in community and social organizations. Information was collected through a study of election records, a review of newspaper archives, and personal interviews of migrant workers from throughout Latin America who currently reside in the United States.

Eric Pier '09
Rachel Austin, Chemistry
Synthesis and Characterization of Catalysts for the Conversion of Wood Waste into Fuels
Fischer-Tropsch Synthesis (FTS), developed in 1923, is a promising chemical process for the transformation of biomass into liquid hydrocarbon fuels by way of synthesis gas (CO and H2). Interest in FTS dropped after WWII with the advent of cheap oil, but rose again in the 1970s with the rising prices of oil. Current interest in FTS is driven by environmental and economic demands based on the unpredictability of fossil energy resources and the development of new technologies. It is a fruitful avenue for a renewable source of petroleum and produces the same type of fuel we already use, eliminating the need for new automobile engines. Current research aims to develop new catalysts that are more active, longer lasting, and less costly. The University of Maine has a three-year U.S. Department of Energy grant to develop new technologies for the rapid screening of catalysts. Chemists at Bates, Bowdoin, and Colby are involved synthesizing and characterizing catalysts and analyzing the fuels produced.

Laura Poppick '10
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Potential Tidal Power Regions in the Gulf of Maine
A portion of the energy demand of dense coastal Maine populations could be met by tidal power generated from Gulf of Maine currents. As tidal power infrastructure can obstruct local nutrient transport, and nutrients drive the fisheries essential to the state's economy, regions particularly sensitive to such a change in nutrient flux must be identified in considering potential tidal power regions. Using census maps, bathymetric maps, and surface current and tidal data, ArcGIS analysis locates regions with high energy demand and in close proximity to ocean currents that meet the 6-knot standard for tidal power generation. By comparing how these regions intersect with molluscan and baitworm habitats that drive important fisheries, this analysis ranks potential tidal power regions. A systematic demarcation of regions suited for tidal power in the Gulf of Maine could accelerate the state's consideration of utilizing tides as an alternative energy source.

Emma Posner '11
Karen Palin, Biology
Barriers to Vitamin D Treatment in the Somali Community of Lewiston, ME – see Annie Carlton '10 for abstract

Sami Qarmout '09
Eric Hooglund, Politics
Exploring Muslim Politics at Bates and in the Field – see Caryn Benisch '09 for abstract

Brian Quarrier '09
Holly Ewing, Environmental Studies
Land-Use History's Effect on Sediment Nutrients in Pleasant Lake, Casco, ME
Over the years land-use history has changed. Every type of land use has a different effect on its watershed. Areas that have more development and farming often have higher amounts of nutrients in their watersheds. Areas that are less disturbed have lower concentrations of nutrients. Lakes that have high concentrations of nutrients (eutrophic lakes) are more likely to have algal growth. Due to the drastic changes in water quality and chemistry caused by eutrophication, it is important to understand the different sources of nutrients. Land-use history was determined by using aerial photographs from 1942, 1964, 1980, and 2001. Sediment nutrients were determined by taking 50 sediment samples around the lake and analyzing them for percent organic matter and total phosphorus. Using GIS, I determine if there is any correlation between land-use history and sediment nutrients in Pleasant Lake.

Adam Ratner '09
Ryan Bavis, Biology
Assessing Learning and Memory of a Color Sequence in Zebrafish
The zebrafish (*Danio rerio*) has become a prominent genetic model today due to its quick reproduction, easily manipulated embryo, and mapped genome. Despite this growing interest in and involvement with genetics, behavioral assays focusing on learning and memory in zebrafish have been very scarce, with behavioral work in the fish world involving primarily goldfish (*Carassius auratus*). This study examines whether zebrafish can learn a two-step color discrimination sequence through appetitive conditioning. If successful, the learning capacity of zebrafish can be more accurately detailed and the fish model for genetics and behavior could be combined into the same species, removing any confounds with species-specific traits. In addition, the designed apparatus allows for future studies involving zebrafish to be conducted focusing on shape discrimination and color discrimination, among many other learning paradigms.

Matthew Reynolds '10
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Alexandra Rice '09
Krista Scottham, Psychology
The Effect of Gender on Sexual Fluidity
The purpose of this study is to explore how males and females at Bates College experience fluidity in their sexual orientation(s). Previous research has indicated a high prevalence of fluidity in sexuality among females, but a lesser understanding of the nature of fluidity in sexuality among males. Approximately 75 participants between the ages of 18 and 22 took part in this research through the completion of a Web-based questionnaire. Findings support previous research with respect to sexual fluidity and shed additional insight into the experience of sexuality among males.

