



## Abstracts

FRIDAY, 1 APRIL 2011  
PETTENGILL HALL ~ SCHAEFFER THEATRE  
OLIN ARTS CENTER  
BATES COLLEGE

## *The Mount David Summit*

The Mount David Summit is an annual celebration of student research, artistic work, and community-based scholarship at Bates College. Each year students from all classes present their work to each other and to faculty, staff, family, and community members in a symposium format at the end of the winter semester. The Summit spotlights the rich and varied academic activities of Bates students across the disciplines, and honors the vibrant intellectual life of the College.

Named for the landmark "mountain" on the campus, the Summit is guided by the motto of the College  
—Amore ac Studio—  
loosely translated, With Love and Zeal, With Ardor and Devotion—  
devotion to scholarship, creativity,  
and the life of the mind.

The Mount David Summit is sponsored by the Office of the Dean of the Faculty.  
We are grateful to Ralph T. Perry '51 and Mary Louise Seldenfleur,  
who have been generous and devoted supporters of the Summit since its first year.

### ~ ABOUT THE 2011 MOUNT DAVID SUMMIT ~

The 2011 Mount David Summit, held on April 1, features the research, creative work, and performances of over 350 students from all Bates classes. It is organized into four sessions, three in the afternoon and one in the evening. The presentation abstracts are published in this booklet; the schedule of events for the summit is available in a separate booklet or on the Web.

The faculty believes that each Bates student will develop into a scholar in his or her own right, and will be ready to articulate and defend his or her ideas in a public forum. The College's General Education program, major programs of study, and the senior thesis/senior project requirement are designed both to prepare students and challenge them to conduct original research and contribute to our knowledge of the world. Many students who present their work at the Mount David Summit are senior thesis writers, approaching the summit of their academic career at Bates. Their presentation—which might be a research poster or a short, 15-minute talk—represents hundreds of hours of work, remarkable dedication to their studies, and a synthesis of all that they have learned at Bates. Other presenters are at different points in this journey; they may be in the process of developing the skills and insights that will serve their thesis work in the future. The artists who participate in the summit—the poets, fiction writers, dancers, musicians, and photographers—bring to their work a combination of technique, cultural and intellectual context, ways of thinking and seeing the world, and raw talent that is nurtured in a liberal arts environment.

The role of faculty advisors in the kind of individualized education that is celebrated at the Mount David Summit is enormous. Faculty work one-on-one with seniors on the thesis; in this process they are both demanding and supportive, guiding research methods, thoughtful interpretation, and effective writing. Many Bates staff members—assistants in instruction, lab technicians, writing specialists, math experts, museum curators, theater designers, digital media specialists, librarians and archivists, and community-engagement staff—also work closely with student-scholars. These members of the Bates community offer students a wide range of skills and expertise.

The abstracts herein provide short summaries of the research and creative work presented in the afternoon sessions of the 2011 Mount David Summit in poster sessions, talks, panel discussions, roundtables, screenings, and literary readings.

## ABSTRACTS (alphabetical order)

### Anna Abelson '11

Rebecca Herzig, Women and Gender Studies

#### *Something More than Whore*

Sex work stands at a unique crossroads between feminist theory and development policies. While sex workers are among the most vulnerable groups of people, no one has yet figured out a way to combine theory and policy to implement interventions that effectively promote the health and well-being of sex workers. This presentation explains the ways sex workers are defining the meanings of feminism and development for themselves to re-claim their bodies and redefine the meaning of agency. I will use sex worker collectives in South Africa, India, and Australia as examples of truly feminist sex worker interventions that manage to get right what Western feminists and the development community have gotten so wrong.

### Deborah Altman '11

Steven Kemper, Anthropology

#### *Under the Protection of Baba: Spirit Possession, Religious Healing, and Women's Empowerment in a South Indian Dargah*

In the south Indian state of Tamil Nadu, spirit possession is a common occurrence among Hindus and Muslims alike. Possession serves as a culturally appropriate medium in which to address frustrations associated with stigmatized issues that the possessed want to express. Due to their marginalized position in society, women are frequently possessed by such evil spirits (*peys*). Among certain social classes in Tamil Nadu, women are unable to talk about many issues relating to sex, marriage, and their roles as women in Tamil society. Although spirit possession in itself is a stigmatized practice in South Asian culture, one could argue that for this subgroup of women, the act of possession and eventual exorcism gives them a sense of empowerment in several ways (catharsis, newfound social freedoms, supportive community, shift of blame, and therapy). My thesis investigates how spirit possession functions as a medium of empowerment for married women in Tamil Nadu.

### Rebecca Andersen '12

Stephen Sawyer, Off-Campus Study Program

#### *Perspectives on Climate Change on Water Resources in Bolivia*

Currently more than 40% of the world's population faces water shortages, and by the year 2025, up to 65% of the world's population will not have sufficient or reliable access to clean water. Water scarcity is one of the biggest challenges we face in this century. This is particularly relevant in Bolivia, where people are already seeing threats to their water supply, mainly as a result of climate change. While studying abroad in Bolivia in the fall of 2010, I studied how changing water sources are affecting the lives of Bolivians. I interviewed farmers, students, children, and scientists to better understand how climate change's effects on water sources impact people in different regions of Bolivia, with a focus on the cities of Cochabamba and La Paz. In Cochabamba, for example, the lack of rain has prevented the growth of many crops essential to the native diet. In La Paz, the glaciers are melting, threatening the water reservoir that sustains the city as well as indigenous communities in the Andes.

### Brigit Anderson '12

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

#### *Risk Assessment of Seismically-Induced Landslides in the North Cascades*

The northwest United States is an active tectonic region. Because of the highly variable terrain and seismicity, the area is potentially susceptible to seismically-induced natural hazards. This does not just include earthquakes, but also landslides brought on by plate movement. Under these conditions, if the geology is primarily loosely packed soft rock, this risk increases. The purpose of this study is to evaluate the risk of landslides caused by active faults in the North Cascades Mountains of northwestern Washington using ArcGIS. Factors under consideration include distribution of active regional faults, surficial geology, rock stability, terrain slope and proximity to densely populated regions.

### Edmund Antell '11

William Ambrose, Biology

#### *Food-Web Analysis and Growth Rates of Two Commercially Important Baitworms (Glycera dibranchiata and Nereis virens)*

The polychaetes, *Glycera dibranchiata* (blood worm) and *Nereis virens* (sand worm) are harvested commercially and sold internationally as saltwater fishing bait, aquaculture feed, and feed for hatchery-raised, at-risk fish species. This multimillion-dollar industry has virtually no regulation: worm diggers must only purchase a license annually, permitting unlimited harvesting except on Sundays. Given the lax regulation on harvesting *Nereis* and *Glycera*, their commercial importance, and their significance in structuring soft-sediment communities, it is surprising how little we know about their growth and reproduction. In 2010 and 2011, the trophic positions of these species and a third predatory polychaete, *Nephtys incisa*, were evaluated using stable isotope analysis at five sites in Maine. Growth rates were measured by mark-recapture using decimal coded wire tags at four sites in 2008 and one site in 2009. Stable nitrogen isotope ( $\delta^{15}\text{N}$ ) analysis, revealed that *Nereis* ( $\delta^{15}\text{N}$  8.55‰) occupies the lowest trophic level, followed by *Nephtys* ( $\delta^{15}\text{N}$  10.73‰), then *Glycera* ( $\delta^{15}\text{N}$  12.22‰). Though these species have potentially similar diets, differing isotopic signatures suggests significant dietary differences. In late May of 2008, *Glycera* were tagged, weighed and recaptured one, two, and three months later, changing their relative wet weight by 57%, 64% and 18%, respectively. From late April to late May and June of 2009, *Glycera* increased in wet weight by 18% and 81%, respectively. To our knowledge, these are the first data collected on *Glycera* growth rates and in conjunction with food-web analysis contributes to evaluating the sustainability of the industry.

### Hunter Archibald '12

Mark Semon, Physics

#### *Terminal Velocity: The Physics of Skydiving*

A skydiver takes a deep breath and hurls himself out of the plane. As he hurtles toward Earth he accelerates until he can go no faster. This speed, called terminal velocity, occurs when the downward force of gravity equals the upward force of drag. Air resistance, air pressure, and a skydiver's daring all influence how

fast he can go. Calculus is used in this project to investigate terminal velocity of falling objects.

**Elizabeth Arens '13, Hally Bert '14, Sean Gemunden '14, and Douglas Goulding '11**

Elizabeth Eames, Anthropology

***Identity and the Creation of a Nation: Perceptions of the Vote among Sudanese "Lost Boys"***

This research examines the perspectives of Sudan's "Lost Boys" in the context of the country's recent referendum to divide into separate northern and southern nations. The past experiences of the Sudanese "Lost Boys" as young refugees displaced by the country's civil war are reflected in the ways these individuals talk about the vote and their assumed roles. Many "Lost Boys" have expressed optimism, describing the vote as a reason for return and a newfound freedom. Others are apprehensive, claiming the vote prompts uncertainty alongside unrest. We collected information from news articles published by agencies based in Africa and the United States and from scholarly articles. Our research is developing as the results of the referendum continue to unfold.

**Hannah Arenstam '11**

Loring Danforth, Anthropology

***Australian Representations of National Identity in the Immigration Museum of Victoria***

The Immigration Museum in Victoria, Australia, is dedicated to conveying the many facets of the country's long history of immigration. In my thesis I examine the representations of Australian national identity displayed in the Immigration Museum to answer the question: What does this museum reveal to Australians and others about Australia? My analysis is based on Geertzian interpretive anthropology and has also been significantly influenced by Benedict Anderson's theory of the nation as an "imagined community." During a semester abroad in Australia I conducted fieldwork within the museum from which my ethnographic data are drawn. My aim is not to provide a definitive answer to the question of what it means to be Australian, but rather to analyze anthropologically an Australian representation of Australian national identity.

**Afroz Baig '11**

Melinda Plastas, Politics

***The Zina Ordinances and Women's Citizenship in Pakistan***

The Zina Ordinances are a set of laws in Pakistan that make adultery a crime against the state. They were implemented in the 1970s, when General Zia-ul-Haq implemented a policy of Islamization in the country. Although the Zina Ordinances are gender-neutral, the laws disproportionately target women. The booming sex industry in Pakistan, along with dowry for marriage, are some examples of how the laws' impact is greater on women. I examine the historical, political, familial, and legal forces that influence the Zina Ordinances. My aim is to see how these factors have shaped the Zina Ordinances, and how the Zina Ordinances, in turn, shape women's citizenship in Pakistan.

**Elisabeth Baird '14, Tara Dugan '13, Andrea Lauden '14, and Emma Reichart '14**

Elizabeth Eames, Anthropology

***Partners in Health's Local Strategies for Combating Malnutrition in Rwanda***

This project explores the local strategies Partners in Health (PIH) has utilized in Rwanda to combat malnutrition. Through analyzing African news sources, the PIH website, and scholarly articles and journals, we have pinpointed the local strategies PIH uses and investigated case studies that exemplify these strategies. To combat the high rate of malnutrition in the Rwandan population, PIH has worked with the Rwandan government and the Clinton Health Access Initiative (CHAI) to support the Ministry of Health in its efforts to comprehensively strengthen the public health system in rural areas in eastern Rwanda. Ultimately, through building and financing hospitals, agricultural reform, and partnership with the government, PIH is reducing malnutrition, which is essential for development and poverty reduction in Rwanda.

**Clyde Bango '11**

Rebecca Sommer, Biology

***HIV-1 Protease Mutations Leading to HIV/AIDS Drug Resistance***

The mechanism of HIV replication holds the lock and key to HIV treatment. Antiretroviral drugs have been designed based on mechanism of inhibition to critical components of the HIV life cycle. However, the short life cycle and the high error rate in genetic replication of HIV leads to rapid mutation and subsequent evasion of designed inhibitors, thus mounting drug resistance in AIDS patients. I reviewed the general classes of the HIV drugs, with a detailed focus on protease inhibitors. HIV-1 protease is an essential enzyme for mature viral proteins that are packaged into new virions to be released from the host cell. The crystallized structure of the HIV-1 protease has allowed for detailed studies in designing inhibitors, yet conservative mutations have led to multiple conformational changes contributing to observed drug resistance. I explored some of the documented mutants of HIV-1 protease in search of patterns contributing to major drug resistance mutations relative to proposed mechanisms of catalysis.

**Arjada Bardhi '12**

Bonnie Shulman, Mathematics

***Changing the Game: A Game-Theoretic Approach to the Role of Microfinance in the Postwar Dynamics of Mitrovica, Kosovo***

Since the ratification of the peace agreement between Kosovo and Serbia in June 1999, Kosovo has been transformed from an ethnically segregated part of the former Yugoslavia to an independent country on its way to rapid economic development and political stability. Nevertheless, little has changed for the ethnically mixed northern Kosovo, where a state of ethnic tension combined with economic underdevelopment make it the hottest flashpoint for current Albanian-Serbian relations. My study focuses on the construction of a game-theoretic model of interethnic dynamics that sheds light on the question of the efficiency of microfinance in "fabricating" peace in conflictual settings such as the northern part of Mitrovica in Kosovo. Should one of the aims of microfinancing initiatives be peacebuilding in these communities? Does it have the potential to provide the right incentives to build sufficient trust among

ethnic groups and mitigate interethnic conflict? If so, what makes microfinance efficient in certain conflict settings and inefficient in others? What can we say about the role of microfinance in Mitrovica? Further elaborating classic models of ethnic conflict first presented by Fearon and Laitin (1996), and Bowles and Gintis (2004), this study attempts to answer these widely asked questions in the microfinance literature from an original standpoint.

**Caroline Barr '11**

Karen Palin, Biology

***The Effect of Cranberry Juice on the Biofilm Formation of Canine Uropathogenic Bacteria***

Urinary tract infections (UTI) are the most common infections in dogs, accounting for about 5-10% of all veterinary visits. Antibiotic resistance is a growing problem in canine UTIs, and is especially troubling because of research showing that humans can contract bacterial strains from pets. Uropathogens can become resistant to antibiotics through the formation of biofilms, bacterial communities that adhere to surfaces and are enclosed in a protective extracellular matrix. Cranberry juice has been shown to inhibit biofilm formation of human uropathogens, but little research has been done with canine uropathogens. However, cranberry is one component of a UTI preventative given to dogs. The purpose of my study is to investigate the effect of cranberry juice on the biofilm formation of bacteria isolated from canine UTIs. If cranberry is found to inhibit biofilm formation, it could be used as a non-antibiotic therapy to prevent canine UTIs, reducing the need for antibiotics.

**Colin Barry '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***A Look at Whitewater in Maine***

Whitewater kayaking in Maine has been gaining popularity recently, however there are still no maps devoted to running rivers. The rivers in this mapping project include the Penobscot, Rapid, Saco, Aroostook, Sandy, and Kennebec River. Many of the guidebooks used now rely on descriptions that are outdated or no longer exist, leaving the paddler in a very vulnerable position. This creates an unnecessary risk for the paddler. If this information could be represented in a visual way using ArcGIS, it would make navigating the rapids much simpler for the paddler. I created a map using ArcGIS that displays the boat landings, class of rapid, optimum flow range, major obstacles, average gradient, water quality, and a general path for the rapids. Spatial representation allows paddlers to find suitable rapids with ease.

**Andrew Beck '11**

Margaret Imber, Classical and Medieval Studies

***In the Shadow of Defeat: Tactical Transformation during the Second Punic War***

In 216 BC, during the Second Punic War, the Carthaginian general Hannibal destroyed a Roman army at the battle of Cannae. Although Hannibal's tactics were devastatingly effective at Cannae, 14 years later, the Romans defeated Hannibal at the battle of Zama. The Second Punic War is a story of adaptation. The victorious Roman army at Zama was the tempered product of disaster, tactically transformed in the shadow of defeat. The historian J.E. Lendon, in *Soldiers and*

*Ghosts*, argues that military transformation is influenced by established military doctrine, reflective of martial traditions and cultural expectations of war. This theory is applied to a study of the Second Punic War. What effect did the military doctrines of the Romans and Carthaginians have on command and tactics at battles of Cannae and Zama, and what was their role in motivating or impeding tactical transformation?

**David Beck '11**

James Richter, Politics

***Ethnic Outbidding in the Mediterranean and Violence in Cyprus, 1964***

In the contemporary world, many states have failed to contain entire "nations" within their borders, while some nations have been thus far fated to separation, their members isolated from one another by borders, mountains, and seas. As a result, some ethnic conflicts can be, and are, local and international, internal and external, and for this reason, new approaches to the study of ethnic conflict are needed. This presentation specifically introduces the concept of interstate transnational ethnic outbidding: a process by which group leaders exacerbate intergroup tensions to gain intra-group power. Further, while ethnic outbidding has generally been studied as it applies to the internal politics of one state, this presentation makes the case that ethnic outbidding is also possible among the leaders of a "nation" whose members live across multiple states. The eruption of violence in Cyprus in 1964 is highlighted to explore this concept.

**Andrew Bernard '11**

William Ambrose, Biology

***Interannual Growth Rate Variation in the Soft-Shell Clam, Mya arenaria, and Its Relationship to Temperature Differences at Maquoit Bay, ME***

Bivalve shells record environmental conditions during shell deposition. We determined the growth history of the commercially important soft-shell clam *Mya arenaria* by examining annual lines in the chondrophore and related interannual variation in growth to regional and local environmental conditions. In addition to annual growth lines it is also possible to observe annual spawning checks; differentiating between these lines increases the resolution with which we detect interannual growth variation. We collected *M. arenaria* from Maquoit Bay, Maine, and used them to create an annual index of growth for 21 years, 1990 to 2011. *M. arenaria* growth over time can be modeled using the Von Bertalanffy growth function. Pairing each modeled year of growth to its corresponding measured year of growth allows us to correct for ontogenetic variation and generate a Standard Growth Index. We then related variations in growth to regional climate oscillations such as the North Atlantic Oscillation and local factors such as air temperature, water temperature, and precipitation. Preliminary results suggest summer air temperature is the best predictor of *M. arenaria* growth rates, responsible for about two thirds of interannual growth variation, while precipitation has no significant effect on growth. Once the relationships between environmental conditions and *M. arenaria* growth are established and quantified, we can use fossil specimens to reconstruct past environmental conditions.

**Katherine Bernier '11**

Jennifer Koviach-Côté, Chemistry

***Synthetic Studies of Koshikalide***

At the end of 2009 a newly discovered 14-membered macrolide, koshikalide, was isolated and its structure determined. This compound is of interest due to its potential cytotoxicity against HeLa S3 cells. To date, no work has been published on the synthesis of koshikalide. I propose that this can be accomplished utilizing olefin metathesis, simple esterification, and stereoselective Wittig reactions. The study of macrolides will continue to be at the foreground of synthetic chemistry as new cytotoxic secondary metabolites are discovered and their potential treatments of today's diseases are exposed.

**Hally Bert '14**

Elizabeth Eames, Anthropology

***Identity and the Creation of a Nation: Perceptions of the Vote among Sudanese "Lost Boys"***-- see Elizabeth Arens '13 for abstract**Thomas Bloch '11**

Helen Boucher, Psychology

***The Self-Concept and Worldview Defense: Do Self-Concept Confusion and Mortality Salience Threaten the Same Construct?***

This research seeks to demonstrate that a threat to one's self-concept clarity produces the same worldview bolstering effects that mortality salience does. There is evidence that mortality salience may not only threaten death, but also imperil the individual's coherent and stable meaning framework, in which self-concept clarity plays a part. After being measured for individual differences in preference for consistency, self-esteem, and affinity for Bates College, participants are asked to rate attribute words in terms of how descriptive of him or her each word is. Participants in the experimental condition are made to describe three instances in which they behaved in a way contrary to that attribute (example: an "assertive" participant will have to describe three times when they were "soft-spoken"), while controls describe three times in which they acted consistent with that attribute. Participants in both conditions then evaluate essays with positive and negative slants toward the participants' college. Results are discussed in terms of implications for terror management theory, the need for transcendence and coherence, self-concept clarity, and meaning studies.

**Eve Boonseng '11**

Karen Palin, Biology

***Comparing Antibiotic Resistance among Clinical Isolates of Staphylococcus saprophyticus with the Effect of Cranberry (Vaccinium macrocarpon) on Growth***

Urinary tract infections affect over 11 million women in the United States each year. While *Escherichia coli* accounts for over 80% of infection, *Staphylococcus saprophyticus*, the second most common, is known to disproportionately affect young college-aged women. Currently, Trimethoprim-sulfamethoxazole (TMP-SMX) is the recommended therapy for acute uncomplicated UTI. Increasing strains of drug resistant *S. saprophyticus*, however, have introduced the need to re-evaluate these first-line therapies. Many studies have shown that regular consumption of cranberry juice can help to reduce recurrent infections and may help to slow the development of antibiotic resistance, but there has been little research done specifically for

*S. saprophyticus*. This current study explores the heteroresistance for *S. saprophyticus* to traditional antibiotics and compares this with the use of cranberry in preventing biofilm formation. Determining resistance profiles for strains of *S. saprophyticus* may help in providing more specific therapies and reduce the development of resistant strains.

**Erin Bourgault '11**

Jane Costlow, Environmental Studies

***Herbal Medicine, Vertical Births, and Placenta Rituals: The Interculturalidad of Birthing in the Andes of Peru***

In an effort to decrease the maternal-infant death rate in Peru, the Ministry of Health has published reports aimed at encouraging doctors to incorporate intercultural ways of giving birth in indigenous Peruvian villages. This thesis researches the reproductive rights, options, and decisions made by indigenous women in the villages of Coporaque, Callalli, Lari, and Chivay in Peru. Many women prefer to use traditional birthing practices, such as the use of herbal medicine, the practices of vertical births, and placenta rituals. Therefore, some women would prefer to give birth with a midwife or alone instead of using the health facilities. I aim to evaluate the conflict between rural, indigenous women in Peru and the medical practice facilities that do not accept the culture of these women, yet can offer them more professional care. In order to better understand this conflict, I use a framework focusing on reproductive rights, ecofeminism, and the medicalization of childbirth. My preliminary ethnographic research in the province of Caylloma suggests that many health clinics do not incorporate intercultural birthing practices, leaving many indigenous women unsatisfied with the treatment or unwilling to use the health facilities.

**Chloe Bourne '11**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***Designing Winter Trails in Witt Swamp, Norway, ME***

In 2004, the Western Foothills Land Trust (WFLT) purchased Witt Swamp in Norway, ME, a 141-acre parcel located along the northeastern shore of the eastern section of Lake Penneesseewassee. Recently, 20 additional acres was given to WFLT, bringing the total acreage to 161. The parcel is comprised of lowland cedar swamp with a small upland pine and hemlock section. Witt Swamp has a high ecological diversity due to the swamps, fens, bogs, and forest ecosystems. The parcel has not been heavily studied by the WFLT yet, and field data still needs to be collected to define the boundaries of Witt Swamp and plan the best location for multiuse trails, taking into consideration sensitive ecological areas and the swamp locations not appropriate for walking. In this project I created an ArcGIS map for the WFLT displaying the parcel, suggested snowshoe trails, and general land cover and vegetation area.

**Kathleen Boyland '11**

Paula Schlax, Chemistry

***30S Ribosomal Subunit Purification and Binding Analysis***

Alternative sigma factors regulate the expression of virulence genes in response to particular stimuli. These virulence genes facilitate the transfer of *Borrelia burgdorferi* from a tick vector to mammalian host and infect the mammal. The translational regulation of alternative sigma factor RpoS is studied using filter binding assays. In addition, transcripts of ribosomal proteins,

components of ribosomes, which are necessary for cell growth, are studied to find regulatory elements.

**Diane Brackett '11**

Ryan Bavis, Biology

***Role of Tyrosine Kinase B (TrkB) Signaling in the Regulation of Carotid Body and Petrosal Ganglion Development by Hypoxia***

There is a correlation between perinatal exposure to hyperoxia (high levels of oxygen) and a reduction in the size of the carotid body (CB), a sensory organ important in respiratory control. This morphological change is associated with a blunted hypoxic ventilatory response (HVR refers to increased ventilation induced by hypoxia, or low oxygen level). The study tests the hypothesis that inhibition of TrkB, a type of cell membrane receptor, has the same effect as perinatal hyperoxia. TrkB's signaling pathway has been shown to be involved in the development of respiratory control; the expectation is that downstream signaling of TrkB is necessary for proper growth, development, and function of the carotid body. This pathway's effect on the petrosal ganglion (PG), a site of respiratory control directly upstream from the CB, also is studied. To test the hypothesis, comparisons are made between the ventilation of 3-month-old mice under normoxic conditions (normal oxygen level) and hypoxic conditions. These mice have received either a drug (1NMPP1) or vehicle during the first seven postnatal days. The drug inhibits TrkB only in the mutated mice. Volumetric measurements of dissected carotid bodies and staining for tyrosine hydroxylase in both the CB and PG help determine the role of TrkB signaling in the development of respiratory control in neonatal mice (tyrosine hydroxylase is an enzyme involved in the synthesis of catecholamines, a class of neurotransmitters; staining indicates the presence of catecholaminergic neurons). Results from the proposed study contribute to an active area of research that seeks to identify the molecular contributors of the developmental plasticity inherent in the respiratory control system.

**Bridget Brewer '11, Zoe Donaldson '11, Matthew Gordon '11, Hallie Herz '11, and Dava Wool '11**

Robert Farnsworth, English

***The Thesis as Poetry or Fiction: A Reading by Senior Writers***

The senior creative writing thesis students in both prose and poetry present a literary reading with selections from their original thesis work. Bridget Brewer and Dava Wool read from their individual collections of short stories. Zoe Donaldson, Hallie Herz, and Matt Gordon read poems from their poetry thesis. The reading offers students who have dedicated their thesis to the creation of original works of prose and/or poetry an opportunity to present and perform their writing to the public, as well as share their various inspirations, motives, and insights in and about the creative process.

**Katherine Brodoff '11**

Helen Boucher, Psychology

***The Manifestation of Trait Self-Control on Social Networking Websites***

Social networking sites such as Facebook allow their users to post and share virtually endless amounts of personal information about themselves on their profiles. With the current popularity of such sites, particularly among college students, there has been concern about whether users are posting "too much information"

(TMI) online, which can pose numerous privacy risks. The present study seeks to examine how trait self-control is revealed on Facebook by examining over disclosure on profiles. A content analysis of the profiles of participants is conducted coding for seven indices of self-control. I hypothesize that based on their profiles, Facebook users lower in self-control tend to be rated as displaying a) more problematic content (i.e., substance abuse, sexual disclosure, and antisocial behavior), b) more general impulsivity or nondeliberateness, c) less content suggesting a strong work ethic, d) less content suggesting interpersonal success, and e) more egotistical or self-promoting content. I also predict that based on the Facebook use questionnaire, users lower in self-control reportedly filter out less problematic content and use Facebook's privacy settings less. This research has implications relating to the accuracy of perceiving personality characteristics through online social networking profiles and it can shed light on which types of people are more prone to post TMI on Facebook.

**Ashley Brooks '14, Emily Egan '13, and Lundat Kassa '13**  
Elizabeth Eames, Anthropology

***Education in Ethiopia (1889-1974): Transition to Global Thinking***

Ethiopia is the oldest sub-Saharan African country with Orthodox Christian roots, which date back to the 4th century. This country is one of only two African empires to have successfully defended itself against colonization. This project explores how Emperor Menelik II (r.1889-1913) and Emperor Haile Selassie I (r.1930-1974) initiated a global-thinking transition independent from colonial influences. Primary sources and African scholars place educational reforms at the forefront of this movement. These emperors gradually secularized the Ethiopian education system, which was previously controlled by the Orthodox Church. Menelik opened the first government-regulated secondary school, while Haile Selassie opened the first public university. The emperors encouraged international communication by hosting foreign intellectuals and sending students abroad. According to Emperor Haile Selassie I, progressive educational reforms complimented traditional customs to renew Ethiopia and guide "people toward the advantages that modern times can bring" (Wagaw 1979).

**Reed Brown '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***Spatial Analysis of Contributing Variables to Appalachian Hut Popularity***

The White Mountain National Forest contains a multitude of recreational opportunities for people of all ages and fitness levels. For people that are adventurous enough a popular trip is to hike up to and spend the night at one of the Appalachian Mountain Club's huts, which lie along the Appalachian Trail. These huts are all popular in terms of recorded attendances but the overall attendance is not distributed evenly. ArcGis spatial analyses was undertaken to consider variables such as size, ease of access by road, trail difficulty in terms of distance and elevation gain, weather, nearby peaks, and cell phone reception to see if there is any correlation between these variables and hut attendance. The final poster contains a map or series of maps showing the hut attendance overlaid with visual representations of the variables.

**Travis Brown '11**

Jennifer Koviach-Côté, Chemistry

***The Synthesis of Exocyclic Enol Ethers Using Sonogashira Coupling***

Spiroketal containing compounds occur abundantly in nature and contain an array of beneficial biological properties including the inhibition of superoxides and the prevention of tumorigenesis. The structural elucidation and synthesis of these compounds, specifically those containing a unique enol ether structure and a polyacetylene chain, has generated much interest within the scientific community across the world. This thesis presents a flexible and stereocontrolled synthesis of a spiroketal enol ether compound isolated from the *Chrysanthemum boreale* species. The proposed synthesis improves upon shortcomings of past syntheses by employing Sonogashira coupling methodology, resulting in higher yields and more stable reaction conditions.

**James Burnham '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***GIS Analysis of Cell Phone and Radio Coverage in Baxter State Park, ME***

Cell phones, radios, and mountains rarely mix well. Large mountains like Katahdin in Baxter State Park are notorious for disrupting and blocking communications. In the modern age of increased technological dependence, park employees are relying on cell phones and radios for communication making it necessary to determine where these systems have signals. In addition to logistic communication, radios or cell phones can serve a safety function in wilderness rescues. Cell phones can also be used by the tens of thousands of visitors the park receives each year. The purpose of this study is to determine what areas have cell and radio coverage within the park using GIS. Spatial analysis includes cell and radio tower location, topography, and line of sight. The resulting map could be used by both park employees and visitors.

**Alice Caffrey '11**

Paula Schlax, Chemistry

***Mutational Studies of RpoS and Translational Initiation in Borrelia burgdorferi***

RpoS is an alternate sigma factor that regulates the expression of a number of key virulence genes in *Borrelia burgdorferi*, the spirochete that causes Lyme Disease. The transcriptional upregulation of this gene is a function of the changes in temperature, pH and cell density that occur immediately preceding and during the bacteria's transition from the Ixodes vector to the mammalian host. In addition to these well-characterized transcription factors, recent studies have suggested the involvement of small non-coding RNAs (sRNAs) in the translational regulation of rpoS, specifically the sRNA DsrABb. This study seeks to characterize the interaction of DsrABb with the 5' untranslated region of rpoS through mutational studies and affinity assays.

**Rachel Carlson '11**

Rachel Austin, Chemistry

***Purification and Characterization of Metallothionein-3: A Possible Target for Lead***

The primary goal of this thesis is to purify and characterize metallothionein-3 (MT-3) proteins. MT-3 is primarily expressed in the central nervous system and contains 20 cysteine residues involved with the binding of heavy metals. MT-3 offers a potential target protein for lead binding and the binding of lead in place of the native metal could have implications for improper folding of the protein disrupting the functionality. It is important to study the binding propensity of lead to MT-3 as binding could be further related to mechanisms associated with symptoms of lead poisoning. The Glutathione S-Transferase (GST) Gene Fusion System method is used for the expression and purification of MT-3. MT-3 was effectively purified and isolated using the GE AKTA UPC 10 FPLC; specifically a 5mL GStap FF affinity column and a 5mL His Benzamidinium FF column from GE. Studies to determine the zinc content of the purified MT-3 were initiated. Metal content and protein concentration of MT-3 using ICP-OES continue to be investigated.

**Patrick Carroll '11**

Karen Palin, Biology

***Biomimetic Inhibition of Staphylococcal Biofilms***

*Staphylococcal* biofilms are important in various types of infections including wound, urinary tract (UTI), and foreign body associated infections. Intercellular communication is a key component in the transition of planktonic bacterial cells to a fully developed biofilm. Recent research indicates that biomimetics may inhibit intercellular communication affecting biofilm formation. Using in vitro models we explore the biomimetic effects of furanones and Sharklet™ on *staphylococcal* biofilm formation.

**Sarah Charley '11**

Rachel Austin, Chemistry

***Bates Molecular Science Journal***

The goal of this project is to exhibit the molecular research at Bates and make it accessible to the Bates community. Unlike a general chemistry thesis, this project uses language that is suited to a wide audience and examines the research from an outside perspective. With this approach, I hope to bridge the knowledge gap between the researchers and the general Bates population. Ideally, this project will help generate a greater interest in the sciences, yield more recognition to researchers and student research assistants, and make chemistry less intimidating to majors and nonmajors alike.

**Lianna Cohen '13**

Lee Abrahamsen, Biology

***The Past, Present, and Future of Antibiotic Resistance: Fighting Back against Antibiotic Resistant Bacteria***

Antibiotic resistance is a fast-approaching epidemic facing scientists, physicians, and all of humanity. In the 1920s, when Alexander Fleming discovered that the mold *Penicillium* prevented bacterial cultures from growing, the antibiotic penicillin was developed as a means of fighting bacterial infections that caused human disease. However, over 90 years later, the bacterial strains previously exposed to penicillin and other similar antibiotics have mutated, and are now resistant to



these drugs. With antibiotic resistance on the rise, it is becoming ever more difficult for physicians to treat patients with bacterial infections. Scientists have been searching for alternatives to antibiotics that will have the same effect as these once highly effective drugs. Among the possible substitutes for antibiotics are bacteriophages, anti-sense RNA, and ionic colloidal silver. Antibiotic resistance poses a huge, looming medical threat to humanity, and scientists are faced with an exciting yet troublesome task of finding alternatives to antibiotics.

**Nora Collins '11**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***A History of the Urban Poverty in Washington DC: METRO Implementation and Changes in Geo-Socioeconomics***

Equitable access to public transit is an important aspect of community and economic development. The Washington, D.C., METRO, which first opened in 1976, was originally marketed to the middle class. In both its original goal and in today's route it is clear that not all of the Washington, D.C., has equitable access to METRO transportation. This GIS analysis studies the correlation between the opening of METRO stations and localized property values particularly retail values, single-family home values, and multifamily homes, median income, education level, diversity, and crime rate. The final maps show a history of the METRO and the corresponding economic and socioeconomic changes from 1976 to 2000.

**Jordan Conwell '12**

Emily Kane, Sociology

***Does Community Diversity Reduce Interpersonal Trust?***

This research study sought to determine whether previous findings regarding the effect of diversity on in-group and out-group trust were influenced by social desirability bias. It also sought to uncover the role of community diversity on interpretations of questions on trust, as another potential explanation for the often-reported negative relationship between community diversity and generalized trust. This research also attempted to replicate a study that reported higher trust among respondents who thought of people they knew (as opposed to strangers) when answering a trust question. Adopting an unobtrusive way of measuring racial attitudes known as a list experiment, we were unable to overcome the social desirability bias among white respondents that may be inherent in other studies on diversity and trust. White respondents in this study indicated higher trust in blacks than in other whites. The list experiment did perform as expected among black respondents however, as they revealed a propensity toward trusting other blacks more than whites. Our results did not replicate the finding that persons who consider people they know in answering questions about trust report higher trust. We also did not find a significant link between the diversity of a respondent's community and whether or not they thought of "people in general" when answering a trust question. Thus, our potential explanation for the often-reported negative relationship between community diversity and trust was not supported.

**Samuel Cory '11**

Lee Abrahamsen, Biology

***The in vitro Effects of Hyperbaric Hyperoxia on Chronic Wound Biofilms***

Chronic wounds are becoming more prevalent in the world, and are often infected with drug resistant bacteria. Particular types of chronic wounds can be treated with hyperbaric hyperoxia or hyperbaric oxygen therapy (HBOT). While HBOT supports cell growth that leads to healing, the effects of HBOT on the bacteria present in the wound are only partially known. Previous research has proven that HBOT reduces the growth of methicillin sensitive *Staphylococcus aureus* and methicillin resistant *Staphylococcus aureus in vitro*. However, these studies have only evaluated pure cultures of specific bacteria, when we know that most chronic wounds are infected with biofilms that are composed of a variety of species of bacteria. Recently a model has been developed for the study of chronic wound biofilms in vitro. Therefore the study of the effects of HBOT on a clinically significant model is now possible. The three genera of bacteria most often found in chronic wounds are *Staphylococcus*, *Enterococcus*, and *Pseudomonas*. Our study investigates the effects of HBOT on the growth of *Staphylococcus aureus*, *Enterococcus faecalis*, and *Pseudomonas aeruginosa* in biofilms individually and in the chronic wound model.