D. Russell Richie '09
Katherine Mathis, Psychology
The Role of Attention in Verb Learning from Impending and Ongoing Models
Previous research has demonstrated that 24-month-olds comprehend and produce verbs learned under impending conditions (verb modeled before action) better than verbs learned under ongoing conditions (verb modeled during action) (Tomasello & Kruger, 1992). Tomasello and Kruger theorize that the ongoing condition's inferiority may lie in its increased attentional demands: infants must attend to both the modeled verb and its referent action. The current study aimed to replicate their work and test this and an alternative theory. In a 2x2 mixed factors design, participants learned verbs taught under both conditions and completed a parallel attention-demanding task in one condition. Approximately forty two-year-olds participated. Data were analyzed with two 2x2 ANOVAs (for comprehension and production of

the modeled verbs) and a two-sample, two-tailed t-test (for performance on the attention task). Implications for theories of verb learning are discussed.

Molly Ritner '09
John Baughman, Politics
Judging Judicial Selection: The Effect of Judicial Elections on Court Decisions
The structure of each state's judicial system is left to lawmakers, resulting in the use of a plethora of selection mechanisms to fill state judgeships across the United States. Controversies concerning the best judicial selection mechanism have plagued states since the Jacksonian Era. The question remains: Does the manner in which judges are selected and reselected affect how justice is rendered in state courts? Previous research, studying the effects of judicial elections in death penalty cases, shows a trend towards more conservative decision-making on the bench in response to electoral variables. This study examines judicial decisions in search-and-seizure cases in state courts of last resort across three election mechanisms: partisan, nonpartisan, and retention elections. Expanding the research to examine more common criminal cases, such as those involving search-and-seizure issues, in six states of varying ideological leanings tests whether the unidirectional shift toward more conservative decision making is consistent across cases and states. The study also examines variations in decision making between different types of election mechanisms. The results inform the debate over judicial selection mechanisms by exploring the manner and extent to which judicial selection mechanisms effect how justice is rendered in state courts.

Winthrop Rodgers '09
William Corlett, Politics
Civic Activism: Between the State and Society – see Timothy Natriello '09 for abstract

Sherraine Rodney '09
Michael Sargent, Psychology
Is It All Just Black and White? Dehumanization and Its Impact on Implicit Judgments of High and Low Prototypicality Blacks
Previous research suggests that images depicting Black Americans have often portrayed them in a negative light, such as portrayals of Blacks as criminals in film. Sometimes these images have been dehumanizing in nature, portraying Blacks as apelike in their physical features. Recent work suggests that exposure to such images may create negative mental associations with Blacks, perhaps leading individuals to associate Blacks with nonhuman animals, such as apes. The purpose of this study is to examine that set of issues. Would participants classify ape images as apes faster after viewing Black faces or White faces? Would such an effect be less likely to occur with light-skinned Black faces than dark-skinned Black faces? The present study predicts the latter.

Ana Nicole Rodriguez '09
Rebecca Herzig, Women and Gender Studies
Beyond the Black Binder: The Body as Subject – see Kathryn Conkling '09 for abstract

Elizabeth Rogers '09
Ronald Barry, Biology
Black-legged Tick* (Ixodes scapularis*) Occurrence, Burdens of Small Mammals, and Infection Rates by* Borrelia burgdorferi *in Southwestern Maine
Lyme disease is the most common vector-borne disease in the United States and is especially prevalent in coastal regions of the Northeast. The etiologic agent of Lyme disease is the spirochete bacterium, *Borrelia burgdorferi,* which is transmitted by the black-legged tick, *Ixodes scapularis*. Larval and nymphal ticks obtain the spirochete by parasitizing the white-footed deer mouse, *Peromyscus leucopus.* Six inland deciduous forest sites in southwestern Maine were sampled in 2008 for the distribution and prevalence of *I. scapularis.* Infestation rate (percentage of individuals infested) was 88%. Median tick

burden (ticks per individual) for initial captures was 4; median tick burden for infested individuals was 4.5. Minimum infection rate (MIR), determined by a Direct Fluorescent Antibody test for 186 larvae was 22% and for 28 nymphs, 29%. Tick burdens and MIRs were considerable, suggesting the geographic spread of vectors and spirochetes inland from heavily infested coastal southern Maine.

Ryan Rollo '09
Tom Wenzel, Chemistry
A method of determining enantiomeric excess using NMR spectroscopy
Nineteen and Twenty amino acids are chiral, “left handed” enantiomers, and fifty percent of all pharmaceuticals are chiral. One enantiomer can be an active drug while the other lays dormant, is slightly active, or is actually toxic. Separation of enantiomers offers solutions to problems occurring with racemic drugs. With growing emphasis on green chemistry, and the fact that many drugs require water solubility, it is important to make use of water-soluble chiral-solvating NMR shift reagents.The effectiveness of a novel method of determining enantiomeric excess using the water-soluble, optically pure, chiral-solvating shift reagent (CSA) sodium 3-(3-((2-carboxypyrrolidin-1-yl)methyl)-2,4-dihydroxyphenyl)propane-1-sulfonate (SCR-PRO) is studied by hydrogen nuclear magnetic resonance spectroscopy (H^1 NMR). A variety of alkyl and alchol amino derivatives are synthesized through the addition of bicyclic aromatic functional groups to complex with SCR-PRO. This method is compared to a study of commercially available (18-Crown-6)-2,3,11,12- tetracarboxylic acid not requiring derivatization of the amine substrates.