**Josalynne Cottery '12 , Segundo Guerrero '12, and Matthew Lipoff '12**

David Das, Off-Campus Study Program

***Connectivity Abroad: Are Cell Phones, Twitter, Facebook and Skype Diminishing the Study-Abroad Experience?***

Three Bates juniors recently returned from study abroad discuss the pros and cons of social media. Josalynne Cottery spent the fall in Santiago, Chile; Segundo Guerrero studied in Milan, Italy; and Matthew Lipoff enrolled at Macquarie University in Sydney, Australia. Joining the discussion are Ethan Magoon, Director of Creative Technology/Web and Multimedia in the Office of College and Media Relations and social media maven, and Dennis Browne, Associate Professor of Russian and advocate of technology both on campus and abroad; they will offer some bytes of their own.

**Gina Crotty '11 , Julia Foxworth '13, and Samantha Rothberg '13**

Rebecca Corrie, Art and Visual Culture

***Bates Interns in Museums on Campus and Off***

The Bates College Museum of Art and the Department of Art and Visual Culture consider serious internships essential to our education, allowing us to have direct contact with objects and explore the relationship between art institutions and the larger community. Our presentations address the process of putting together exhibitions, from research to curatorial work to the installation, with each intern describing her individual program. Internship duties include composing didactic labels, handling art objects, using art databases, and installing paintings and sculpture. These presentations will interest anyone concerned with art, especially those who hope to pursue a career in the museum world.

**Margaret Curran '11**

Pallavi Jayawant, Mathematics

***Two-Sided Stable Matchings: Applications to the National Resident Matching Program***

The Stable Matching Problem arises from trying to match  $n$  men to  $m$  women based on ranked lists each participant submitted. Instead of just picking men and women randomly and pairing them together, a matching algorithm can be used to ensure that no pairing of a man  $m$  to a woman  $w$  exists such that  $m$  prefers another woman  $x$  to  $w$  and  $x$  prefers  $m$  to her current partner. The resulting matching is called a stable matching. A widely applicable matching algorithm, known as the Gale-Shapley Algorithm, uses a series of "proposals" to come to a stable matching. The National Resident Matching Program (NRMP) uses an expanded version of this algorithm to match medical school graduates (residents) to hospitals by using an applicant proposing execution. Some of the complications of this algorithm, along with some of the recent advances in theory towards resolving these issues are presented.

**Katherine D'Angelo '11**

Leslie Hill, Politics

***Do Women in Politics Matter?: Ugandan Women's Political Activity in Regard to Reproductive Healthcare***

While scholars praise Uganda for the success of its women's movement and the government's response to HIV/AIDS, Ugandan women suffer from poor reproductive health. This study addresses why reproductive health outcomes are so poor in Uganda given such high levels of women's political activity. The politics of reproduction involves interactions among international, national, and local actors and belief systems as they create the circumstances in which reproductive healthcare decisions occur. This analysis draws attention to the underlying power relations surrounding reproductive health in order to reveal their effect on health outcomes. As such, I identify women's political activity, the barriers faced when trying to influence reproductive healthcare, and the conditions that make this activity successful. I also analyze key governmental decisions that affected reproductive healthcare to understand the government's gender ideology and how its position influences women's political activity.

**Brendan Davidson '14, Sonja Favaloro '14, Alexis Martinetti '14, Nawshaba Nawreen '11, and Kaitlin Webber '11**

Lavina Dhingra, English

***Image and Sound: Reading and Writing Lyric Poetry***

Representative students from Professor Lavina Dhingra's Lyric Poetry course recite a selection of the poetry they wrote in fall 2010. Students were inspired by poets including Wordsworth, Allen Ginsberg, and visiting poet Meena Alexander. Students discuss the influence of prior works through stylistic, tonal, and referential subtleties.

**Amy DeStefanis '11**

Lee Abrahamsen, Biology

***Risk Factors for the Carriage of Staph. aureus in the Student Population***

Methicillin-resistant *Staph. aureus* (MRSA) infections as well as other *Staph.* infections are a very common problem in hospitals and communities. This project continued research done by Nate Johnson in 2009-2010 to further assess potential risk factors for

the carriage and transmission of MRSA in the student population at Bates College. Given that students live in close contact with each other, often in crowded dorms with multiple roommates, and share the same public spaces and utilities, it is not surprising that MRSA has previously been found at Bates. In last year's study at Bates, skin diseases such as eczema were found to be a significant risk factor for *Staph.* infection. My study includes an assessment of how this year's period prevalence of MRSA and *Staph.* infections compares to last year's, and also includes an assessment of additional potential risk factors including usage of public athletic facilities, participation on sports teams, number of roommates, and recent antibiotic use.

**Abritee Dhal '11**

Stephanie Richards, Biology

***Mutagenesis of RSK2 to Locate Nuclear Localization Signal of RSK2***

Protein kinases have been implicated in mediating prometastatic signaling in human cancers. RSK2 is a member of the family of 90-kDa ribosomal S6 kinases. The RSK2 pathway is a key regulator of cancer proliferation. Serine/threonine kinases play a key role in the mitogen activated protein (MAP) kinase signaling pathway, which is important in cell proliferation and oncogenesis. RSK2 is activated in response to a number of different stimuli such as insulin, growth factors, neurotransmitters, and chemokines (Sturgill et al. 1988), and upon activation RSK2 moves from the cell cytoplasm into the nucleus. There, RSK2 phosphorylates a wide range of nuclear substrates such as transcription factors. This RSK2 activity contributes to cell division, and when cells divide over and over again it leads to cancer and tumor formation. Research has been done to see how RSK2 localizes into the nucleus; however, the mechanism is still not understood. As a way to better our understanding of the mechanism in which RSK2 localizes in the nucleus, I have mutated RSK2 to determine which amino acid residue is key in localizing RSK2 into the nucleus. This could eventually lead to the development of more treatment options for certain cancers such as breast cancer and head and neck squamous cell cancer (HNSCC).

**Jennifer Diefendorf '11**

James Richter, Politics

***Taking Back Sicily: The Antimafia Movement and Its Counter-Hegemonic Attack on Cosa Nostra***

This thesis utilizes Gramscian theory to explore the antimafia movement's shift in tactics from the 1980s to present day. The movement that arose out of the violence of 1980s Sicily is hardly the same in nature as the contemporary movement. During the 1980s, the mafia was conceptualized mainly as a political problem requiring political solutions. When legislative reforms did little to destroy mafia power, however, Cosa Nostra came to be perceived as a cultural phenomenon. In order to curb mafia power, therefore, the antimafia movement recognized the need for societal reforms. Using my own fieldwork from Sicily, I show that the movement changed its focus over time from state to society. Gramscian theory is employed to argue that the antimafia movement is a counter-hegemonic movement working to eliminate the physical and ideological domination Cosa Nostra has held over Sicilians for nearly 150 years. Moreover, Gramsci's ideas show why—when challenging hegemonic power—it is not enough for civil society to target the state for

reform. Rather, the antimafia movement must engage in a deliberate and evolving attack on Cosa Nostra, working amongst society in order to redirect Sicily's political, social, and economic trajectory that the mafia has dictated since the 1860s.

#### **Rachel DiStefano '11**

Nancy Koven, Psychology

##### ***The Relationship between Alexithymia and Memory***

Alexithymia is a personality construct in which an individual has difficulty processing and regulating emotions, resulting in a wide range of impairments. This pattern of dysfunction may be explained by a deficit in selective attention for emotional information, which may then lead to impaired memory for emotional stimuli. The purposes of Study 1 are a) to clarify the relationship between alexithymia and selective attention using an emotional Stroop task, and b) to clarify the relationship between alexithymia and memory using an incidental memory task. Study 2 then investigates the possibility of an underlying verbal memory deficit in alexithymia by examining specific components of memory processing. Together, these studies clarify the cognitive contributions to this emotion-processing deficit and may ultimately identify mechanisms to target in clinical interventions for this condition.

#### **Deniz Dolcen '13**

Gregory Anderson, Biology

##### ***A Shelter-wood Harvest in 2006 at Range Pond State Park, Poland, ME Resulted in the Regeneration of Mature White Pines (Pinus strobus) and Increased Recruitment of Seedlings***

Range Pond State Park had a selective harvest of white pines in 2006. The goal of the harvest was to limit competition for light and soil nutrients for improved white pine growth and recruitment. In order to test for harvesting success, two plots (harvested and non-harvested) 20 x 30 meters in area were measured for differences in height, DBH (diameter at breast height), NND (nearest neighbor distance) and seedling internode growth. Results showed that there was no difference in age, NND, and DBH, while there was significant difference in height and spatial dispersion. This could mean that the harvest improved the competition for sunlight but did not aid in the population's secondary growth.

#### **Zoe Donaldson '11**

Robert Farnsworth, English

##### ***The Thesis as Poetry or Fiction: A Reading by Senior Writers -*** - see Bridget Brewer '11 for abstract

#### **Heather Doolittle '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

##### ***Using LiDAR Data and GIS Mapping to Create a Bedrock Map of Small Point, ME***

The bedrock geology of Small Point, Phippsburg, Maine is currently defined as a complex system of faults and folds, within the Ordovician Cape Elizabeth formation, but lacks differentiation between varying lithologies. New 0.5-0.1 meter resolution topographic datasets (LiDAR) show unmapped features in this area, providing a key to past tectonic events. This study aims to create a detailed bedrock map of an area of Small Point using both field and GIS methods. New methodologies for digital mapping using GPS enabled GIS technology in

combination with 2004 and 2007 LiDAR datasets are developed. Both LiDAR and orthoimages are used to formulate a detailed aerial view of the sample site, and can be utilized to view large-scale features. The combination of field and digital data allows for greater mapping precision. This study provides both a new methodology for digital mapping and a modern bedrock map of Small Point.

#### **Colin Dowey '13**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

##### ***Bicycle Routes, Northern Tier, Washington State***

This project uses ArcGIS to create a useful map of the Northern Tier bicycle touring route as it passes through Washington. This map improves upon existing maps by including campsite locations and elevation profiles for the hardest climbs along Route 20 in the North Cascades National Park. The map also suggests alternate routes based on places of interest and cities. Mileage of all sections of the route are clearly labeled to allow for "on-the-road" planning. A "fly-by" created in ArcScene following the route across Washington accompanies the poster/map and provide a unique look at the route from the air. There is vast amount of free data available from Washington that can be manipulated and used to create this map.

#### **Melissa Ducommun '11**

Lee Abrahamsen, Biology

##### ***Down-Regulation of Chondroitin Sulfate Proteoglycans (CSPGs) in the Glial Scar Following Spinal Cord Injury by Lentiviral Gene Delivery***

Following spinal cord injury, the formation of a glial scar is one of the main barriers to nerve regeneration. The glial scar is composed primarily of astrocytes and other types of glial cells that produce inhibitory molecules, creating an environment that is not permissive for neuron growth. I used a technique called lentiviral gene delivery to eliminate inhibitory molecules from the glial scar and create an environment more permissive to nerve growth.

#### **Tara Dugan '13**

Elizabeth Eames, Anthropology

##### ***Partners in Health's Local Strategies for Combating Malnutrition in Rwanda*** -- see Elisabeth Baird '14 for abstract

#### **Ian Dulin '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

##### ***Analysis of the Vulnerability of Tidal Marshes and Adjacent Uplands from Sea Level Rise in Casco Bay Using a GIS Model***

In order to plan for possible sea-level rise in the future, ArcGIS is used to determine areas vulnerable to several sea level rise scenarios in Casco Bay, Maine, to determine the implications of such events. Data including high quality LiDAR elevations, storm surges, sea level rise scenarios, and habitat indexes are used to determine such areas. Also available are relevant reports on sea level rise and marshes in Casco Bay from the Maine Geological Survey. This GIS model is used to identify and map areas in Casco Bay deemed vulnerable to sea level rise scenarios of ½ meter, 1 meter, and 2 meters, as well as identify adjacent uplands where tidal marshes could develop in the future. The

project is developed in conjunction with Curtis Bohlen of the Casco Bay Estuary Partnership.

**Emily Egan '13**

Elizabeth Eames, Anthropology

***Education in Ethiopia (1889-1974): Transition to Global Thinking***-- see Ashley Brooks '14 for abstract

**Joseph Ekpenyong '12 , Sara El Assaad '14, and Sabrina Minjares '12**

Elizabeth Eames, Anthropology

***Our Country, Our Religion: The Africanization of Christianity***

African religion during the colonial era started to change when the European missionaries imposed their own traditions. In the words of one researcher, missionaries believed: "If you want to belong to Christ, you must speak and act like the white man." Many Africans have since fought for the "Africanization of the Christian message" with African Independent Churches (AIC) serving as one of the primary agents for pushing this ideal forward. An important desire among AICs is to affirm a Christ who identifies himself with the African. We demonstrate the measures taken to fulfill this desire by presenting aspects of one of these Christian movements, Kimbanguism, started by Simon Kimbangu in 1921 in what was then the Belgian Congo (now Democratic Republic of Congo).

**Sara El Assaad '14**

Elizabeth Eames, Anthropology

***Our Country, Our Religion: The Africanization of Christianity*** -- see Joseph Ekpenyong '12 for abstract

**James Epstein '13**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***Running Routes in Falmouth, ME***

An alumnus of Falmouth High School, I am familiar with roads and trails in Falmouth, ME. Participation in the cross country and track programs in high school propel my interest in mapping the running routes in my hometown. Typical runs within Falmouth range from 2 to 12 miles in length. While these routes are easily accessible, many recreational runners are not aware of them, so a collection of run information including distance, elevation, traffic, and water hazards would be beneficial. All of this information can be digitally referenced using a mapping program called ArcGIS. In addition to 2-dimensional maps of routes, 3-dimensional fly-by maps can be formulated, giving viewers a virtual tour of the topography and experience of a particular run. Residents of Falmouth can be supplied with poster of this data viewable in the high school and Falmouth Town Hall.

**Meghan Fahey '11**

Stephen Sawyer, Off-Campus Study Program

***Environmental Education: Interdisciplinary Approaches from Abroad and at Bates***

What are effective education models for an informed and engaged citizenry in Central America? What do the educational models and theories of Freire and Dewey lend to the environmental education movement in the region? My thesis seeks to raise awareness of the importance, reproduction, and

use of native ornamental plants, and their contribution in the conservation, beauty, and identity of Costa Rica. Environmental education is a foundational first step to promote pro-environmental behavior to address the environmental crisis we are currently facing. I build the theoretical base for this exploration of environmental education from my interdisciplinary political, anthropological, social, educational, and environmental perspectives.

**Sebastian Farach Aldana '11**

Todd Kahan, Psychology

***Code-Switching and Bilinguals***

Previous research has demonstrated a cognitive control advantage for bilinguals over monolinguals (Emmorey, Luk, Pyers, & Bialystok, 2008). The necessity to select a language while suppressing another is believed to enhance cognitive control in bilinguals. This study investigates whether bilinguals who code-switch frequently (use two or more languages interchangeably throughout a conversation) differ in their cognitive control functions than bilinguals who do not code-switch as often. Frequent code-switchers, non-frequent code-switchers, and monolinguals (control) were given a set of flanker tests to measure their executive abilities. Discussion focuses on whether bilinguals who code-switch frequently differ in their cognitive control abilities than bilinguals who do not code switch frequently.

**Wesley Farnsworth '11**

Michael Retelle, Geology

***A Case Study of Spatial Variability in Snowpacks: Norwegian High Arctic and Presidential Range, NH***

Studies show that slab avalanches initiate on weak interfaces in snowpack and that the internal stratification is predominantly controlled by meteorological events, however, little is known about how snowpack stratigraphy varies across a slope and what influences local topography have on the internal structure. Although snowpack on a slope can appear "uniform," (constant aspect, inclination, curvature, exposure, and relative altitude) the internal stratigraphy and stability are not necessarily consistent. This study addresses what roles rock outcrops, topographic lows, and base irregularities play in internal snow structure. How does base topography and seasonal snow-infill change snowpack stratigraphy and stability? This study is a two-part research project conducted in Svalbard and the Presidential Range of New Hampshire in New England. Initial work has been performed on small "uniform" slopes, where numerous snow pits are excavated, each providing locations for three snow stability tests and occasional snow profiles. Spatial variability of the snowpack is one of the key factors in avalanche formation. A greater understanding of snow stability enables better predictions as to where and when slab avalanches will occur. This knowledge becomes increasingly important as more people visit avalanche terrain, directly driving up the number of avalanche-related accidents.

**Sonja Favaloro '14**

Lavina Dhingra, English

***Image and Sound: Reading and Writing Lyric Poetry*** -- see Brendan Davidson '14 for abstract

**Basil Ferenczi '11**

John Kelsey, Psychology

***The Effect of 5-HT1A Agonists and NMDA Antagonists on Parkinson's Disease and Apomorphine-Induced Dyskinesia: The Role of Serotonergic Raphestriatal Neurons***

The typical therapy for Parkinson's disease (PD), L-DOPA, improves normal movement, but in some patients produces excessive involuntary movement referred to as L-DOPA-induced dyskinesia (LID). While PD reflects too little of the transmitter dopamine (DA), LID appears to reflect too much. Surprisingly, two classes of drugs (serotonin agonists and glutamate antagonists) have been reported to improve symptoms of both disorders. One objective of this thesis is to determine 1) if serotonin agonists improve PD in the absence of LID (my preliminary data indicate they do not) and 2) whether the effects of the serotonin agonist on PD involve the same neuronal system as for LID. A second objective is to determine if glutamate antagonists can improve dyskinesia in animals in which the dyskinesia has been induced by injections of the direct DA agonist apomorphine, which would eliminate the influence of serotonergic systems.

**Limor Finkel '11**

Baltasar Fra-Molinero, Spanish

***Mafalda, the Wise Child: Representation of the Argentina of the 1960s and 1970s in a Comic Strip***

Throughout the latter half of the twentieth century, Argentine society experienced profound change as a result of political and economic factors. As a result of frequent shifts between democratic and dictatorial governments, a social environment of uncertainty became a permanent characteristic in the life of most citizens. Despite censorship and successive shifts in government regimes, the majority of which were military dictatorships or characterized by authoritarian programs and ideologies, many Argentines continued to publish criticism and commentaries of the government in various forms. *Mafalda*, Argentina's most well-known comic strip is one such example. The comic's creator, Joaquín Salvador Lavado (commonly known as Quino), portrays the daily life of a young girl, Mafalda, living in a typical middle-class neighborhood in Buenos Aires. This thesis explores how Quino's comic strip, published from 1964-1973 amidst various political coups, reflects Argentine popular culture. More specifically, this thesis discusses the various representations of social classes and gender roles from this era of Argentine history through the lens of the adolescent Mafalda, who combats suppression and censorship in her penetrating social commentaries.