Daniel Roop '10
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Mapping the Impact from Volcanic Activity at Yellowstone National Park
Unbeknownst to many, Yellowstone sits atop an active volcano and one of the world's largest lava filled calderas underlying 40% of the park's subsurface. Future volcanic activity at the National Park could significantly impact the surrounding ecological habitat and park infrastructure. GIS and research on the projected extent of volcanic eruptions are used to develop hazard maps. These maps illustrate current and past seismic activity, thermal vents, surface geology, and tourist and wildlife habits and the potential damage from a volcanic eruption at the park based on spatial analyst and joining techniques.

Kimberly Russell '09
Rachel Austin, Chemistry
Lead Binding in Metallothionein-3 and Other Cysteine-rich Compounds
Metallothioneins (MTs) are proteins rich in cysteines. MTs are known to naturally coordinate Zn2+, for this reason it is thought that MTs will coordinate heavy metals. Metallothionein-3 (MT3) is a protein specific to the brain and central nervous system. MT3, also known as the growth inhibitory factor (GIF), inhibits the growth and survival of neurons. MT3 has been connected to Alzheimer's disease (AD), and initial studies have indicated that brains of persons with AD are deficient in MT3. If MT3 binds lead it is thought that it could explain some of the neurological effects associated with lead poisoning. Unlike other MTs, MT3 will compete for available zinc and it is found only in the brain and central nervous system. This research focuses on lead binding to MT3 and other cysteine rich compounds as well as the stability of Pb-MT3 complexes to determine if lead-protein binding is under thermodynamic or kinetic control. A cysteine-rich peptide, HIV-CCHC was used to test titration and monitoring techniques. MT3 and other compounds were titrated with a Pb-standard solution and the binding of lead was measured by monitoring lead-thiolate charge-transfer bands in the 200-400 nm range. This research will help further develop our understanding of metal-protein binding and mechanisms that might be involve in lead poisoning.

Stuart Ryan '09
William Ambrose, Biology
Growth Rates of the Hairy Cockle (*Clinocardium ciliatum*) across the Barents Sea Polar Front
Atlantic and polar water masses meet in the Barents Sea along the Polar Front, enhancing primary production and benthic biomass. We collected hairy cockles (*Clinocardium ciliatum*) from a transect across the Polar Front to examine the relationship between water mass and cockle growth, and to relate interannual variation in growth to environmental conditions. Using calcein dye the annularity of *Clinocardium*'s lines was confirmed. Preliminary results indicate that Atlantic cockles grow faster than polar cockles. The Arctic Climate Regime Index explained over 40% of interannual growth variability, indicating that regional climate trends strongly influence bivalve growth. Stable carbon isotope signatures from muscle tissue indicate that the diets of bivalves residing in different water masses vary in composition, possibly a result of phytoplankton dynamics and grazer composition. Water mass appears to influence the input of biogenic material to the benthos, however large scale climate trends appear to govern productivity across water masses.

Rachel Salloway '09
Áslaug Ásgeirsdòttir, Politics
Preventive Health Care for Incarcerated Women
Due to high rates of substance abuse, homelessness, and mental illness, incarcerated women represent a high risk population for infectious diseases, sexually transmitted infections, and unwanted pregnancies, among other health issues. Despite the high rate of medical problems, a large portion of this population does not access medical care when not incarcerated, primarily due to high costs. This study evaluated the health needs of women incarcerated at the Rhode Island Adult Correctional Institute during spring 2008 and concluded that the prison setting serves as a unique opportunity to provide health care to a medically-underserved population. Specifically, the research focused on preventive health care measures, such as cancer screening, infectious disease testing, immunization, and smoking cessation programs, and determined that not only is there a need for prisons to increase their preventive interventions, but an interest from the incarcerated women in these services.

Erin Sienkiewicz '09
Lee Abrahamsen, Biology
The Effects of Hyperbaric Oxygen Therapy on Cytomegalovirus
Cytomegalovirus (CMV) is a double-stranded DNA herpesvirus surrounded by a lipid envelope. CMV infects 50 to 80% of the adult population, but symptoms of the acute infection are often completely subclinical. The virus often infects opportunistically among immunocompromised patients, such as HIV/AIDS patients and organ transplant recipients. Hyperbaric oxygen therapy (HBOT) is used to treat a variety of conditions including chronic wounds and carbon monoxide poisoning. HBOT is also being studied for use in treating viral infections. It has been shown to relieve HIV/AIDS related fatigue and has also been found to reduce the amount of free virus in the blood plasma of HIV-infected patients. Our study investigates the effects of HBO on the growth of CMV in cultured human embryonic lung (HEL) cells. Infected HEL cells were exposed to clinical levels of HBO (100% oxygen at a pressure of 2 atmospheres) for 90-minute sessions over five days. Viral growth was measured using a standard plaque assay.

Andrew Simon '09
Helen Boucher, Psychology
Motivated Self-Perception and Perceived Subjective Temporal Distance in Recall of Autobiographical Memory
Building on past research that found evidence for motivated self-perception as well as differences in subjective temporal distancing from past events, the present study examined motivational influence on the perceived subjective distance of autobiographical memories. Student participants were induced to believe that introversion is conducive of success or failure and then asked to recall a recent past personal

experience related to introversion. High self-esteem participants in the introversion-success condition felt closer to their generated experiences than those in the introversion-failure condition, whereas low self-esteem participants reported no differences in subjective distance. Additional findings revealed that the effect of condition (introversion-success or introversion-failure) on changes in self-perception was mediated by the perceived subjective distance with which memories were recalled.

Scott Sinisgalli '10
Karen Palin, Biology
Barriers to Vitamin D Treatment in the Somali Community of Lewiston, ME – see Annie Carlton '10 for abstract

Benjamin Smeltzer '10
Lilian Childress, Physics
Quantum Optics
This independent study course centers around studying quantum mechanical effects in a defect center in diamond, the NV center. In particular, the electronic spin of a single NV center can be easily manipulated, in this case using a magnetic field, and measured, using a laser. This makes the NV a practical system for carrying out experiments exploring theoretical predictions based on quantum theory. The poster will present the results of experiments carried out in lab demonstrating the behavior of a spin in static and oscillating magnetic fields. The easy manipulation of spin in the NV center not only serves as a great aid to learning about quantum mechanics, but also has practical applications in the realm of quantum information science.

Alexis Smith '09
Lavina Shankar, English
Female Longing for Home in Jhumpa Lahiri's **The Namesake**
Jhumpa Lahiri politicizes the notion of home in contemporary American literature, revealing that the burden of domestic longing and homemaking falls most heavily upon women during times of transition and unrest. In her novel, *The Namesake*, Lahiri reveals that longing for home among Bengali female immigrants threatens to eclipse their belonging. This presentation addresses the extent to which Lahiri's female protagonist, Ashima, translates this longing into belonging, relinquishing limiting cultural expectations and longings in order to assimilate to America. Through negotiating between the forces that aid her assimilation and those that preclude it, Ashima maintains her autonomy and resists a paralyzing longing for home. Ultimately, this presentation illuminates Lahiri's literature as a form of restoration. Through her realization of Ashima as a woman who writes her own American life, Lahiri redresses the marginalization of female immigrants in contemporary America.

Courtney Stachowski '10
Heidi Chirayath, Sociology
Factors Affecting Women's Access to Contraception: A Case Study on Six African Countries
Sub-Saharan Africa has one of the highest fertility rates in the world. The push toward fertility awareness has become crucial in curbing population expansion in regions lacking resources to support such growth. However, the low utilization of modern contraceptives has left many African countries behind in the global fertility transition. Through a case study of six African countries, this paper explores the factors affecting access to contraception including spousal attitudes, socioeconomic status, education level, place of residency, and belief in traditional versus modern medicine. At this time, the results and conclusions have yet to be determined.

Kristina Stafstrom '09
Stephanie Richards, Biology
Identifying the NLS of RSK2
RSK2 (p90 ribosomal S6 kinase 2) is a protein found in our cells that activates other proteins by chemically adding phosphate groups to them. This phosphorylation results in a functional change of the target proteins that stimulates growth control. RSK2 is initially in the cytoplasm of the cell, but has been found in the nucleus as well. This suggests that it functions in the nucleus to activate transcription of certain growth genes. Serious consequences occur if RSK2 is not functioning properly. Studies have confirmed RSK2 as the gene involved in Coffin-Lowry Syndrome (CLS), in which patients have an inactive form of (mutated or absent) RSK2 protein. This genetic disorder is characterized by facial dysmorphism, digit abnormalities and severe psychomotor retardation. By contrast, certain types of cancers may be caused by the constant RSK2 signal to produce growth factors. For example, RSK is overexpressed in approximately 50% of human breast cancer tissue samples and prostate cancer tissues compared to the normal tissues, suggesting that regulation of RSK has been compromised in both of these cancers. The most recent studies have indicated RSK2 overexpressed in pancreatic cancer. Therefore, RSK2 is an important protein to study because of its involvement in CLS and these common cancers.