**Gregory Flynn '11**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***Determining Potential Areas for New Ski Resorts in Southwestern Montana***

Ski resorts in Colorado, California, and Utah are quickly becoming overcrowded, and demand for new ski resorts is on the rise. Southwestern Montana is an area with high potential for new ski resorts based on its topography, average snowfall, and easy access from a large International Airport in Bozeman. Although some ski areas already exist in the region, such as Big Sky and Bridger Bowl, there is room for more resorts, which could foster the growing economy of Montana. By using ArcGIS, topography, seasonal precipitation, traveling distances,

and existing infrastructure can be analyzed to determine what mountains are the most suitable for new ski areas. This information could help future development of the Montana ski industry, giving rise to new recreational areas, and gaining tourist revenue for the state.

**Elliot Foster '11 , Sarah Jacobson '14, Clara Maeder '14, and Jarret-Paul McKallagat '14**

Elizabeth Eames, Anthropology

***HipLife Music as Medium of Social Change among Ghanaian Youth***

HipLife is a dominant force in the world-music industry. Rooted in Ghanaian highlife music of mid-twentieth century, contemporary HipLife music is hip-hop music in which the artist raps in a local Ghanaian dialect over a beat. HipLife has allowed Ghanaian youth to express their voice and work for social change through a medium unique to Ghana. Through the study of African sources, case studies, and recorded interviews, we conclude that the youth in Ghana have become part of a significant movement in Ghanaian society because HipLife music generates media attention and is accessible to a demographic cross-section of youth. By incorporating proverbs, history, and hip-hop music, it is a culturally legitimate medium through which the young take the liberty to speak freely.

**Julia Foxworth '13**

Rebecca Corrie, Art and Visual Culture

***Bates Interns in Museums on Campus and off*** -- see Gina Crotty '11 for abstract**Nathaniel Funk '11**

Hong Lin, Physics

***Rainbows and Refraction: The Physics and Geometry of Prisms***

When a beam of light hits the interface between two mediums, two things can happen. It will either be reflected, like a common bathroom mirror, or refracted, such as with a prism. This depends on both the indices of refraction, properties intrinsic of the two mediums, and the angle at which the beam hits the interface. Prisms are specially designed polygons that take advantage of refraction, and sometimes reflection as well, to achieve a specific alteration of the original beam or image, for use in optical systems as complex as the telescopes that let us view the edges of the universe, or as simple as those that just to create a rainbow on the wall.

**Drew Gallagher '11**

Heidi Chirayath, Sociology

***The Burden of Caregiving***

Informal family caregivers make up a workforce of close to 65 million Americans, providing vital, unpaid care, support, and assistance to chronically ill or disabled family members, friends, and neighbors nationwide. The demands of caregiving have proven to take a substantial physical, financial, and emotional toll on those providing the care. Females, representing the majority of family caregivers, are particularly affected due to a number of influential factors. Specifically, depression and depressive symptoms afflict the lives of close to 60% of all caregivers. As the demand for caregivers continues to rise with an aging American population, the burden of caregiving, specifically caregiver depression, will only continue to oppress

and strain the lives of this invaluable workforce. Through a content analysis of the shared narratives of caregivers within the online Family Caregiver Forum, I show that similar themes, relationships, and factors characterize the often-troublesome caregiving experience.

**Sean Gemunden '14**

Elizabeth Eames, Anthropology

***Identity and the Creation of a Nation: Perceptions of the Vote among Sudanese "Lost Boys"*** -- see Elizabeth Arens '13 for abstract

**Katelyn Gilardi '11**

Nancy Koven, Psychology

***Orbitofrontal Cortex Gray Matter Correlates of Trait Emotional Intelligence***

Coping with life's daily stressors requires a certain degree of skill in the ability to understand and regulate one's emotions. People who are lacking in these skills are often labeled "alexithymic." Current research implicates frontal lobe abnormality in alexithymia, but it is unclear whether this accurately accounts for brain-related patterns associated with perceived emotional intelligence at the facet level. A recent study found correlations between trait meta-mood facets (ability to attend to, have clarity of, and repair emotions) and gray matter volumes of different regions in the frontal lobe using voxel-based morphometry, a key finding of which was the relationship between attention to emotion and orbitofrontal cortex (OFC) volume. The present study uses manual volumetry, a more conventional neuroimaging method, to examine the relationship between attention to emotion and OFC volume. This study uses structural MRI scans and Trait Meta Mood Scale scores from 30 healthy adults that participated in the aforementioned study. It is hypothesized that poorer attention to emotion will be associated with decreased volume in all areas of the OFC. This would be the first study to date to examine OFC correlates of perceived emotional intelligence using manual volumetry. With evidence of OFC contribution to emotion-processing deficits, researchers may be able to target the OFC for therapies to treat emotion-processing disorders.

**Ian Gilchrist '11**

Rachel Austin, Chemistry

***A MCD Study of the Diiron Active Site of  $\omega$ -Alkane Hydroxylase (AlkB)***

The non-heme diiron monooxygenase  $\omega$ -Alkane Hydroxylase (AlkB) is a membrane spanning metalloenzyme that is the first step in the catabolism of medium length alkanes in a variety of hydrocarbon dependent organisms. The marine organism *Alcanivorax borkumensis* AP1 is the source of AlkB used in this study. The protein was purified using Fast Protein Liquid Chromatography (FPLC) and then magnetic circular dichroism (MCD) was used to gain spectroscopic data on the diiron active site, which contains predominantly histidines as the metal ligands. These data provide continued insight in respect to the theory that a single atom magnetically links the two iron ions.

**Justin Giroux '11**

Joshua Henry, Chemistry

***Infrared Characterization of Trioctylphosphine Oxide (TOPO)***

Nanocrystals are promising materials for future photovoltaic devices because of their high theoretical efficiencies. To this point, however, realized efficiencies of nanocrystal-based photovoltaics has been disappointing. This is potentially due to insulating organic capping agents, like trioctylphosphine oxide (TOPO), which bind to the surface of nanocrystals and inhibit the movement of electrons. The focus of this study was the development of infrared spectroscopy as a tool for studying the interaction of TOPO and cadmium selenide (CdSe), a common nanocrystal material. Using transmission infrared spectroscopy it was found that solvent and concentration dramatically effect both the location and shape of the symmetric phosphine (P=O) stretch of TOPO in the infrared spectrum. The sensitivity of this transition to its electronic environment is herein used to evaluate the binding of TOPO to the CdSe surface.

**Tracy Glazier '11, Chelsea Pennucci '11, Hannah Porst '11, Megan Schleck '11, Kara Western '11, and Rosalie Winslow '11**

Georgia Nigro, Psychology

***World Cafe of Public Scholarship: A Poster and Discussion Session***

The Community-Based Research Fellows Program, run by the Harvard Center for Community Partnerships, allows students to pursue academic research that meets significant public goals or needs, as articulated in dialogue with community partners. This year, the group of six students is working on different projects ranging from school reform to family self-sufficiency. In this presentation, students present their research in a short poster session followed by a roundtable discussion with faculty members, community partners, and other participants.

**Elizabeth Glennon '11**

Sonya Kahlenberg, Biology

***Conservation Education in Uganda***

We evaluate the effectiveness of conservation education in 14 primary schools surrounding Kibale National Park (KNP) in Uganda. Specifically, we examine whether educational initiatives directed at teachers will impact their students. Students in grades 4-6 were administered surveys to test their knowledge of local wildlife and elicit their opinions of KNP and chimpanzees, an endangered species. On knowledge surveys, older students outperformed younger ones, and students in schools participating in teacher educational programs scored higher than students in non-participant schools. Student opinions of KNP and chimpanzees were generally more negative than positive and were not influenced by teacher programs. Proximity of schools to KNP affected neither student knowledge nor opinions. We conclude that knowledge about wildlife is transmitted from teachers to students, suggesting it is an efficient way to disseminate this information. More research is needed to understand the likely complex factors underlying student opinions of wildlife and the national park.

**Hiromi Go '11**

Bonnie Shulman, Mathematics

***Global Games: A Emerging Field in Game Theory***

Game theory is a mathematical tool used by economists to study how people make choices in social interactions. During the last

two decades, game theory has made great progress as a result of the introduction of new theoretical approaches. "Global games" is one such new theoretical approach. The term "global games" refers to a subset of incomplete-information games with two special properties: 1) unlike traditional incomplete-information games, global games allow each player's information to correlate with the information of the other players, and 2) global games are played in the form of coordination games. These two properties lead to a solution of the longstanding problem of equilibrium selection when there is not a unique Nash Equilibrium. In my poster, I closely examine the symmetric binary cases of global games as a foundation for investigating more complex classes of games.

#### **Sara Godek '11**

Nancy Kleckner, Biology

##### ***Tangier Disease: ABCA1 Mechanisms and Treatments of Reverse Cholesterol Transport***

ABCA1, an ATP-binding cassette transporter mutated in Tangier disease (TD), promotes cholesterol transport across cellular membranes by loading apolipoprotein A-I with cholesterol, to form nascent HDL, or the precursor to "good" cholesterol. Many mechanisms have been proposed for cholesterol efflux and ABCA1, but a hybrid of direct transport with phospholipid translocase activity of cholesterol supports evidence from recent studies. The release mechanism suggests a release of nascent HDL particles in an endocytotic manner; whether this is necessary for cholesterol efflux has yet to be determined. TD and other cholesterol-related illnesses require the comprehension of ABCA1 mechanisms and reverse cholesterol transport for the treatment of symptoms, the major one being atherosclerosis. Statins and fibrates are the two most commonly used medications to manage the symptoms of TD, but promising clinical trials for future treatments include apolipoprotein A-I variants and synthetic LXR agonists.

#### **Matthew Gordon '11**

Robert Farnsworth, English

##### ***The Thesis as Poetry or Fiction: A Reading by Senior Writers -***

- see Bridget Brewer '11 for abstract

#### **Amanda Goss '13**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

##### ***Mapping Historical Landslides on Bainbridge Island, WA, to Predict Future Hazards***

This project uses the digital mapping program ArcGIS to map historical landslides on Bainbridge Island, WA, and determine the areas that are most at risk for future landslides. Bainbridge Island, located in Puget Sound, was dramatically shaped by the glaciers of the last ice age. The island is mainly built of debris left by the retreating ice: glacial till, sand, gravel, and clay. As the Puget Sound area sits over a major subduction zone, the region is also very seismically active. This combination of loose surface material and potential shaking poses a considerable landslide hazard to the shorelines of Bainbridge. Using .5m resolution topographic data called LiDAR, it is possible to map both the locations of historical landslides and newly discovered faults on the island. This information, combined with data on surface geology, shoreline slope stability, and drift of sediment on beaches, yields a landslide hazard map for Bainbridge Island.

#### **Douglas Goulding '11**

Elizabeth Eames, Anthropology

##### ***Identity and the Creation of a Nation: Perceptions of the Vote among Sudanese "Lost Boys" -- see Elizabeth Arens '13 for abstract***

#### **Munroe Graham '13**

Clarisa Pérez-Armendáriz, Politics

##### ***Justice and the Guatemalan Civil War***

Do countries just go back to normal after a civil war has torn the country apart? What does it take to legitimize the government and the institutions after an internal war that has lasted 36 years? In an analysis of Guatemala after the civil war, we must understand the importance of justice as a form of retribution for the violence and murder that characterized Guatemalan society from 1960 to 1996.

#### **Andrew Grant '13, Maura Neal '12, and Tyler White '13**

Elizabeth Eames, Anthropology

##### ***Lake Chad: Examining the Positive Effects of a Depleting Major Fresh Water Source***

Lake Chad, formerly a fresh water source to 20 million people in Chad, Niger, Nigeria, and Cameroon, has shrunk by 95% from 1963 to 1998 due to global climate change. While its shrinking has strained local economies and ecosystems, positive agricultural, socioeconomic, and cross-cultural cooperative efforts have emerged, including the exposure of new fertile land on which to farm and herd cattle and the booming industry of *Spirulina algae* cultivation by Chadian women. The governments of those countries neighboring Lake Chad are cooperating to raise awareness of the effects of climate change and are collaborating to support projects like the oil drilling and the redistribution of water to the lake through pipelines and damming. These endeavors are of paramount importance because scientists estimate that the lake will further shrink, or even disappear, in the 21st century.

#### **Segundo Guerrero '12**

David Das, Off-Campus Study Program

##### ***Connectivity Abroad: Are Cell Phones, Twitter, Facebook and Skype Diminishing the Study-Abroad Experience? -- see***

Josalynne Cottery '12 for abstract

#### **Alisa Hamilton '11**

Elizabeth Eames, Anthropology

##### ***Suivre la mode: Agency and Performance in Teenage Girls' Dress in Urban Senegal***

*Suivre la mode*, or "follow the fashion," examines the influences of media, parents, and religion on the dress habits of teenage girls in urban Senegal. In a country with strong Islamic values, why are so many teens sporting sequined tank tops and denim mini-skirts? How do girls combine conservative "traditional" styles with those inspired by Rihanna and Beyonce? This short ethnographic film explores how two generations of Senegalese women approach the controversial issue of adolescent fashion. The film includes interviews with girls and mothers as well as footage from a talent show, a beauty pageant, and a fair. I filmed the project during my semester abroad in Dakar, Senegal the spring of 2010. After editing the film at Bates College, I returned to Dakar to show the film to its participants and ask for

feedback before editing the final version. A question-and-answer session will follow the screening.

**David Harning '13 and Cameron Held '14**

J. Dykstra Eusden, Geology, and Camille Parrish,  
Environmental Studies

***Alpine Zone Classification: High Peaks Region of Baxter State Park, ME***

The high alpine regions of Baxter State Park in Maine have not been thoroughly mapped since the 1990s. The area above tree line is an important and fragile ecosystem very reliant on certain climatic conditions, particularly temperature. ArcGIS mapping of the high alpine area in the northern region including the Traveler peaks, Pogy peaks, First Lake, and the SFMA (Scientific Forest Management Area), using high resolution aerial imagery of Baxter State Park, can be compared to the 1993 map of the same alpine areas to show how the alpine regions have changed. A map of the different alpine vegetation zones illustrates which types of vegetation have expanded their range since 1993 and which have actually lost range. This has the potential for showing the effects of climate change, as different plant types succeed in different regions.

**Carolynn Harris '11**

William Ambrose, Biology

***Stable Isotopic Shifts in Fish Bones from Multiple Archeological Coastal Middens in Penobscot Bay, ME***

The carbon and nitrogen stable isotope compositions of collagen extracted from well-preserved archeological fish bones has the potential to provide useful information on fish diets and food web dynamics over time. Previous work on the Turner Farm archaeological site in Penobscot Bay, Gulf of Maine, reveals significant shifts in fish diets have occurred since European colonization (post 1620s). The objective of the present study was to analyze samples from other archaeological sites within Penobscot Bay to characterize the spatial extent of the isotopic shift measured at Turner Farm. Cod, flounder, and sculpin bones were analyzed from six stratified coastal middens located within Penobscot Bay and from two modern fish populations (near shore and off shore). The archaeological bones were sampled from midden strata of multiple ages between 500 and 2,400 years ago. All bone samples were demineralized in 0.2N HCl, extracted in weak NaOH, freeze dried, and 0.5-1mg were subsampled into tin boats for C and N isotopic analysis on the EA-IRMS. Over the last 1,000 years, both the C isotopic signatures of the three fish species examined decreased with time toward the present. The modern systems were consistently the most depleted in  $\delta^{13}\text{C}$  compared to the paleo signals from the archaeological middens. The average magnitude of this shift is ~3 for cod and ~5 for flounder and sculpin. The recent  $\delta^{13}\text{C}$  depletion seen in cod, flounder, and sculpin suggest the diets of demersal fish in Penobscot Bay have changed and currently are heavily influenced by kelp. This diet change may be indicative of wide scale changes to near-shore ecosystems in Penobscot Bay. Eelgrass beds on Maine's coast have declined by more than 50% in the last century. Evidence suggests that nitrogen loading and other human impacts such as permanent docks and mooring chains are the main cause of this decline.

**Bryan Harrison '11**

Rebecca Sommer, Biology

***Transplacental Exposure to Arsenic in Mice Alters the Expression of Diabetic Genes***

Arsenic is a naturally occurring metal. Exposure to high levels of arsenic in drinking water has been known to cause various types of cancer, skin lesions, and type II diabetes. The EPA sets the legal limit at 10 ppb of arsenic in drinking water, but regions of Taiwan have levels as high as 1,000 ppb. In this study female mice were exposed to 0, 50, or 500 ppb of arsenic in their drinking water prior to mating. At 3 weeks old, offspring were given clean water and their livers were harvested for testing at 4 months of age. The expression of genes known to be important to diabetes was tested. Ten genes were found to be either up- or down-regulated compared to control mice: *Acly*, *Adra1a*, *Ccr2*, *Gcgr*, *Ifng*, *Il12b*, *Pck1*, *Retn*, *Sreb1*, *Ucp2*. These genes are known to be important to glucose metabolism, lipid metabolism, and chronic inflammation and are thought to play an important role in toxicity of developmental exposures to arsenic.

**Cameron Held '14**

J. Dykstra Eusden, Geology, and Camille Parrish,  
Environmental Studies

***Alpine Zone Classification: High Peaks Region of Baxter State Park, ME*** – see David Harning '13 for abstract

**Hallie Herz '11**

Robert Farnsworth, English

***The Thesis as Poetry or Fiction: A Reading by Senior Writers*** - see Bridget Brewer '11 for abstract

**Katherine Hines '11**

Kathryn Low, Psychology

***Orthorexia Nervosa: Obsession with a Healthy Diet***

Bratman (1997) coined the term "orthorexia nervosa" about 15 years ago to characterize people who have obsessions with healthy eating and a perfect diet. Though some experts recognize orthorexia as a potential eating disorder, it is not listed as a diagnosis in the DSM IV, nor is it likely to be listed in the next DSM. Almost all the studies published in English, though conducted abroad, address either the diagnostic criteria of orthorexia or the prevalence of the disorder. Besides some of Bratman's own investigations, there is almost no research on orthorexia in the United States. The current study attempts to determine the prevalence of orthorexia in an American, college-aged population and investigates whether there is a relationship between orthorexia and internalization of the thin ideal, body dissatisfaction, perfectionism, and obsessive-compulsive tendencies.