Susannah Stone '09
Rebecca Sommer, Biology
Physical and Gene Expression Effects of Developmental Arsenic Exposure on the Induction of Type II Diabetes
Significant epidemiologic studies show increased prevalence of type II diabetes mellitus in human populations chronically exposed to arsenic, a naturally occurring toxin found in approximately 30% of the private drinking wells in Maine. While the reasons behind the association of arsenic with type II diabetes is unclear, preliminary laboratory work in mice shows that exposure to arsenic may cause symptoms consistent with type II diabetes. This study examined blood glucose and gene expression levels in adult mice exposed to relatively low levels of arsenic early in their development.

Paul Suitter '09
John Baughman, Politics
A State House Divided: The Affects of Legislative Term Limits on the Policymaking Process of the Maine Legislature
As the term-limits movement swept over the United States in the early 1990s, Maine became the fifteenth state to adopt a law constraining its state legislators. Because Maine was the only state to include a retroactivity clause in its statue, it became the first state in the nation to implement term limits in 1996. While the modest amount of scholarship dedicated to legislative term limits has focused on legislators' personal viewpoints concerning term limits and how legislatures interact with other players in government, this thesis investigates the effects of increased legislative turnover (as a result of legislative term limits) upon the institutional and policymaking processes within the Maine State Legislature. Because Maine is at the cusp of its "third generation" of term limited legislators, a unique opportunity is available to study both the long-term and immediate impacts of implementing term limits. By examining various aspects of the policymaking process over the past twenty years, including roll call votes in joint standing committees and votes on the floors of the Maine Senate and Maine House of Representatives, this thesis sheds new light on how term limits can affect a legislature's key facets such as partisanship, consensus-building, committee power, the power of party leadership, and cooperation between the House and Senate.

Nicholas Swerdlow '09
Paula Schlax, Chemistry
***The Role of Transcript Length in the Translational Regulation of RpoS in* Borrelia burgdorferi**
The alternate sigma factor RpoS (σ^s) controls the expression of key virulence factors in *Borrelia burgdorferi*, the causative agent of Lyme disease. These virulence factors facilitate the bacterium's

transfer from the *Ixodes* tick vector to a mammalian host and subsequent mammalian infection. The regulation of the *rpoS* gene is dependent upon the ability of the small ribosomal subunit to bind the 5'-untranslated region of the mRNA. Our research investigates the effects of a long untranslated 5' leader sequence on translational initiation. Ribosome binding studies using nitrocellulose filter binding indicate that the affinity of the small ribosomal subunit to a short (-51 nt) *rpoS* mRNA ($K\sim 4x10^7\ M^{-1}$) is slightly higher than the affinity to a long (-171 nt) transcript ($K\sim 2x10^7\ M^{-1}$). Additionally, the fraction of mRNA that binds to the ribosomal subunit depends on transcript length. Translational efficiency assays demonstrate that the translation of the short transcript is significantly more efficient than the long. Our results suggest that the long transcript folds into a structure that inhibits translational initiation. By understanding the translational initiation and regulation of this virulence gene we will contribute to the understanding of the life cycle of this important pathogen.

Chloe Tennyson '09
James Hughes, Economics
Price Discrimination in Car Sales
Several experiments have been conducted which investigate the potential for measurable price discrimination in car negotiations. These studies have been illustrated through multiple papers by Ian Ayres and Peter Siegelman, with further results tested by Fiona Scott Morton. These studies suggest, through formulaic experimentation, significance in discrimination toward Blacks and women in initial pricing for new car sales. Currently, evidence cannot prove a consistent level of discrimination, or "disparate treatment," among those same customers. This study offers a nonexperimental appropriation of data from one Chevrolet dealership in Livonia, Michigan. Through investigation of true data over a ten-year period at this dealership, the study investigates discrimination, evidenced at a deal's close, as opposed to experimentation in deal-making.

Dillon Tung '09
Meredith Greer, Mathematics
Applying Goggle's Pagerank Algorithm to the Ranking of College Basketball Teams
Google is one of the most ubiquitous sites on the Internet. The Pagerank algorithm, which quantitatively rates each Web page's importance, is one of the key pieces behind its success in revolutionizing the search engine. The Pagerank algorithm is a beautiful application of linear algebra, making use of stochastic matrices and the Perron-Frobenius theorem to guarantee a unique solution. The algorithm can be generalized to rank other items, including teams and players in sports. I use a generalization of the algorithm to rank each team in Division I college basketball and demonstrate its flexibility in handling multiple statistics beyond margin of victory.