**Quan Ho '11**

Nancy Kleckner, Biology

***Modulation of the First Phase of Feeding Behavior of Helisoma trivolvis by Neuropeptide Phenylalanine (NPF) stimulation of Buccal A Cluster (BAC) Neurons***

Rhythmic behaviors such as feeding, breathing, and locomotion are controlled by central pattern generators (CPG). The CPG in *Helisoma trivolvis* that controls the triphasic feeding pattern consists of three distinct movements—protraction, retraction, and hyper-retraction—of a radula (tongue-like organ). The CPG controlling this rhythmic behavior is subject to



neuromodulation. Neuropeptide phenylalanine (NPF) is a modulator that affects various physiological functions in gastropod mollusks. NPF facilitates a gradual transition from standard feeding behavior (ingestive) to regurgitation (egestive) responses in sea slugs (*Aplysia californica*). Moreover, NPF-induced stimulation of buccal A cluster (BAC) neurons has been shown to reconfigure the feeding CPG of *Helisoma trivolvis*. The goal of this thesis was to determine whether NPF-induced stimulation of BAC neurons reconfigures the standard feeding pattern to regurgitation or satiation. Simultaneous recording from a BAC neuron and a motor neuron indicates that NPF might affect a transition to satiation through a phase resembling regurgitation.

#### **Micaela Holland '11**

Francesco Duina, Sociology

##### ***The Fear of Crime in Durban, South Africa: A Qualitative Study***

The goal of this study is to understand citizens' perceptions of crime and subsequent fear in Durban, South Africa. In the spring of 2010 intensive, in-person interviews were conducted with 21 Durban residents that had lived in the city for a minimum of 10 years to understand motivations for the fear-of-crime and the implications that fear had. The sample was controlled for race, age, sex, and socio-economic status. I found that race and gender were the only two individual factors that affected perceptions of crime. Race is the most significant factor that influenced perceived risk of victimization and consequent levels of fear.

#### **Emily Howe '11**

Lillian Nayder, English

##### ***Disease in the Victorian Era***

This thesis considers the ways in which Victorian writers such as Charles Dickens, Charlotte Brontë, George Eliot, and Joseph Conrad employ disease and disease imagery to make some of their most broad and ruthless social critiques. The authors invert both the expected relationship between class and disease, and the expected relationship between the colonizer and the colony in terms of disease. The centrality of disease to the social critiques offered by all four writers reflects the significance of disease during this time, and the importance of understanding how Victorian society conceived of disease

#### **Sarah Jacobson '14**

Elizabeth Eames, Anthropology

##### ***HipLife Music as Medium of Social Change among Ghanaian Youth*** -- see Elliot Foster '11 for abstract

#### **Emily Jasinski '11**

Susan Langdon, Psychology

##### ***Predictive Validity of the Helpfulness Implicit Association Test***

Why do people help others? Is it because they have been told that it is the right thing to do or is it a concept that has been ingrained within an individual? The present study looked at one specific subset of the agreeableness Big Five personality trait, helpfulness. This study investigated whether implicit measures based on the IAT reflected an implicit helpful self-concept and whether such an implicit measure was capable of predicting actual helpful behavior. An individual's self-reported measure of respect was also analyzed to determine whether a reported type

of respect correlated with reported and observed levels of helpfulness.

#### **Audrey Jensen '11**

Steven Kemper, Anthropology

##### ***Exploring Balinese Secular and Religious Consumption of Marine Turtles: A Call for Renewed Conservation***

This research reveals the interlocking and complex relationships between the environment and Balinese culture by specifically explaining and analyzing the Balinese connection to the endangered marine turtle. As a symbol, the marine turtle plays a significant role as a sacrificial offering in numerous Balinese Hindu rituals that are performed in order to appease spirits and maintain balance in the universe. Hindu texts state that marine turtles should only be used for sacrificial purposes in the most significant ceremonies, the Panca Walikrama, held every decade, and the Ekadasa Rudra, held every century. However, in more recent times, marine turtles are hunted and traded in the illegal animal market under the pretense of use in ritual, yet secular consumption is the reality. This research utilizes two theoretical frameworks, symbolist anthropology and cultural ecology, in order to establish the ecological need for conservation of marine turtles due to their vastly diminishing populations and to provide context for the current secular and religious uses of marine turtles in Bali. Balinese culture is invested in marine turtles. Therefore, no genuine ecological conservation can occur without cultural conservation as a priority as well. This research addresses the question of whether ecology and culture can function, adapt, and survive together. Ultimately, with new conservation strategies that utilize ecological science in conjunction with local knowledge and participation, both marine turtle populations and the use of these species in the Balinese Hindu Panca Walikrama and Ekadasa Rudra ceremonies can survive.

#### **Amy Johnston '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

##### ***Geologic Area around Morse Mountain in Phippsburg, ME***

Bates Morse Mountain Conservation Area is used by Bates College for research and other activities. This project examines the surficial geology of the Small Point Quadrangle. The geological data is digitized and layers of bluff and landslide data are added to this particular area. This information is accessed from the Maine Geologic website, which provides digital data for coastal bluff maps, coastal landslide hazards maps, and surficial geology information for the State of Maine. The map of the combined layers describes how things compare in this coastal Maine area and examines any potential landslide areas and erodible bluffs.

#### **Elizabeth Johnston '11**

Todd Kahan, Psychology

##### ***Inattentional Blindness: An Examination of Featural, Phonological, and Categorical Processing***

The study sought to determine the extent to which background information is processed in an inattentional blindness scenario. Bates students participated in three experiments. The first experiment examined whether stimuli, which are not seen as a result of inattentional blindness, were nonetheless processed for featural-level information. To examine this, participants performed a speeded discrimination task regarding a target line

of letters (whether the letters consist of straight or curved lines), and the effects of a flanking background letter were assessed. The second experiment examined whether background stimuli were processed for phonological information. The third experiment examined whether background stimuli were processed for categorical information. Results will help to elucidate whether background stimuli, which are missed as a consequence of inattentional blindness, are nonetheless unconsciously processed.

#### **Eliza Kano-Bower '11**

Atsuko Hirai, History

#### ***The Causes, Laws, and Effects of the Third Wave of Japanese Legal Reform***

The so-called third wave of legal reform has been in place in Japan for the last two decades. This thesis first explores the roots the Japanese legal culture and law. An overview of past reforms and the evolution of legal culture is necessary to understand the reforms of the present. I then explain the economic causes of this third wave of reform, and how the reform process evolved. I also discuss the actual legal changes focusing on education and corporate law. I give evidence that the legal reforms are not having the effects desired by the reformers. The final chapter provides possible explanations for why the changes have not yet brought about the reform desired by the government.

#### **Morgan Kapinos '11**

Claudia Aburto-Guzmán, Spanish

#### ***El Otro: Immigration, Xenophobia, and Soccer Leagues in Argentina***

I examine how discriminatory and xenophobic reactions to Bolivian immigrants are presented within the context of the first division soccer leagues in Buenos Aires, Argentina. My thesis has investigated the development of the Other (*el Otro*) throughout the history of Argentina, studying how race, ethnicity, and class have intertwined to construct hierarchies that in turn justify discriminatory practices. Today the new wave of immigrants coming to Argentina from Bolivia are subjected to this discrimination, which pervades all areas of society, including the soccer leagues. After a brief historical overview, my presentation explores why the soccer leagues in Argentina offer an ideal context in which to view contemporary discrimination and xenophobia targeted at specific stigmatized immigrant groups. It addresses the revealing sociological elements of this arena and analyzing popular chants recited at the soccer games.

#### **Aaron Kaplan '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

#### ***How Cities Should Be Designed: Growing Questions Surrounding the Livability of the City of Ørestad, Denmark***

Ørestad is being built from the ground up as a model modern "livable" city. Construction of this city has been ongoing since the late 1990s and in the past decade urban development of the area has progressed enough for businesses and people to begin to live and work in Ørestad; essentially it is beginning to become livable. This project analyzes and illustrates the development of Ørestad and what makes it the "ideal" modern city. This analysis is based on three maps of Land-Sat imagery, which illustrates pre-development, development so far, and plans for the future. It compares and calculates how the land

cover has changed over time, and how these changes will progress.

#### **Lundat Kassa '13**

Elizabeth Eames, Anthropology

#### ***Education in Ethiopia (1889-1974): Transition to Global Thinking*** -- see Ashley Brooks '14 for abstract

#### **Ingrid Knowles '11**

Beverly Johnson, Geology

#### ***A Biogeochemical Study of Ditchplug and Natural Pools in the Sprague River Marsh, Phippsburg, ME***

Many of the marshes in New England currently have a network of small, hand-dug ditches (made by the first European settlers 300+ years ago). In an effort to restore these ditched marshes and to increase the surface area of pool habitat available, the U.S. Fish and Wildlife Service plugged several ditches in the Sprague River Marsh, Phippsburg, ME, in the early 2000s. Since emplacement of the ditchplugs, few efforts have been made to monitor the ditchplug pools. The purpose of this research is to study the biogeochemical cycling of ditchplug and natural pools in the Sprague River Marsh in Phippsburg, ME. In the summer of 2010 mummichogs (*Fundulus heteroclitus*), surface sediment, vegetation, biomass cores, and other marine organisms were collected for stable isotope analysis. General water quality parameters and nutrient data ( $\text{NO}_3^-$ ,  $\text{PO}_4$ , and  $\text{NH}_4$ ) were monitored. Initial results suggest enrichment in the  $\delta^{13}\text{C}$  in the muscle tissue from the mummichogs collected in the ditchplug pools. Further analysis is underway to further understand the isotopic and hydrological differences in the ditchplug and natural pools.

#### **Margaret Krueger '12**

Kathryn Low, Psychology

#### ***Nutrition Program with Teenagers at the Boys and Girls Club of Lewiston/Auburn***

I am working with and conducting research at the Boys and Girls Club of Lewiston/Auburn, where I am leading a nutrition and cooking program. The program, created by a specialist for the Boys and Girls Club, is entitled Healthy Habits, and is a part of a more general program, The Triple Play: A Game Plan For Mind, Body, and Soul. The Healthy Habits program includes ten lessons and is spread out over five weeks. The objective of this program is to spread knowledge of good nutrition and a good diet. I am cooking easy, affordable, and healthy meals that members can make at home. At the end of the program, I will be assessing the knowledge and understanding of the participants.

#### **Kedar Kurpad '13**

Craig Decker, German

#### ***The Colby-Bates Database for Reading Resources in German***

A common problem in upper-level foreign-language learning is the abrupt transition from language and grammar focused courses to purely content-based courses taught in the language of instruction. This can come as a shock to many students who are not used to the sense of immersion necessary to develop a high level of skill in an academically learned language. With this problem in mind, students and professors from Bates and Colby colleges have begun to construct a German language reading database with various texts and articles accessible to students of all levels of language instruction so that they can

become accustomed to reading in a content-based context before they begin to take content-based courses. By constructing a user-friendly, expansive, and fun database, we hope to expose students of all levels of German to interesting and insightful content that will prepare them for higher level courses which focus less on sentence structure, vocabulary, and grammar, more on abstract concepts and personal inquiry.

#### **Christopher LaBrecque '11**

Karen Palin, Biology

##### ***Biomimetic Inhibition of Staphylococcal Biofilms***

*Staphylococcal* biofilms are important in various types of infections including wound, urinary tract (UTI), and foreign-body associated infections. Intercellular communication is a key component in the transition of planktonic bacterial cells to a fully developed biofilm. Recent research indicates that biomimetics may inhibit intercellular communication affecting biofilm formation. Using in vitro models we explore the biomimetic effects of furanones and Sharklet™ on *staphylococcal* biofilm formation.

#### **Ryan Larsen '11**

Lee Roecker, Chemistry

##### ***Coordination of Thiourea Ligands to Cobalt(III)***

The syntheses of a cobalt(III) complexes containing N, N'-dibenzylthiourea, 1-methyl-3-(m-tolyl)thiourea, N-phenyl-N'-benzoylthiourea, N-phenyl-N'-4-methylbenzoylthiourea, and N-phenyl-N'-4-bromobenzoylthiourea have been accomplished by reaction of  $[(en)_2Co(OSO_2CF_3)_2](CF_3SO_3)$  with the thiourea ligands in tetramethylene sulfone. Coordination isomers were separated by ion exchange chromatography and the resulting complexes were characterized by  $^1H$  and  $^{13}C$  NMR spectroscopy. The ligands form a 4-membered chelate ring and are bonded through the thiourea sulfur and one of the urea nitrogens.

#### **Catherine Lary '11**

Rebecca Herzig, Women and Gender Studies

##### ***Perceptions of Women and Gender Studies at Bates and Beyond***

A product of the socially charged 1960s, women and gender studies has spread to college and university campuses across the country inspiring institutional change. Despite women and gender studies' major contributions to academia, the field has struggled to achieve legitimacy in the eyes of many scholars due to backlash and stigma. In my thesis I discuss the evolution of women and gender studies in the United States, and then I turn my attention to the personal experiences of women and gender studies majors at Bates.

#### **Benjamin Latham '11**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

##### ***Mapping Backcountry Ski Terrain in Southern Maine***

Every week, hundreds of Bates students leave campus, making the trek to Bethel or Kingfield where steep slopes await them at Sunday River and Sugarloaf. While these resorts can be great destinations for a relaxed day of skiing or snowboarding with friends, they can get extremely crowded on weekends. Southern Maine has many areas with potential for backcountry skiing and riding; all that is missing is a working database of potential

backcountry zones. Using an ArcGIS analysis to identify areas which meet the criteria necessary for safe and usable slopes such as slope angle and aspect, land cover, ownership status, and accessibility, this project seeks to map potential backcountry terrain. This analysis will be followed up with a visit to some of these locations to determine the accuracy of the study and its applicability to other areas in the state and region.

#### **Andrea Lauden '14**

Elizabeth Eames, Anthropology

##### ***Partners in Health's Local Strategies for Combating***

***Malnutrition in Rwanda*** -- see Elisabeth Baird '14 for abstract

#### **Matthew Lipoff '12**

David Das, Off-Campus Study Program

##### ***Connectivity Abroad: Are Cell Phones, Twitter, Facebook and Skype Diminishing the Study-Abroad Experience?***

-- see Josalynne Cottery '12 for abstract

#### **Paul Lombardi '11**

Joseph Hall, History

##### ***The Slave Conspiracy of 1741 and Race Relations in Colonial New York City***

In the mid-eighteenth century, New York City was far from the tolerant and liberated city it would eventually become. Still struggling to form its own identity, colonial North America's largest city quietly grappled with how an increasingly diverse population could coexist in a quickly expanding urban environment. In March and April of 1741, tensions came to a head as fires broke out and raged throughout the city. Speculation that the fires were the result of a widespread slave conspiracy led to the trials and subsequent executions of 34 blacks and 4 whites in the months that followed. This event was known as the Conspiracy of 1741. While many historians have contended with the question of whether or not this uprising was the result of a widespread slave conspiracy, the events' true importance lies in what this incident can tell us about race relations in colonial New York City.

#### **Hannah Mack '11**

Francesco Duina, Sociology

##### ***Davidam and Eelam: Collective Action Framing and the Differing Success of Two Tamil Nationalist Movements***

Using the lens of W.A. Gamson's collective action framing for social movements, this research project deconstructs the late twentieth-century Tamil ethnic separatist uprisings of South India and Sri Lanka. The movements share the same fundamental constitutive element: organization around the Tamil language and culture. However, while the South Indian Dravidian movement is widely recognized as a successful politicization of a cultural identity, in Sri Lanka the situation quickly deteriorated into ethnic civil war between the Sinhalese government and Tamil rebel groups. In order to explore this difference in outcomes, I examine political speeches, transcripts, and newspaper accounts as well as secondary source data and piece together the roles of caste, language, and the political climate in the social construction of these two movements.

**Clara Maeder '14**

Elizabeth Eames, Anthropology

***HipLife Music as Medium of Social Change among Ghanaian Youth*** -- see Elliot Foster '11 for abstract**Qasim Mahmood '13**

George Perkins, Economics

***Fighting Tax Evasion in Pakistan: A Study of IMF Tax Reforms and Improving Transparency***

In Pakistan, a lack of an effective legal system and corrupt government has made it easy for individuals to evade taxes. There are many factors contributing to this tax evasion, and it has great impact on the overall health of the economy. The past decade has witnessed a worsening budget deficit, which has compelled the government to rely on foreign aid and loans to finance its expenditures, while at the same time cut down on critical development projects. In an effort to curb this practice, the government of Pakistan has been forced to adopt IMF instituted reforms to improve transparency and tax structure. The effectiveness of these reforms is a main focus of this project. Specifically, I wish to investigate whether these reforms have been effective in causing a significant increase in government revenue. A second goal of this research builds on these results to determine an optimal combination of different tax types to reduce tax evasion in Pakistan.

**Marissa Maliwanag '11**

William Ambrose, Biology

***Relationship between Environmental Change and Annual Growth Rates of the Soft-Shelled Clam (*Mya arenaria*) in the Gulf of Maine from 4,200 Years B.P. to Present***

I analyzed shells of soft-shelled clams (*Mya arenaria*) from the Turner Farm archaeological midden in Penobscot Bay to reconstruct environmental conditions over the last 4,200 years. Growth rates were used as environmental predictors for 4,200, 3,500, 2,400, 1,000, and 500 years B.P., and present at Turner Farm and for 2,400 years B.P. at Butter Island and Oak Hill. *M. arenaria* from 3,500 years B.P. grew 13.5% faster than modern *M. arenaria*, likely a result of differences in seawater temperature or food. No difference in growth rate was found among the three sites at 2,400 years B.P., suggesting large-scale factors influence growth rates more than local factors. Stable carbon isotopes ( $\delta^{13}\text{C}$ ) of Turner Farm shells from 3,500, 2,400, 1,000 years B.P., and present day were examined to evaluate food resources. Preliminary data show an enrichment of 1.77 ‰ in  $\delta^{13}\text{C}$  from 3,500 years B.P. to present, possibly due to higher temperature, faster growth rate, higher metabolic rate, or consumption of a more enriched food source. The ratio of lithium to calcium in co-occurring mussel shells (*Mytilus edulis*) was used as a proxy for water temperature. The combination of Li/Ca and  $\delta^{13}\text{C}$  data will allow me to relate growth rates to differences in temperature and food among time periods.