Gabriella Vannoni '09
Lee Abrahamsen, Biology
A Preliminary Study of Learning by Secondary School Students Using Hands-on versus Computer Simulation Laboratory Methods
Learning science is a combination of gaining factual knowledge, applying that knowledge to ask questions, and conducting experiments to answer them. In recent years science education has been struggling to receive the funding that it needs in order to finance the experimental learning that is so important to the construction of students' own scientific frameworks. The lack of funds has a significant effect on schools' abilities to support hands-on experiences for students in science classrooms. Most recently there has been a push to move from hands-on or "wet" labs to less expensive computer simulations with the hope that both formats can produce similar learning outcomes. In this study, we compared learning outcomes, based on test scores, from two activities that were done as both field experiences and computer simulations. Four classes of ninth grade students participated in measuring tree heights and measuring the rate of water flow in a stream. Two classes did hands-on experiences and two classes did analogous computer simulation activities. Composite data for the entire group of 59 students revealed no significant differences in test scores between the hands-on and computer simulation groups.

However, when data was analyzed by gender, we found that girls earned significantly higher test scores than boys when the group participated in hands-on experiences. Conversely, when the groups participated in computer simulations, the boys earned significantly higher test scores than the girls. This suggests that a combination of hands-on labs and computer simulations can be a successful approach to teaching science.

Gabriella Vannoni '09
Karen Palin, Biology
Barriers to Vitamin D Treatment in the Somali Community of Lewiston, ME – see Annie Carlton '10 for abstract

Alina Volobuyeva '11
Paul Kuritz, Theater
371 Film Festival – see Kevin Chambers '10 for abstract

Maren Vouga '09
Georgia Nigro, Psychology
Barasho ingriisi*: Somali Children Learning English in Head Start*
Global migrations that have occurred in the past few decades have challenged school systems to extend the traditional curriculum and reach out to culturally and linguistically diverse students. A body of research addressing the immigrant experience in U.S. schools has accompanied the trend of global migration and grown exponentially in the past couple of years. This research has formed the basis of much policy reform in the field of education. However, changes in policy do not necessarily predict changes in practice, and many educational institutions continue to struggle to accommodate their students' cultural and linguistic differences. The present study was an ethnographic case study of the Somali students in two Head Start classrooms in Lewiston, Maine. The aim of the study was to present the teachers of both classrooms with curriculum that would maximize their English language learners' (ELLs') language acquisition. I conducted classroom observations, and designed and implemented an eight-week, small-group, book-based intervention. Data came from field notes and teacher assessments based on Creative Curriculum, the curricular approach used by Androscoggin Head Start. In the thesis, I discuss both the ELLs' experiences with the standard classroom curriculum and the intervention as a sustainable tool for teaching future ELLs.

Leslie Wade '09
Lilian Childress, Physics
Electromagnetically Induced Transparency in Rubidium Vapor
Electromagnetically induced transparency (EIT) is an experimental technique for causing transparency in a medium ordinarily opaque to a certain frequency range of light by eliminating the medium's interaction with it. EIT is observed when two optical fields are adjusted to interact with a three-state quantum mechanical system in a medium. One optical field is set near resonance to a transition between two of the three quantum states, while the other is set near resonance with a different transition within the three-state system. The result is optical pumping into a dark state, which eliminates the medium's effect on the two optical fields and allows transparency at a specific frequency range. I studied and present a qualitative and quantitative approach to understanding the theory fundamental to EIT. In addition, I built a Rubidium vapor cell experiment to observe EIT and explore its applications.

Elise Walsh '09
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Analysis of Food Accessibility for Nutritionally At-Risk Single Parent Households that Depend on WIC Vouchers to Obtain Nutritious Food Using an ArcGIS Model
In the 2000 census year 25-40% of Lewiston, Maine's downtown residents lived below the poverty level. Low socioeconomic status is often associated with poor diet and poor health (Vasquez-Jacobus and Harris

2007). Women and their infants and children (below the age of five years old), with income meeting national guidelines are considered nutritionally vulnerable and are eligible to receive nutritious food through the Supplemental Nutrition Program for Women, Infants, and Children (WIC). This study uses ArcGIS and census data to assess food accessibility by focusing on the location of grocery stores and corner markets in relation to WIC eligible residences, and identifying which grocery stores and markets accept WIC vouchers. A distance analysis is used to quantify how easily food is available to each household.

Sheena Washington '09
Krista Scottham, Psychology
Fitting into a Jigsaw Puzzle: Minority Students' Perspectives of Bates College
Like many predominantly White institutions, Bates has struggled with providing an atmosphere where students of diverse backgrounds feel welcomed. Nevertheless, Bates has worked very hard over the years to improve racial climate through a set of initiatives. Although the institution has evaluated the effectiveness of its programs and initiatives, less has been done to examine the effects of these programs on the overall general climate over time. In this qualitative study, ten male and female undergraduates from traditionally underrepresented racial groups (e.g., African, Native, Hispanic, and Asian American) were interviewed about their perceptions of Bates College and their participation in and experiences with Bates' diversity initiatives. This information was compared to data from Bates alumni to examine whether underrepresented students' perceptions have changed over time. These findings will provide information to Bates about the effectiveness of new initiatives in improving the overall perceived racial climate.

Michael Watson '09
Ryan Bavis, Biology
The Aural Study of Nocturnal Bird Migration over a Fine Spacial Scale
Bird migration has been studied aurally since the early 1900s. Recent advancements in audio technology and the study of migratory calls have greatly enhanced the ability to study nocturnally migrating birds, which are difficult to study by pure observation. Nocturnal migratory calls were recorded for two weeks in October in Gardiner, Maine, at three different sites. Looking at the differences in call rates between sites provides insight into the variation of migratory calls over a fine spacial scale. The call recordings can also be broken down by species, giving insight into migratory patterns on a species-specific level. Already in this study, the nocturnal migration of Pine Siskins (*Carduelis pinus*) has been clearly seen at all three different study sites. The Pine Siskin is believed to only migrate diurnally, but this study clearly shows it migrates nocturnally as well.

Amy Werblin '09
Michael Sargent, Psychology
God for President: Religiosity, Policy Content, and Political Endorsement in Voting Behavior
The merits and disadvantages of prayer in public schools are contentious in religious and political spheres, where outlooks are varied. This study examines how voter behavior on a policy that is either in favor of or opposed to prayer in public schools is influenced by political party endorsement and religiosity. Current research indicates that political party endorsement strongly influences voters' choices, even when the content of policy has negligible effects (Cohen, 2003), but questions remain as to the limits of this effect. This study expands Cohen's model by investigating the ways in which religiosity of particular voters interacts with the content of a pro, or anti-prayer policy as well as partisan endorsement of that policy. Predictions imply an interaction will occur between religiosity and political party endorsement.

Madeline White '09
Eric Wollman, Physics
Computational Models of Stars
While it is possible to use optical telescopes to observe the exterior properties of a star, these same optical telescopes cannot probe the interior of a star. Computational models of the stellar interior must be used to gain such information. Constructing a computational stellar model involves solving a system of four differential equations, which describe the structure of a star, at a discrete set of positions within the star. The output is a table of values for the physical properties at each position. I am studying the theory on which the four equations of stellar structure are based, and I am using MATLAB to write my own code for computing the model. I will verify my model by computing a model of the Sun, for which reliable models already exist. I will then explore how chemical composition and mass can affect the properties of a star.

Sadie White '09
Sawyer Sylvester, Sociology
Effect of the Discovery of Wrongful Conviction on the Death Penalty Debate
Wrongful conviction is one of the most pressing issues in the criminal justice system. Though research has uncovered some of the leading factors generating this problem, there is still far more of what is unknown about wrongful conviction. Consequences of wrongful conviction are profound. This thesis attempts to examine what is known about this injustice, the effect of the discovery of wrongful conviction on the death penalty debate, and the initiatives started or reforms proposed in an attempt to reduce the frequency of wrongful conviction. This thesis hopes to convey the importance and urgency of the problem of wrongful conviction, especially as it exists alongside the death penalty in the United States.

Laura Will '09
Katherine Mathis, Psychology
Effects of Media Literacy Education on Body Image and Self-Esteem in Adolescent Girls
Recent research has highlighted that some messages in the media targeted to women have negatively affected young women's self-esteem and body-esteem (Bergsma & Carney, 2008; Galician, 2004). Media literacy education is a comprehensive approach to deconstructing, analyzing, and resisting media's role in the decline in healthy habits. The current study employed the values and strategies of media literacy education to investigate the impact of a six-week program involving activities such as content analysis of teen magazines and novel definitions of ideal beauty on self-esteem and body-esteem in ten pre-adolescent girls at the Boys & Girls Club of Auburn. This study used a pretest/posttest design to assess changes in self-esteem, body-esteem, body satisfaction, body perception, and locus of control. The hypothesis predicted that after the intervention participants would report higher levels of both body and self esteem, lower levels of body-dissatisfaction, and greater internal locus of control.

C. Challen Willemsen '09
J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies
Possible Habitats for Orchid Species in Maine Using GIS Models
This project develops a GIS (Geographic Information System) model based on environmental variables to map potential habitats for the wild orchids of Maine. The specific objectives include correlating known species occurrence to environmental parameters and developing a model to predict the possible habitats of the different species. The orchid family represents the largest flowering plant family in the world. In places with marked summer and winter seasons, such as the New England area, orchids are terrestrial, usually herbaceous perennials. There are 53 species and varieties of orchids in Maine. Of these, 13 are rare, threatened, or endangered. Like all plants, each has its own habitat range, based mostly on vegetation cover or forest type, which in itself varies according to soil composition, temperatures and precipitation. Conservation of orchids in Maine is not direct – the protection of a species depends on the protection of its natural habitat. As a means of identifying which species of orchids lie within conservation lands, a GIS model can be developed that demarcates possible habitats within the state, based on GIS information on soil type, precipitation, temperature, altitude, forest cover, and conservation

status. The analysis will use data provided by the Maine Office of GIS through their online library. The combined data will be used to make maps of the different counties, pointing out overlapping data showing habitats conducive to the existence of each species. Such a model might prove to be an important tool in identifying orchid populations and in determining the conservation status of their respective habitat.