**Joanna Mangar '11**

Jennifer Koviach-Côté, Chemistry

***The Radical Scavenging Activity of Phenylethanoid and Phenylpropanoid Glycosides***

Plants are subject to many biotic and abiotic stresses, including high altitude, low temperatures, draught and nutrient deficiencies. Plants often cope with such stresses by increasing their capacity to scavenge free radicals, by means of antioxidants. One class of antioxidants found in plants is the

phenylethanoid glycosides (PHGs), characterized by a phenyl ethyl group linked by a glycosidic bond to the anomeric position of a core glucose molecule. Phenylpropanoid glycosides, comprise a subset of PhGs, and contain an aromatic ester, in this case caffeic acid. We have synthesized a non-natural analog of a phenylpropanoid glycoside, without the phenyl ethyl group, to test the importance of the phenyl ethyl group in radical scavenging activity, when a single caffeoyl group is present. We further tested radical scavenging activity as a function of the number of caffeoyl groups, while varying their relative positions. Free radical scavenging activity is assessed using the 1,1-diphenylpicrylhydrazyl (DPPH) assay, using tocopherol as a standard.

**Alexis Martinetti '14**

Lavina Dhingra, English

***Image and Sound: Reading and Writing Lyric Poetry*** -- see Brendan Davidson '14 for abstract**Lauren McAllister '11**

Georgia Nigro, Psychology

***Educating the Educators: Development and Evaluation of Training Programs for Preschool Special Education Staff***

People depend on the expertise of their children's educators. It is expected that a child's time in a classroom will be utilized in the best possible way. However, what is the best way to teach teaching so that in fact the desired quality of education occurs? In a special education classroom this becomes even more essential with an increased staff to child ratio. In the current research, staff training programs for modified utilization of the Picture Exchange Communication System (PECS) were developed and evaluated through focus groups and interviews with one-on-one aides and the director of a preschool classroom for children special needs. The outcomes of the assessment of the programs were then utilized in development of other staff training experiences.

**Kevin McDonald '11**

Georgia Nigro, Psychology

***Influence of Service-Learning on College Student-Athletes' Identity Development: Applying the Student Development Theory of Arthur Chickering***

Prior research suggests that both athletics and service-learning have effects on college students' identity development. Athletics has been found to negatively impact academic and career development, autonomy, and interpersonal relationships. Service-learning has been found to have positive effects in these areas of student development. In my thesis, I conduct a comparative analysis of the following four types of students: non-service-learning non-athletes, service-learning non-athletes, non-service-learning athletes, and service-learning athletes. I use the Student Developmental Task and Lifestyle Assessment (SDTLA), based on Arthur Chickering's vectors of development, to assess levels of student identity development. A comparative analysis is conducted to see if service-learning plays a role in the identity development of collegiate athletes. I hypothesize that non-service-learning athletes will have the lowest measures of identity development, whereas the service-learning non-athletes will have the highest measures. In other words, service-learning will offset the negative effects of athletics on college student development.

**Kaitlyn McEnroe '11**

Karen Palin, Biology

***Prenatal Health for Somali Women***

This community-based research project explores development of and presentation of prenatal curriculum in a culturally appropriate manner for young Somali women in Lewiston, Maine. These women are dealing with expectations and traditions in dual cultures as they go through their pregnancies. They often lack their traditional pregnancy support systems, and may be unfamiliar with prenatal care and childbirth in the United States. This presents challenges for providing prenatal education. Through library research and discussion with community partners such as midwives, cultural brokers, youth education coordinators, and others, topics for prenatal education were identified. This work focuses on providing information about fetal development during the first and second trimesters, maternal nutrition, prenatal testing, and breast-feeding. Women before pregnancy or in their first and second trimesters were recruited by local community partners and invited to the education workshops. The two workshops held this year serve as pilot work for establishment of an ongoing education program in Lewiston, Maine.

**Anna McGrath '11**

John Kelsey, Psychology

***The Effects of D-Cycloserine and Propanolol on Extinction of Morphine Withdrawal-Induced Conditioned Place Aversion and Stress-Induced Reinstatement***

Drug cues in the environment have a long lasting ability to evoke cravings in recovering addicts. In order to prevent relapse, extinction therapy has been used to disassociate the conditioned drug cues from the drug effects. While this is a useful technique in principle, it has not had tremendous clinical success because extinction is context-specific. D-cycloserine (DCS), a drug that enhances glutamate transmission, has been shown in some studies to enhance consolidation of new memories and increase the rate and effectiveness of extinction. Other studies, including those conducted in our lab, have found that DCS can strengthen the reconsolidation of drug memories, prolong extinction, and enhance relapse. My first experiment is to replicate these latter findings. Assuming that DCS enhances extinction and relapse, I determine if propanolol, a beta blocker with amnesic properties, interferes with drug memory reconsolidation, thereby enhancing extinction and blocking reinstatement.

**Jarret-Paul McKallagat '14**

Elizabeth Eames, Anthropology

***HipLife Music as Medium of Social Change among Ghanaian Youth*** -- see Elliot Foster '11 for abstract**Tyler Mehegan '11**

John Kelsey, Psychology

***D-Cycloserine Facilitates Either Extinction or Reinstatement of an Opiate-Withdrawal-Induced Conditioned Place Aversion under Different Procedural Circumstances***

Extinction therapy for drug addicts is a common therapy in which addicts are conditioned to disassociate stimuli/environments that previously predicted the presence of a particular drug from the drug itself. Extinction therapy by itself, however, has proven insufficient to completely prevent relapse;

under certain circumstances, the stimuli/environment-drug memories reappear after apparently complete extinction. Because extinction is now understood not to be the unlearning of the old memory, but rather the learning of a new memory that inhibits the old memory, the cognitive enhancing drug D-cycloserine (DCS) has been identified as a drug that could potentially enhance the new learning that occurs during extinction. However, recent evidence from our lab and others (Lee et al., 2009) has suggested that, rather than facilitate extinction, DCS may under some circumstances facilitate a process called reconsolidation, in which the old stimuli/environment-drug memory is reactivated and more securely stored, in turn leading to increased relapse. The clinical potential of DCS, thus, relies on the understanding of the circumstances under which DCS facilitates extinction versus reconsolidation. Through observations of the DCS effect on morphine withdrawal in rats, I attempt to identify these different circumstances.

**Jackson Mesick '11**

Lee Roecker, Chemistry

***Synthesis and Kinetic Studies of Six-Coordinate Cobalt(III) Complexes Containing Sulfur- and Nitrogen-based Organic Ligands***

Six-Coordinate Cobalt(III) complexes have been synthesized through a series of substitution reactions.  $[\text{Co(III) en}_2\text{Cl}_2]^{1+}(\text{Cl}^-)$  has been reacted with sulfur containing amines (giving a total of one sulfur and five amine interactions). The formation of these compounds was done either through one reaction (direct application of amine to cobalt complex), or through two (direct application, followed by a second heated reaction to cause the sulfur bond to form). These complexes were confirmed to be the expected compounds by  $^1\text{H}$ - and  $^{13}\text{C}$ -NMR. The cobalt-sulfur metal-ligand interaction gives a strong peak at a specific wavelength ( $\sim 300$  nm) in the ultraviolet range, and this peak was used to quantify the strength of the interaction. Kinetic studies were done to this effect using small amounts of NaOH to disrupt the sulfur-cobalt interaction and replace it with a water-cobalt interaction.

**Sabrina Minjares '12**

Elizabeth Eames, Anthropology

***Our Country, Our Religion: The Africanization of Christianity*** -- see Joseph Ekpenyong '12 for abstract**Sarah Moore '11**

Michael Sargent, Psychology

***Value of Wealth and Self-Presentation as a Moderating Effect for Risky Choices***

Risky choice framing suggests that gain frames will produce risk-averse behaviors and loss frames will create risk-seeking behaviors and these behaviors are amplified when an item of value is present. Previous research suggests that males actively seeking a mate tend to value wealth more than a male not seeking a mate. Given this information, it is hypothesized that men primed to think about searching for a mate will show stronger framing effects than men in a control condition. The purpose of this study is to determine if men looking for a mate are risk-averse or risk-seeking during a fictitious gambling game. Participants, 284 males recruited via Cotterweb, are randomly assigned to a mate search prime or control condition and then respond to a hypothetical gambling scenario in which

the outcomes are either framed as gains or losses. This tests whether mate search priming moderates risky choice framing.

**Adrian Morales '11**

Craig Decker, German

*The Colby-Bates Database for Reading Resources in German*

**Elliott Morgan '11**

Matthew Côté, Chemistry

*Imaging and Spectroscopy of Chemically Bound Fluorescent Nanospheres*

Developments in nanotechnology have led to new methods of confining light. Under optimum conditions, incident photons of specific frequencies can produce oscillating regions of electron density in conductive metal bordered by dielectric media. These propagating waves of negative charge produce corresponding evanescent fields that decay exponentially into the metal and dielectric media, confining activity to the interface. These wave phenomena are known as surface plasmon polaritons (SPP) and hold promise in signal transmission across gold nanorods. A number of factors including nanoparticle topography and nearby emitters influence the behavior of polaritons. Atomic force microscopy (AFM) can be used to map and position nanostructures for measuring SPP activity using fluorescent spectroscopy. Experiments using fluorescent nanospheres show both enhanced emission as well as nonradiative quenching as a function of distance between fluospheres and SPP evanescent fields. I am investigating plasmonics by developing techniques for adhering fluorescent dyes and nanospheres to silicon AFM tips with minimal bleaching effects.

**Matthew Moschitto '11**

Jennifer Koviach-Côté, Chemistry

*The Sonogashira Cross Coupling of Vinyl Triflates and Terminal Alkynes*

The Sonogashira reaction was employed to accomplish the sp<sup>2</sup>-sp coupling of vinyl triflates to terminal alkynes. This reaction is generally catalyzed by palladium (0) compounds and CuI in the presence of base. Palladium, however, is an expensive chemical and thus finding other catalysts to accomplish this coupling is important. Other catalysts that can be used are iron and copper ligated compounds. The result of this particular Sonogashira reaction is the biologically important enyne moiety. This moiety is seen in spiroketal enol ether 1, which is chemopreventive. Using ribose as a model for this system, a vinyl triflate was obtained using n-phenyltriflamide. The vinyl triflate was then reacted with phenyl acetylene to obtain the enyne moiety using Pd(PPh<sub>3</sub>) and CuI as catalysts. Future reactions would seek to accomplish this reaction with copper ligated compounds.

**Nancy Muñoz '11**

Krista Scottham, Psychology

*A Possible Integration Program for Bates College: Intergroup Contact Theory or Race Conversations*

The purpose of this study is to evaluate the effectiveness of two programs, Breaking Bread and Campus Conversations on Race, in improving cross-cultural relations at Bates College. Participants' program preference, level of intergroup anxiety, and fears of appearing prejudice were assessed to determine the effectiveness of each program in facilitating cross-cultural

relations. Based on these findings, one program will be selected and recommended to Bates College Office of Intercultural Education for future planning.

**Julia Murphy '11**

Heather Lindkvist, Anthropology

*Encounters with HIV-AIDS Stigma at Eshowe Hospital in KwaZulu-Natal, South Africa*

In the region of KwaZulu-Natal, South Africa, it is estimated that 1 in 5 people are HIV-positive. For many years the South African government questioned the legitimacy of HIV-AIDS and made little effort to reduce the spread of the devastating virus. However, in April 2010 the National AIDS Council launched a massive HIV counseling and testing campaign designed to test 15 million South Africans and reduce the HIV incidence rate by 50% by June 2011. While volunteering in a rural South African hospital I observed that reluctance to be tested is largely related to the HIV stigma that persists in South African society. As a result, health care providers use their power and authority to coerce South Africans into undergoing HIV counseling and testing.

**Nora Murray '12 and Andrew Wilcox '11**

Dennis Browne, Russian

*The Sights, Sounds, and Sense of Russian Poetry*

This presentation explores the ways in which the mood of Russian poetry can be translated into English. This involves a variety of poetic maneuvers. Among these maneuvers are content, rhyme, meter, word choice, symbols, and sounds. This presentation looks specifically at the poetry of poets Anna Akhmatova and Joseph Brodsky, two of the twentieth century's most renowned Russian poets. Anna Akhmatova is regarded as the grand dame of Russian poetry. Her ability to translate quintessential elements of the Russian experience into verse is unparalleled. Akhmatova served as Brodsky's mentor and anointed him as the next great Russian poet. Besides being a poet, Brodsky is well known as a translator, and translated many of his own poems from Russian into English. His own tactics for and philosophy of translation play a large part in understanding of the ways in which the mood of a poem in one language can be transmitted successfully, or not, into another language.

**Molly Mylius '11**

Stephen Sawyer, Off-Campus Study Program

*CrunchTime: An Assessment of Wild and Domestic Grazers in the Engaruka Wildlife Corridor*

As the conservation movement in Tanzania has gained momentum and funding over the past few decades, protected areas have become one of the primary methods used to preserve species and ecosystems. However, animals are not exclusively limited to the land within these park boundaries, and many of them move through so-called wildlife corridors: land that exists around and between these conservation areas. One such wildlife corridor exists in Northern Tanzania between Mto wa Mbu and Engaruka. Animals from Tarangire National Park and Lake Manyara National Park both use this area as wet-season pasture. However, the area also supports a growing number of pastoralists, many of whom are encroaching upon wild habitats. This project attempts to assess the current and historical situation of wild grazers in comparison to domesticated grazers in the area. According to Maasai interviews, wildlife sightings have been declining over recent years. These declines can be

attributed to a combination of drought, over hunting, and population growth. Transect data shows that the ratio of domesticated grazers to wild grazers is over 20:1, and that wild animals avoid being in the vicinity of bomas. This paper concludes that with the paving of a major road and the continuation of unmonitored commercial hunting, wild population declines are inevitable unless the government takes steps to protect wildlife in the area.

**Nawshaba Nawreen '11**

Lavina Dhingra, English

*Image and Sound: Reading and Writing Lyric Poetry* -- see Brendan Davidson '14 for abstract

**Maura Neal '12**

Elizabeth Eames, Anthropology

*Lake Chad: Examining the Positive Effects of a Depleting Major Fresh Water Source* -- see Andrew Grant '13 for abstract

**Cody Newman '11**

Rachel Austin, Chemistry

*Evaluating Ruthenium Catalysts for the Hydrodeoxygenation of Fast Pyrolysis Oil*

Wood-derived biofuels are an attractive alternative to non-renewable petroleum fuels. However, these fuels require substantial catalytic upgrading before they can be utilized in traditional combustion engines. This study provides an overview of the characterization and reactivity of several ruthenium catalysts used to upgrade phenol, a model compound representing a variety of molecules present in wood-based pyrolysis oil.

**Molly Newton '11**

Michael Retelle, Geology

*Monitoring Sedimentation Patterns and Tidal Inlet Migration at Small Point, Seawall, and Popham Beaches, Phippsburg, ME*

From long-term environmental events such as sea-level rise and environmental change to short-term events such as major storms and human activity along the shoreline, beaches represent landforms that change quickly in response to changes in the conditions of the environments that surround them. Barrier beaches are heavily influenced by the paths of the tidal inlets linking these beaches to the estuaries located behind the beachfront. Seawall Beach, Popham Beach, and two pocket beaches on nearby Small Point represent dynamic examples of landforms under change. These beaches have seen massive amounts of erosion over the last five years, concurring with shifts in the paths of the tidal inlets linking coastal marsh to ocean. Through topographical surveying of the beach face and mapping of tidal channels, this study examines the potential relationship between shifts in position of tidal inlet and erosion/deposition on the beachfronts of these four beaches.

**Noel Nguyen '11**

Georgia Nigro, Psychology

*The Effects of Post-traumatic Events on Parenting Style in Somali Women*

Adults parent their children based on techniques learned from their experiences as a child and advice from grandparents, friends, medical providers, and the community. However, when

a parent experiences a traumatic event or events during their developmental growth or while parenting their own children, it can have long-term effects on parenting. In this study, I interviewed Somali women participating in the Nurturing Program offered by Advocates for Children about parenting styles. Most of the participants have experienced some type of traumatic events such as rape, abuse, war, resettlement, or neglect. Based on the interviews and observations of the participants of the Nurturing program, we can see if there is a relationship between experiencing traumatic event or events and parenting behaviors. If there is a relationship, Advocates for Children will use the information to provide better services or intervention programs for parents who have experienced traumatic events.

**Thao Nguyen '11**

T. Glen Lawson, Chemistry

*Role of UbcH5 Isozymes in EMCV and HAV 3C Protease Ubiquitylation*

The 3C protease is a viral protein important for replication of picornaviruses in mammalian host cells. It catalyzes most cleavages of the polyprotein encoded by the picornaviral RNA genome into functional moieties. It also cleaves cellular factors to inactivate host protein synthesis or innate defense system. The host cell ubiquitin-proteasome system recognizes the 3C protease as a target for degradation. Previous studies have suggested that the ubiquitin-proteasome mediated pathway is required for optimal virus replication. At least three pathways were shown to catalyze polyubiquitin chain formation on the 3C proteases of encephalomyocarditis (EMCV) and hepatitis A (HAV) virus and target the 3C protease for destruction. It has been shown in vitro that one of the pathways involves the ubiquitin-conjugating enzymes E2, UbcH5a. We have examined the isozymes UbcH5b and UbcH5c, and found they also support 3C protease ubiquitylation in vitro. To study the role of the UbcH5 isozymes in picornavirus infection, we are using interfering RNA to knockdown UbcH5 enzymes in host cells. We expect that experiments with these knockdown cells will reveal whether the UbcH5-mediated ubiquitylation pathway plays an important role in EMCV replication.

**Jamie Nickerson '11**

Pamela Baker, Biology

*Genetics of Susceptibility to Bone Loss Related to Periodontal Disease*

Human periodontal diseases are infectious, cause chronic inflammation and tooth loss, and are correlated with instances of osteoporosis. Studies suggest that genetic predisposition contributes to the severity of bone loss and progression of the disease. Previous studies have shown that the mouse strain BALB/cByJ is hereditarily susceptible to alveolar bone loss with infection with *Porphyromonas gingivalis*, and that gene expression changes with infection. In this study we sought to distinguish the genes that may confer susceptibility to bone loss associated with periodontal disease by characterizing the expression of various bone remodeling genes that occurred in the strain. We compared the relative gingival RNA expression of sham-infected and infected BALB/cByJ mice by isolating the gingival RNA from 10 sham-infected and 10 infected mice euthanized 1, 2, and 3 weeks after infection with *P. gingivalis*. cDNA was made and amplified using primers associated with osteoporosis for quantization by qPCR. The results suggest

several genes that may link periodontal disease and osteoporosis.

#### **Anzela Niraula '11**

John Kelsey, Psychology

##### ***Acute and Chronic Doses of Nicotine Increase Impulsive Responding in Rats***

Impulsivity, a tendency to commit rapid, unplanned actions, disregarding their negative consequences, is a common trait among substance abusers. Drug abusers tend to prefer immediate rewards over larger, but delayed rewards, which is also known as delay-discounting. What is not clear is whether impulsivity is a cause or consequence of drug addiction. To investigate the effects of nicotine on impulsive responding, in this study, rats performed 2 delayed discounting tasks after receiving acute and chronic doses of nicotine. Water-deprived rats were presented with 2 levers of which responding on 1 lever delivered a water reward after a variable delay (0 - 35 s), while responding on the other delivered the same magnitude of reward immediately but with a 0.5 probability. Rats choose the delay lever when the delay is short, but reduce their preference for the delay lever as the delay is increased. Acute doses of 0.4, 0.8, and 1.2 mg/kg nicotine reduced the rats' preference for delayed reward at intermediate delays and this effect was largest at 1.2 mg/kg nicotine. Likewise, chronic doses of 0.8 mg/kg nicotine progressively decreased the preference for delayed reward over 5 days. These data indicate that drugs of addiction can increase impulsivity, potentially contributing to both the development and maintenance of the addiction.

#### **Andrew No '14, Rebecca Ross '14, and Anabel Schmelz '14**

Elizabeth Eames, Anthropology

##### ***Voiceless but Not Silent: The Independent Media's Response to Mugabe's Oppression in Zimbabwe***

Since Robert Mugabe and the Zanu-PF's rise to power in 1980, censorship laws have become increasingly severe through the Access to Information and Protection of Privacy Act and the Interpretation of Communications Bill. Zimbabweans have moved outside of mainstream media to fight against these oppressive laws to provide truthful, nonpartisan news and to fight against Mugabe's dictatorship. This study investigates independent media sources of Zimbabwe which include Mark Chavunduka's effort in creating *The Standard*, the contrast between independent news sources and those sanctioned by the Zimbabwean government, and the underground movement of the Zvakwana group.

#### **Ryan Novas '11**

Michael Sargent, Psychology

##### ***Orientation & Orientation: The Effects of Inversion on Rapid Judgments of Male Sexual Orientation***

Research has shown that participants can accurately judge sexual orientation from limited exposure to nonverbal behavior (Ambady, Hallahan & Conner, 1999). The purpose of this present study is to distinguish whether it is configural or component-based processing that is used to make these judgments. During configural processing, the face is interpreted as a set of relationships and configurations between the different parts. During component processing, information comes from the distinct and separate aspects of the face, such as the shape of the eyes, or the size of the nose. Studies have demonstrated that when faces are inverted configural processing abilities are

severely hindered, but component processing abilities remain (Cloutier, Mason, & Macrae, 2005). To determine what role, if any, configural processing plays in rapid judgments of sexual orientation, this experiment investigates the ability of participants (N = 96) to judge the sexual orientation of males' faces from upright and inverted pictures with exposures of 33 ms, 6,500 ms, and self-paced judgments. It is expected that participants will be less accurate at forming judgments with photos that are inverted. If this is the case, this will suggest that configural processing plays a role in forming accurate judgments of sexual orientation.

#### **Sean O'Brien '11**

Pamela Baker, Biology

##### ***Regulation of Global Gene Expression and Biofilm Formation in Response to Iron Limitation by Aggregatibacter actinomycetemcomitans***

The bacterium *Aggregatibacter actinomycetemcomitans* is a gram-negative periodontopathogen associated with localized aggressive periodontitis as well as several systemic infections such as endocarditis, and cardiovascular disease. In the oral cavity, *A. actinomycetemcomitans* must adapt to an iron-limited environment in order to remain attached to the tooth and other oral surfaces by regulating gene expression of several biofilm determinant factors including fimbriae, extracellular polymeric substance, and lipopolysaccharide. The objectives of this study are to determine the proper working conditions and parameters for isolating total RNA from *A. actinomycetemcomitans* to establish a complete transcriptional profile using a microarray analysis, as well as investigate the role of iron-regulated sRNA molecules in biofilm formation using microtitre biofilm assays. Collectively, this data will be used to confirm prior real-time PCR data on select biofilm determinant genes. This research will lead to a better understanding of how *A. actinomycetemcomitans* modulates its gene expression in the oral cavity, and has clinical implications for disease susceptibility and patterns of occurrence.

#### **Paul Okot '11**

Amy Douglas, Psychology

##### ***Confidence and Witnesses' Testimony***

The current paper examines whether fine-grain vs. coarse-grain questions would influence participant-witnesses' confidence and accuracy. Fine-grain questions require detailed answer whereas coarse-grain require general answer. Participants serve as mock witnesses, and they view a clip of a staged robbery then answer paper-and-pencil questions that are based on 4 categories: appearance, time, color, and distance. The questions are separated into 2 parts. In the first part, participants either receive mostly fine-grain questions or mostly coarse-grain questions. In the second part, all participants receive half fine-grain questions and half, coarse-grain questions. The order in which participants will receive the questions is randomized. After each question, participants are asked to rate their confidence based on the answer that they have provided. I expect that participants who receive the coarse-grain questions in part 1 instead of the fine-grain will do better on part 2 by providing more information and accuracy and higher confidence. The study shows that grain size of questions can influence witnesses' confidence and accuracy. In particular, questions that require definite answers are likely to sabotage a witness's confidence on subsequent questions.



**Claire Parker '11**

Joshua Henry, Chemistry

***Investigation of the Surface Chemistry of Cadmium Selenide Using Atomic Force Microscopy***

Nanocrystals are promising materials for future photovoltaic devices because of their high theoretical efficiencies. To this point, however, realized efficiencies of nanocrystal-based photovoltaics, has been disappointing. This is potentially due to insulating organic capping agents, which bind to the surface of nanocrystals and whose presence is necessary for maintaining a number of their physical properties. This goal of this investigation is a better understanding of the interaction between one such organic molecule, trioctylphosphine oxide (TOPO) and the surface of cadmium selenide (CdSe), a common nanocrystal material, using atomic force microscopy.

**Sebastian Pedraza '11**

Paula Schlax, Chemistry

***Determining 5' Ends in RNA Transcripts in Diverse Bacteria: Borrelia burgdorferi and Marine Synechococcus CC9311***

In this project, the 5' ends of RNA from two different bacteria, *Borrelia burgdorferi* and *Synechococcus* CC9311 were being identified. The interest in the identification of the 5' end transcripts is to further understand the regulation of operons. In this project the regulation of the alpha operon containing genes S4, S11 and S13 genes which in our model organism *Escherichia coli* its S4 acts as a regulatory protein. In our organisms of study, their alpha operons do not contain the S4 gene indicating an alternate way of regulation. The identification of the 5' ends in each of the bacteria was primarily done using 5' RACE method, TOPOTA plasmid vector cloning, DNA purification and sequenced at Mount Desert Island Biological Laboratory using automated dideoxy DNA sequencing with fluorescent ddNTPs method and then analyzed using BLAST and Clustal W programs. A preliminary round of work indicated multiple 5' ends of transcripts for the r-proteins in both *Borrelia* and *Synechococcus*. Further research on this project will be using TAP to identify 5' ends from both bacteria which in research has shown more effective identification of the 5' ends.

**Chelsea Pennucci '11**

Georgia Nigro, Psychology

***World Cafe of Public Scholarship: A Poster and Discussion Session*** -- see Tracy Glazier '11 for abstract**Eliza Perry '13**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***Witt Swamp Trail System***

This project provides visitors to Norway, ME, with a comprehensive map of the recreational features of Witt Swamp Preserve. The map marks bridges, trail intersections, and parking accommodations, and delineates trail difficulty and usage type. The trails devised for the 161 acres of woodland and wetland are dog-friendly, non-motorized, and suitable for either hiking during the summertime or snowshoeing in the winter. The parcel is located on the northeastern side of Lake Pennesseewassee. The United States Geological Survey Seamless Data Warehouse provides map layers. The Bates College Imaging and Computing Center provides the software (ArcGIS)

and GPS devices. Currently, the parcel remains untouched; the specific boundaries have not been physically marked and a single unmaintained logging trail is the only known, though unmarked, pedestrian trail. Western Foothills Land Trust (WFLT) has delegated the following tasks to myself and my partner, Chloe Bourne: flagging the parcel boundaries, devising and marking appropriate trails within those boundaries, and combining said components into a GIS model with a finalized, distributable map. Chloe focused on devising the snowshoeing trail while I focused on the summer hiking trail with help from Norway natives Bill Newcomb and Jeff Chase. All trails will meet the Maine Department of Environmental Protection (DEP) standards.

**Hannah Porst '11**

Georgia Nigro, Psychology

***World Cafe of Public Scholarship: A Poster and Discussion Session*** -- see Tracy Glazier '11 for abstract**Emma Posner '11**

Claudia Aburto Guzmán, Spanish

***Opportunities and Constraints of Formal and Non-Formal Education in the Peruvian Amazon: Women's Perspectives on Local Concerns***

In an indigenous community in the Peruvian Amazon, elders express conflicting hopes for young women: that they will maintain local customs and transmit local knowledge to their children, and that they will gain access to secondary and postsecondary degrees and professional opportunities. While hopes for cultural preservation and community development do not inherently conflict, the lack of educational and job opportunities within this community result in out-migration and cultural loss among younger generations. In my thesis, I explore the ways in which members of this community hope to preserve their culture through community development. Framed by literature on development and education, indigenous movements, and indigenous feminisms, my thesis explores building capacity, or *capacitación*, among young women to engage as active citizens and leaders of their community. I conducted interviews and focus groups during two visits to the community. My analysis highlights the community's concern for *capacitación*, the structures that support the *capacitación* of young women, and women's strategies and solutions for community development. Rooted in principles of community-based research and feminist research methodology, my thesis strives to give voice to local women.

**Anna Query '11**

Georgia Nigro, Psychology

***The Implementation of Mental Health Services at Longley Elementary School***

Research shows that a high percentage of youth needs mental health services. Of those youth who are currently benefiting from services, about 75% receive the services in school (Rones & Hoagwood, 2000). With the knowledge that emotional and behavioral mental health problems provide a significant barrier to learning and academic success, school-based health centers have been designed to address both physical and mental health needs of students at school. The Lewiston-Auburn School-Based Health Centers are operated by Community Clinical Services, a federally qualified health center affiliated with St. Mary's Health System. These health centers currently run in the middle and

high schools, and work to help children succeed in school by keeping them healthy in all respects. This fall a new school-based health center has been initiated at Longley Elementary, with the goals of addressing mental health issues in the students as well as enlisting families and the community in supporting their children's mental health. This study investigates the level of satisfaction with this pilot program through parent and teacher interviews. The hope is to determine satisfaction with the program and to address any difficulties experienced by the participants. This research will demonstrate how mental health services are carried out in schools and the processes involved in the beginning stages of such a program.

#### **Emma Reichart '14**

Elizabeth Eames, Anthropology

***Partners in Health's Local Strategies for Combating Malnutrition in Rwanda*** -- see Elisabeth Baird '14 for abstract

#### **Lindsay Reuter '11**

Sue Houchins, Women and Gender Studies - AAS

***Tracing the Transmission of Māori Fire Poi: a Study in the Appropriation and Commodification of an Indigenous Movement Pattern***

A case study in the appropriation of a movement pattern, this thesis examines a group of women from southern Maine who are self-identified practitioners of fire poi: a performance art of the Māori, the indigenous people of New Zealand. Through participation and observation, I seek to understand and problematize these women's relationship with an appropriated art form. In what ways do their identities enable cultural appropriation of a movement practice? How does this appropriation fit into larger narratives of colonization? Their appropriation of fire poi hinges on its commodification: the movement pattern must be broken down into smaller products in order to participate in a global, commercial market. I ask, how is poi commodified to gain market value and is this of detriment to the traditional form or practitioners of the traditional form?

#### **Eammon Riley '11**

Paula Schlax, Chemistry

***Ribosome Biogenesis in Diverse Prokaryotes***

Ribosomes are a highly conserved and essential cellular component that mediate protein synthesis in all living organisms; their quantity within the cell dictates growth rates. Ribosome biogenesis was studied in *Borrelia burgdorferi*, the causative agent of Lyme Disease, and *Synechococcus*, a cyanobacterium that contributes to the sequestration atmospheric carbon dioxide, through 5' RLM-RACE of r-protein transcripts as well as ribosome purification and characterization. It was hypothesized that differences in r-protein operon arrangement would yield differences in the regulation of ribosome assembly. Understanding ribosome biosynthesis in these two organisms is necessary to the manipulation of their growth.

#### **Nicolette Robbins '11**

Kathryn Low, Psychology

***Asexuality: Can It Be Measured?***

A number of conceptual and methodological obstacles have made it difficult for researchers to draw definitive conclusions regarding the definition, prevalence, and correlates of asexuality. Due to this inconsistency within the field, it is not possible to

compare results across studies. The current study has three principle aims: 1) to develop an accurate quantitative measure of asexuality; 2) to partially replicate Prause and Graham's 2007 study; and 3) to gain a better understanding of the "coming out" experience. A measure of asexuality will provide an objective standard with which to determine asexuality, thus allowing researchers to study comparable samples of asexual individuals. This measure is multi-dimensional and draws from already-developed scales of sexuality as well as qualitative data from previous studies on asexuality. It is anticipated that a high score on the asexuality measure will correlate positively with likelihood to self-report being asexual.

#### **Vanessa Robinson '12**

Stephanie Richards, Biology

***Combination Treatments of Targeted Drug Therapies for NF1 Null Melanomas***

Over the past summer and fall I interned in Dr. David B. Solit's lab at Memorial Sloan-Kettering Cancer Center in New York, compiling data for my supervising doctoral student, Moriah Nissan. My role in the research focused on in vitro modification of the parallel signal transduction pathways of MAPK/ERK and PI3K/AKT within NF1 null, BRAF/NRAS wildtype melanoma cell lines. Through combination treatments of targeted drug therapies I induced cell death and analyzed the response at intervals over a period of 24 hours by means of growth curves, western blots, and fluorescence-activated cell sorting.

#### **Monica Rodriguez '12**

Stephen Sawyer, Off-Campus Study Program

***Is Western Beauty Popular among Urban Younger Women***

Beauty practices and norms exist in every culture; researchers argue about Western influences or concepts of beauty in China. Chinese women are exposed to an "unusual set" of culture-specific dynamics unknown to the same degree in other societies." Most notably beginning with foot binding, women have constantly manipulated their bodies and faces to emulate an ideal of beauty. My surveys of urban youth in the Beijing's Haidian District, popular Chinese fashion magazines and Chinese versions of Western magazines, and academic research provide a practical framework to determine whether urban women between the ages of 18 and 35 believe that Western influence is popular. I argue that Western-styled beauty is popular among young urban women to such a great extent that many women readily agree to manipulate their faces and bodies to achieve an ideal look.

#### **Rebecca Ross '14**

Elizabeth Eames, Anthropology

***Voiceless but Not Silent: The Independent Media's Response to Mugabe's Oppression in Zimbabwe*** -- see Andrew No '14 for abstract

#### **Zachary Ross '11**

Lynne Lewis, Economics

***Response Bias in Homeowner Surveys: Who Cares about the Penobscot River?***

Literature suggests that persons who choose to respond to attitudinal questionnaires may be significantly different from those who choose not to respond. If this is true, extrapolations to the general population will be biased and can misinform policy

decisions. This poster explores this question further by examining a 2010 survey of Penobscot River area homeowners. A hedonic model was used to estimate effects of housing and environmental characteristics, including location in relation to the Penobscot, on property values. Results find that survey non-respondents implicitly attribute negative value to the Penobscot River, a result confirmed in the literature. However, it appears that this penalty does not exist among survey respondents. Furthermore, our results imply that behavior toward the river accounts for the entire significant difference between these two samples, an interesting conclusion. As a consequence, caution must be used in drawing larger generalizations from the survey data, as the focus of the survey was on behavior toward the river.

#### **Samantha Rothberg '13**

Rebecca Corrie, Art and Visual Culture

*Bates Interns in Museums on Campus and off* -- see Gina Crotty '11 for abstract

#### **Amrita Roy '11**

Bonnie Schulman, Mathematics

##### ***Mathematical Modelling of Classical Ballet***

In this project, I mathematically modelled specific dance techniques that are common to classical ballet, for example, the rotational movement known as a pirouette and the jump in the air known as a grand jeté.

#### **Keegan Runnals '11**

J. Dykstra Eusden, Geology

##### ***The Vogar Fissure Swarm, Reykjanes Peninsula, Iceland: Aseismic Kinematics of an Oblique Rift Zone***

Exposure of the mid-Atlantic ridge in Iceland offers a unique place to study hotspot-ridge interactions along an oblique rift zone. The Reykjanes Peninsula is a left lateral shear zone characterized by a series of NE striking en echelon fissure swarms oblique to the rift axis and N-S trending dextral strike slip faults. This study focuses on the Vogar fissure swarm in southwest Iceland, in order to better constrain the mode of deformation within it. Movement of the faults and fissures that make up the fissure swarm is thought to either be related to seismic events along the ridge, or occur aseismically due to dike injections during eruptive episodes. GPS measurements and field-based mapping were employed to examine a 7x3 km cross section of the fissure swarm in order to constrain its kinematics. The faults tend to terminate at the contact of a historical fissure lava and an ~18,000-year-old shield lava. Cooling properties of the historical lava flow and overflowed pre-existing faults were concluded to contribute to its present-day structure. The faults' termination at the historical lava supports the theory that movement along the faults occurs primarily aseismically during eruptive episodes.

#### **Diane Saunders '11**

Stephanie Richards, Biology

##### ***Characterizing a Nuclear Localization Signal in RSK3***

The genetic material of eukaryotic cells is contained in the nucleus, where the processes of DNA replication and transcription are highly regulated. Because proteins are produced in the cell's cytoplasm, those necessary for nuclear activities must be transported into the nucleus. A nuclear

localization signal (NLS) is the portion of a protein's amino acid sequence that acts as a "tag," allowing interactions with necessary accessory proteins. Ribosomal S6 kinases (RSKs) are ubiquitous signalers that regulate genes critical to development, and aberrant RSK expression has appeared in prostate and breast cancer tumors, late-onset diabetes, and mental retardation (Anjum and Blenis 2008, Carriere et al. 2008). Since RSK3 is involved with cell cycle regulation, it offers promise as a potential chemotherapeutic target. This study will probe various portions of the human RSK3 sequence for ability to transport a reporter protein to the cell nucleus, with the aim of identifying a functional NLS.