Clark Winchell '09
Robert Thomas, Biology
Effects of Rising CO_2 Levels on the Germination of Asiatic Bittersweet (*Celastrus orbiculata*)
Recent studies have shown that increased CO_2 levels induce varying response on plants species. While many plants experience a positive reaction to enriched CO_2, it has been observed that pollenization and germination in some species exhibit adverse effects in CO_2 enriched environments. General trends have yet to emerge in the field and work is currently being done on crops and additional species to determine potential ramifications. Understanding the response of invasive species will aid in the comprehension of future ecological concerns and delineate the parameters necessary for future management. Asiatic bittersweet was tested to determine if a positive response occurred under enriched CO_2 conditions. Seeds of invasive bittersweet were germinated in an ambient CO_2 chamber (~390 ppm) and in an elevated CO_2 chamber (~700 ppm). Germination rate, germination time were analyzed. Asiatic bittersweet experienced a negative correlation to increased CO_2.

Molly Wolkin '09
Michael Sargent, Psychology
Implicit and Explicit Perceptions Regarding Depression and Bipolar Disorder
Past studies have used explicit measures to assess the extent to which people hold negative attitudes toward bipolar disorder and depression. Results indicate that people explicitly describe those with bipolar disorder as more violent or dangerous than those with depression. The purpose of this study is to determine whether or not these findings hold true using implicit measures. In addition, certain personality measures will be administered in order to determine which factors correlate with tendencies to implicitly or explicitly associate bipolar individuals more with danger or depression more with sadness.

Irene Wood '09
Lee Abrahamsen, Biology
Creating a HPV Educational Protocol for Young Women at the Transitional Living Program, New Beginnings
Genital human papillomavirus (HPV) is ranked as one of the most common sexually transmitted infections (STIs) in the United States. Sexually active young women have a cumulative prevalence of HPV infection of up to 82%. Although many genital HPV infections are transient, if an HPV infection is not properly followed up, it can develop into cervical lesions that are potentially precancerous. Understanding the dynamics of the infection as well as the importance of follow-up treatment is key for decreasing the incidence of HPV infection. My thesis focused on developing a public health educational protocol targeted to the adolescent and young adult female population. The education protocol was implemented over five educational sessions with a group of young women living at the Transitional Living Program (TLP) of New Beginnings. Knowledge before and after the implementation of the educational protocol was assessed to determine whether the protocol helped expand the test group's understanding of HPV. The participants also helped to create an educational pamphlet about HPV for young women by young women to be distributed at New Beginnings as well as other free clinics in Lewiston/Auburn.

Tamara Wyzanski '09
Rebecca Herzig, Women and Gender Studies
Beyond the Black Binder: The Body as Subject – see Kathryn Conkling '09 for abstract

Kristen Young '09
Ryan Bavis, Biology
Effects of Perinatal Hyperoxia on Hypoxic Ventilatory Responses in Mice
Exposure of animals to high O_2 (hyperoxic) environments during the first few weeks after birth may have permanent effects on respiratory function. When babies are born prematurely, they are often exposed to hyperoxic levels, which may permanently alter their breathing. In order to better understand the developmental effects of hyperoxic levels on humans, more animal studies must be completed. I am testing how hyperoxic exposure in mice in the first few weeks after birth affects ventilation later in life.

Alexia Zhang '10
William Ambrose, Biology
Growth Rate and Long-Term Abundance Patterns of the Bloodworm,* Glycera dibranchiata*, Mid-Coast Maine
I measured growth rates of commercially important bloodworms, *Glycera dibranchiata,* on four mudflats in Maine. In late May, I placed 200 bloodworms in 15 m^2 corrals located at two sites in Freeport and two sites in Wiscasset. Bloodworms increased their weight an average of 64.2% after one month, and 56.5 % after two months. Bloodworms seeded in mid-July and dug after one month decreased in weight an average of 17.5%. Worms at Oak Island grew an average of 32.83% and worms at Rattlin Bridge grew an average of 16.15% after one month in bottomless buckets. These results indicate that worms can grow rapidly. Mean densities of *Nereis virens*, the primary food source for bloodworms, were compared among all sites. Long-term abundance patterns on a flat protected from digging indicate that bloodworm densities fluctuate dramatically possibly in response to environmental conditions.