#### **Allegra Scharff '11**

Jane Costlow, Environmental Studies

##### ***College and Community***

In his book, *The American College Town*, Blake Gumprecht notes that many small liberal arts colleges were designed to seclude their students from the harsh reality of the real world so they could focus solely on their academic pursuits. However, many of these colleges are now located in towns where their students' new found knowledge and skills could improve the well-being of the local community. In light of this, should the students still be secluded from their college towns? In a documentary film featuring Bates alumni who chose to remain in Lewiston, I explore this question. Does the liberal arts "bubble" still exist and if so, how were these alumni able to break out of it and form meaningful connections? Was their ability to do so a result of personal characteristics and/or life experiences, or is it something any Bates student can do? Lastly, if any student can form a meaningful connection with the Lewiston community, why do some students chose not to do so?

#### **Megan Schleck '11**

Georgia Nigro, Psychology

*World Cafe of Public Scholarship: A Poster and Discussion Session* -- see Tracy Glazier '11 for abstract

#### **Anabel Schmelz '14**

Elizabeth Eames, Anthropology

*Voiceless but Not Silent: The Independent Media's Response to Mugabe's Oppression in Zimbabwe* -- see Andrew No '14 for abstract

#### **Carolyn Silva-Sanchez '11**

Clarisa Pérez-Armendáriz, Politics

##### ***Leaving Parents behind: An Analysis of No Child Left behind and its Impact on Somali Parents in Lewiston, ME***

We hear so much about the No Child Left Behind (NCLB) legislation, but what is it, and how is it flawed? My thesis looked at how the policy goals of the No Child Left Behind Act compare to the educational experience of English Language Learning (ELL) students and their parents, one of the legislation's target groups. NCLB is said to promote more choice for parents, and I wanted to discover if this was true. In order to do this I interviewed Somali parents in the Lewiston community as well as teachers and school administrators. I found that parents are not sufficiently informed to access the choices available to them, and that the theory behind NCLB, the market approach to education, does not work in this community.

**Nicholas Silverson '11**

William Ambrose, Biology

***Growth Patterns of the Circumpolar Green Sea Urchin, *Strongylocentrotus droebachiensis*, in a High-Arctic Fjord in Northeastern Svalbard, as a Proxy for Environmental Variability***

Growth patterns in the tests of sea urchins provide records of biological responses to regional and local climate variation, on the time scale of decades. Determining the relationship between growth and environmental variability in the high arctic is important because this region is especially sensitive to global climate change. Sixty-five individuals of the circumpolar green sea urchin (*Strongylocentrotus droebachiensis*) were collected in 2007 from Rijpfjorden (80°15'N; 22°15' E), in northeastern Svalbard. Ages and annual growth patterns of the green sea urchin were obtained by measuring distances between alternating bands of slow, translucent winter growth and fast, opaque summer growth in the interambulacral plates. Growth was modeled using the von Bertalanffy growth function. A standardized growth index (SGI), which removes ontogenetic changes in growth, was calculated for each calendar year. A growth history of *Strongylocentrotus droebachiensis*, spanning approximately 40 years, was compared to regional climate indices and local environmental manifestations of climate variation known to influence growth in arctic bivalves and the structure of high-latitude benthic communities in general. Interannual growth patterns of *S. droebachiensis* were also compared to growth patterns of the bivalves *Serripes groenlandicus* and *Hiatella arctica* in Rijpfjorden, whose growth was especially responsive to fluctuations in the arctic climate regime index (ACRI), to see if regional and local climate variables have similar effects on organisms with different feeding strategies.

**Elizabeth Sonshine '12**

J. Dykstra Eusden, Geology, and Camille Parrish, Environmental Studies

***The Outdoor Gym: Running and Exercising around Lewiston***

The goal of this project is to create a map of the Lewiston area where students can plan running and biking routes by distance and level of difficulty. This allows students to discover new routes suitable for their different workouts and aesthetic enjoyment. The routes include running and biking trails on nearby roads and within Thorncrag Bird Sanctuary. Field methods include data collection through GPS tracks and waypoints and the map was made in ArcGIS, which include routes for outdoor activities of every season. All routes are accessible for running and biking during the spring, summer, and fall while trails at Thorncrag could be used for winter activities like snowshoeing and cross-country skiing. The final product will be posted in the library, as well as Alumni and Merrill gymnasiums.

**Brian St. Thomas '11**

Meredith Greer, Mathematics

***Probabilities of RISK***

RISK is a popular board game in which each player's goal is to conquer the world. The exact probabilities associated with the game have only recently been correctly quantified. In RISK, each turn consists of consecutive battles. This thesis seeks to understand the way in which Markov Chain Analysis has been applied to determine the likely outcomes of a single battle, and

to apply a similar analysis to extrapolate these results into determining the likelihood of outcomes of consecutive battles. This information can be used to form strategies and guide player decisions. The techniques used to visualize and determine trends in these probabilities involve both linear algebra and computer programming.

**Elizabeth Stadtmueller '11**

Kathryn Low, Psychology

***Veteran PTSD CheckList-Civilian Version (PCL-C)***

***Performance Following 5-day Acceptance and Commitment Therapy Treatment for Post-traumatic Stress Disorder: Pre- and Post-Test Differences Based on Military Era and Age***

Post-traumatic stress disorder (PTSD) is an anxiety disorder that affects millions of Americans. A subset of the population greatly impacted by PTSD is veterans. At this time, two behavioral treatments for this disorder are empirically supported: cognitive processing therapy and prolonged exposure. Unfortunately, the treatments utilizing these therapies can be time-consuming and emotionally exhausting, resulting in high attrition rates. The goal of the current study is to evaluate a 5-day intensive outpatient program for the treatment of PTSD offered at a VA Medical Center in New England based on Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999). ACT is a third-wave behavioral therapy based on mindfulness and has been supported in the treatment of other anxiety disorders and mood disorders. A secondary aim of the study is to determine if efficacy of the program is dependent on cohort status (OEF/OIF vs. Vietnam) or veteran age.

**Devon Stetson '11**

Pamela Baker, Biology

***Public Views on Vaccination***

The invention of vaccines has contributed to an increased life expectancy, combated diseases that once killed many people every year, and eradicated smallpox. Despite the good vaccines give to human life, many groups of individuals are wary of vaccination, if not avidly opposed to them. Certain religious groups advise against the use of vaccines, some groups advocate that vaccines are too dangerous for children, and others advise against the additives in vaccines. Other organizations support vaccines and strive to make them available to as many people as possible. My thesis examines the opinions of these groups and individuals and compares their views to peer reviewed published research in the field to debunk or support commonly held views.

**Alexandra Steverson '11**

Rachel Austin, Chemistry

***A Study of Metallothionein-3, Brain-Specific Protein, and Lead(II) Binding Affinity***

Lead is an elusive public health concern that effects neurological development at blood levels as low as 10ug/dl. Lead has a high affinity for cysteine sites of zinc proteins, such as metallothionein-3. This specific isoform is found abundantly in the central nervous system and can act as a heavy metal sponge. This study purified metallothionein - 3 from E. coli using fast protein liquid chromatography and a GST-tag with a thrombin recognition site. Further studies are on-going involving ICP and metal titrations to characterize lead(II) binding.

**Blaise Thompson '11**

Matthew Côté, Chemistry

***Spectroscopic Investigation of Plasmonic Nanoparticles***

Plasmonics is the study of surface plasmon polaritons (SPPs): electromagnetic excitations that can exist at and near the surface of conductors. SPP investigation is a relatively new field (plasmonics was only coined as a term in 2001) but has quickly become a hot topic due to its potential in a wide variety of applications. Waveguides, photonic circuits, molecular rulers, and chemical sensors are just a few of the SPP-based devices that could revolutionize both science and industry if actualized. But we are not there yet. There is much left to be understood before plasmonic based devices become ubiquitous in our everyday lives. Current cutting edge research is on the shape, size, and environment of SPPs (see Van Duyne, Tong, Crozier for examples). By learning about and utilizing these SPP properties, scientists are developing more and more sophisticated and useful ways of generating and controlling SPP-based devices. In this project, we use 2 techniques to investigate SPP properties. The first is an optical phenomenon called total internal reflection (TIR), used to generate images and spectrographs of SPP supporting gold nanorods. The second method utilizes a specialized device called an atomic force microscope to move a fluorescent bead near SPP supporting systems. The fluorescence can couple into the SPP excitation, and offers a different angle for SPP study. Both methods together offer a powerful approach for discovering SPP properties, allowing us to characterize connections that would otherwise be missed.

**Dorian Tolis '11**

Nancy Kleckner, Biology

***Signal Transition Mechanisms Used by Glutamate to Curtail Feeding in *Helisoma trivolvis****

Glutamate is an important regulatory neurotransmitter in the triphasic feeding behavior in the pond snail, *Helisoma trivolvis*. It excites phase two motor neurons while inhibiting those in phases one and three. The receptors that mediate this regulation are only partially characterized. One possible mechanism that has been proposed is that glutamate acts directly on motor neuron B19 to activate an inwardly rectifying potassium channel (Kir), possibly a GIRK subtype. Using single and dual channel recordings from neurons involved in the swallowing phase of feeding, the purpose of this study was to determine the signal transduction mechanisms used by glutamate to inhibit the activity of these neurons. This was done using a pharmacological approach with intracellular recordings and the perfusion of whole-ganglia preparation with quisqualic acid, an agonist for group I metabotropic glutamate receptors, and antagonists that are selective for different glutamate receptor subtypes. Quisqualic acid application (10  $\mu$ M) was sufficient to produce hyperpolarization in B19. BaCl<sub>2</sub> and CsCl, known inhibitors of Kir channels, did not block quisqualic acid-induced hyperpolarization at concentrations of 100  $\mu$ M, 300  $\mu$ M, and 1 mM in B19. Kir subtype GIRK 1/4 blocker tertiapin-Q did not block quisqualic-acid-induced hyperpolarization. This suggests that potassium channels involved in glutamate-mediated hyperpolarization in B19 must be of a different mGluR subtype.

**Rachel Vaivoda '11**

Karen Palin, Biology

***Inhibition of Adhesion and Biofilm Formation of *Staphylococcus saprophyticus* by Cranberry***

The purpose of my yearlong thesis is to study the connection between cranberry juice and the inhibition of growth and biofilm formation by *Staphylococcus saprophyticus*, the second-most common cause of Urinary Tract Infections (UTIs) in college-aged women. Cranberry has traditionally been used as a natural or folk remedy for a multitude of infections, including UTIs. Clinically isolated strains of *S. saprophyticus* and two controls, *Staphylococcus aureus* and *Staphylococcus epidermidis*, were tested for viability in the presence of cranberry. Dilutions of uropathogens were pretreated with varying concentrations of cranberry juice in broth, and were plated to assay for growth. Scanning electron microscopy was used to visualize any inhibitory effect. Demonstration of an inhibitory effect by cranberry on uropathogens could further support the usage of cranberry as an alternative, non-antibiotic prevention or treatment option for UTIs.

**Eliza van Heerden '11**

Ryan Bavis, Biology

***Cardiorespiratory Effects of Chronic Hyperoxia in Neonatal Rats***

Rats reared in hyperoxia (60% O<sub>2</sub>) from birth exhibit abnormal respiratory control: normoxic ventilation is reduced at 4 and 7 days of age (i.e., P4 and P7), but not at P14, and the hypoxic ventilatory response (HVR) is blunted at P7 and P14, but not at P4 (Bavis et al. *J Appl Physiol* 109: 796-803, 2010). To determine whether these respiratory deficits impair tissue O<sub>2</sub> delivery, arterial O<sub>2</sub> saturation (SpO<sub>2</sub>) and heart rate were measured by pulse oximetry at P4 and P14 for rats reared in 60% O<sub>2</sub> (Hyperoxia) or 21% O<sub>2</sub> (Control). At P4, hyperoxia rats had lower SpO<sub>2</sub> (93.0 $\pm$ 1.3 vs. 98.8 $\pm$ 0.2%; mean $\pm$ SEM) and lower heart rates (332 $\pm$ 10 vs. 380 $\pm$ 9 bpm) while in normoxia than controls. SpO<sub>2</sub> was also lower in hyperoxia rats at P14, but to a lesser extent (97.0 $\pm$ 0.4 vs. 98.7 $\pm$ 0.1%); heart rate was not different from controls at P14. When exposed to hypoxia (12% O<sub>2</sub>), the drop in SpO<sub>2</sub> was greater in Hyperoxia rats than controls; however, this difference was more pronounced at P14 (!SpO<sub>2</sub> = -42 $\pm$ 2 vs. -24 $\pm$ 2% in controls), consistent with the blunted HVR of hyperoxia rats at this age. Hyperoxia rats also had lower hematocrits at P4 and P14 and smaller hearts at P4. Therefore, hyperoxia rats do not appear to compensate for low SpO<sub>2</sub> and heart rate by increasing blood O<sub>2</sub> capacity or stroke volume. Together, these data suggest that tissue O<sub>2</sub> delivery is compromised during both normoxia and acute hypoxia in neonatal rats reared in hyperoxia.

**Sasha Villahermosa '11**

Jennifer Koviach-Côté, Biological Chemistry

***Synthesis and Antioxidant Activity of Phenylethanoid Glycoside Analogs***

Phenylethanoid glycosides (PhGs) are a naturally and widely distributed organic compound in the plant kingdom. When plants undergo a variety of biotic and abiotic stresses, PhGs are released. They are characterized by a hydroxyphenylethyl moiety attached to  $\beta$ -glucopyranose molecule through a glycosidic bond and play an important role in radical scavenging. The disposal of dangerous free radicals species can prevent and repair numerous cellular and physiological

pathways and components. A PhG analog was synthesized and tested for its antioxidant activity using a DPPH assay.

**Alison Vingiano '11**

John Baughman, Politics

***Feminism and Nationalism in Displaced Tibetan Communities***

In summer 2010 I received a Stangle Fellowship for Economics or Law to pursue an internship with the Tibetan Women's Association in Dharamsala, India, and study the relationship between feminism and nationalism in this displaced community. After this experience, and my experiences studying abroad in Prague, I wrote my senior thesis on the relationship between feminism and nationalism in transitioning post-Soviet democracies. My experiences in India proved essential to understanding the relationship between gender and the state. I plan on using the poster I created for the Parents Weekend poster session to present my research: I will share the complex stories of Tibetan refugee women living in exile, while also presenting my research on how gender relationships inhibit women from becoming productive members of the Tibetan government in exile.

**Kaitlin Webber '11**

Lavina Dhingra, English

***Image and Sound: Reading and Writing Lyric Poetry*** -- see Brendan Davidson '14 for abstract

**Kaitlin Wellens '11**

Donald Dearborn, Biology

***Colony Formation and Nest Preference in Galapagos Blue Footed Boobies (Sula nebouxii)***

Group breeding is found across taxa, suggesting benefits to these types of aggregations. Advantages of group breeding, such as decreased rates of predation, are environmental pressures for the formation of seabird colonies as well. In this study we tested three theories of colony formation among a population of Galapagos blue-footed boobies (*Sula nebouxii*) to gain a better understanding of why seabird colonies exist. Nest locations could be selected in three manners: 1) randomly with respect to other birds, 2) via the periphery model of distribution, where nest success decreases as we move towards the periphery of the colony, 3) via a central-satellite distribution in which low-quality birds choose to nest close to high-quality birds in hope of gaining social or reproductive benefits. We compared our population's nesting distribution to a random nesting model to determine the colony's formation pattern and found that nest success was randomly distributed.

**Kara Western '11**

Georgia Nigro, Psychology

***World Cafe of Public Scholarship: A Poster and Discussion Session*** -- see Tracy Glazier '11 for abstract

**Tyler White '13**

Elizabeth Eames, Anthropology

***Lake Chad: Examining the Positive Effects of a Depleting Major Fresh Water Source*** -- see Andrew Grant '13 for abstract

**Andrew Wilcox '11**

Dennis Browne, Russian

***The Sights, Sounds, and Sense of Russian Poetry*** -- see Nora Murray '12 for abstract

**Rosalie Winslow '11**

Georgia Nigro, Psychology

***World Cafe of Public Scholarship: A Poster and Discussion Session*** -- see Tracy Glazier '11 for abstract

**Andrew Wood '11**

Claudia Aburto-Guzmán, Spanish

***A Local-Global Movement: Anti-Mining Activism in Intag, Ecuador***

My thesis offers an analysis of "The Curse of Copper" and "Después de la Neblina," two documentaries about an anti-mining movement in the Intag region of Ecuador. Since the early 1990s, activists have resisted proposed mining projects by international mining corporations. In December 2006, a paramilitary group allegedly funded by Ascendant Copper Corporation entered the ecological reserve in the community of Junín. The ensuing confrontation between paramilitaries and activists in Junín became the focal point of a number of documentaries. "The Curse of Copper" and "Después de la Neblina" each focus on a different integral aspect of the movement—one as an environmental crusade, the other as a quest for agency and social justice. The thesis analyzes how these documentaries use images to construct identities and shape perceptions of local and global actions.

**Dava Wool '11**

Robert Farnsworth, English

***The Thesis as Poetry or Fiction: A Reading by Senior Writers*** - see Bridget Brewer '11 for abstract

**Zoe Wortmann '11**

Emily Kane, Sociology

***I'll Be the Princess, You Be the Knight: A Study of the Social Construction of Gender in a Preschool Classroom***

Scholars have widely recognized childhood as a crucial moment in the social construction of gender. Though there is substantial research regarding the ways in which adults influence the construction of children's gender identity, in recent decades, sociologists have begun to explore the active role that children take as they participate in the creation of their own gender identities through interactions with both adults and peers. This thesis explores the ways in which 4- and 5-year-olds construct gender in a classroom setting. A qualitative analysis of field notes chronicling over 30 hours of observation in a preschool classroom at a progressive, private school in New York City, sheds new light on the ways in which children both construct and resist traditional understandings of gender. The way children of this age talk about gender, as well as the way they convey ideas about gender in their play suggest that even very young children have a complex understanding of societal expectations regarding gender.