

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 2014 Summit ~

The 2014 Mount David Summit, held on March 28, features the research, creative work, and performances of 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, film makers, 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 and quantitative reasoning specialists, 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 2014 Mount David Summit is dedicated to the memory of
Ed Muskie '36 and Ted Coulombe '91

~ ABSTRACTS ~
(in alphabetical order)

Kathryn Ailes '14

Making Homing: Collaborative Choreographing from Personal Histories

Carol Dilley, Theater and Dance, advisor

For my senior thesis in dance, I am choreographing a proscenium-stage work and writing a theoretical analysis of the choreographic process. My thesis explores nonbiological familial ties and the blurred lines separating the influences of nature and nurture. In my presentation, I will discuss the nuances of using personal history to create a theatrical work that is not necessarily a narrative of that history. Alongside my fellow dance majors, I will offer insight into the choreographic and scholarly process of crafting a full-length dance piece on Bates students.

Joshua Ajamu '14

The Contrasting Perspectives of Africa in Western and African Cinema

Jonathan Cavallero, Rhetoric, advisor

Senegalese filmmaker Moussa Toure wrote, "I am an African with an African point of view and I make African cinema. But not the kind of African cinema Europeans think of, the cinema of folklore, of exoticism, of slowness-the funny, naïve Africa. I refuse to do this. I try to make a kind of cinema with which people can identify. I am not an ambassador who is hooked on talking about the tragedy of Africa." Through a critical eye, the Western media is hooked on focusing on the tragedies of Africa, which has led generations to associate Africa with violence. My thesis project analyzes Hollywood cinema in relation to Africa cinema, focusing on each industry's construction and representation of African identities. I have examined the intertwined history of these industries through a short video, which presents various perspectives on films produced on Africa, for African and Western audiences.

Abigail Alexander '14

Opioidergic Modulation of Mitral Cells in Accessory Olfactory Bulb Processing

Jason Castro, Psychology, advisor

Opioids are a diverse set of neurotransmitters that modulate synaptic processing as a function of behavioral state. Their role in modulating sensory processing is compelling in the olfactory system, where there is a robust and unexpected expression of opioid receptors. To investigate the synaptic actions of opioids in olfactory processing, whole cell voltage clamp recordings were obtained from principal neurons of the accessory olfactory bulb – a brain region critical for detecting and discriminating social odors. Spontaneous post-synaptic currents (PSCs) were recorded in the presence of met-enkephalin (100µM), a broad-spectrum opioid receptor agonist. A reduction was observed in the frequency of spontaneous PSC's (p<.001, Kolmogorov-Smirnov, n=5), but no concomitant change in amplitude (p=.85, Kolmogorov-Smirnov, n=5). This indicates a pre-synaptic mechanism of the effect. To explore the role of opioids in a

more physiological context, we are currently testing whether opioid receptor agonists modulate recurrent inhibition evoked by mitral cell activation.

John Allard '16, Tara Das '16, and April Graham '16

Women's Grassroots Organization in Africa

Patricia Buck, Education, advisor

How has the National Union of Eritrea Women (NUEW) grassroots movement changed conceptions of human rights in Eritrean society? Basic human rights are a universal necessity for every society. Italian colonialism and the UN's decision to give Ethiopia autocracy over Eritrea subordinated women under patriarchal rule. The National Union of Eritrean Women (NUEW) - a grassroots movement founded in 1979 – seeks to establish women's rights and enhance human rights throughout Eritrea. Since its establishment, NUEW has gained important healthcare rights, fought for equality for women in the household, and has grown to be a successful social movement in Eritrea. We examine the agenda through which the organization approaches human rights to benefit women in Eritrean society.

Joshua Arenstam '14

Food as Metaphor: The Use of Food Symbolism in French and German Film

Raluca Cernahoschi, German and Russian Studies, advisor

This study examines the usage of food as a metaphor in French and German cinema and the implications of these food metaphors on their respective cultures. In examining the works of two directors, Fatih Akin and Abdellatif Kechiche, I considered various symbolic usages of food in their films. The directors used food to comment on topics such as inclusion and exclusion, national and cultural identity, and hybridization. These topics work to promote the discussion of inter-group relations in both France and Germany. The inclusion of food as a universal symbol is an attempt to reinforce the sociopolitical themes presented in the films. While universally applicable, food metaphors are also used to highlight aspects of one specific national or cultural group. This duality works to further a discussion of cultural diversity in a variety of directions. Each has an immigrant background that informs their films, though neither make films typical of the "immigrant film" genre. Six films were chosen to provide a sufficient breadth while allowing for a depth of study: *La faute à Voltaire* (*Blame It on Voltaire*, 2000), *Gegen die Wand* (*Head-On*, 2004), *La graine et le mulet* (*The Secret of the Grain*, 2007), *Auf der anderen Seite* (*The Edge of Heaven*, 2007), *Soul Kitchen* (2009) and *La vie d'Adèle* (*Blue is the Warmest Color*, 2013). Traditional film analysis methods were applied to specific scenes where food is present, and this analysis was used to develop an understanding of the usage of food as a metaphor. In addition, sociological theories of food were applied to these scenes, which were examined both sociologically and anthropologically. Theoreticians included Eva Barlösius, Gerard Genette, Pierre Bourdieu, and Erich Auerbach.

**Mildred Aroko '14, Kelly Kruger '14,
Alexander McKenzie '14, Meredith Miles '15, and
Sean Murphy '15**
*The Highs and Lows of My Study-Abroad Experience in 6
Mins. and 40 Secs.*

David Das, Office of Off-Campus Study, advisor
Upon returning from his "semester abroad" in France, Charles Dickens devoted a novel to describing "the best of times...the worst of times." In this panel, students who have recently studied abroad were challenged to summarize their study-abroad roller coaster not in 300 pages, as Dickens did, but in twenty slides, speaking about each image for only twenty seconds.

Michael Arsnow '14
DNA Vaccines, A Potential Cure for Type I Diabetes
Paula Schlax, Chemistry, advisor

Type I diabetes is a widespread, chronic, autoimmune disease that affects approximately 1 in 300 Americans at a yearly incidence rate of about 16 people per 100,000. The current means of treatment requires injections of biosynthetic insulin to regulate blood glucose, or the introduction of unsustainable procedures like pancreatic transplant and immunosuppressive treatments that only transiently return insulin production in the patient (Atkinson and Eisenbarth 2001). Given these options and the current lack of any cure or vaccination, normal insulin treatment commonly results in long term health problems due to poor blood glucose regulation (Daneman 2006). Scientists have been searching for a practical means of combatting this disease without the negative side-effects associated with immunosuppression; and within the last decade, the advances of gene therapy have provided some promising findings in the field of DNA vaccine technology. Since its accidental discovery two decades ago (Tang, DeVit, Johnston 1992), significant progress in DNA-vaccine treatment has been made. DNA vaccines elicit a specific immune response to an antigen encoded on a DNA plasmid, which is taken up by host cells eliciting a cellular and humoral immune response. Within the last six months, a DNA "reverse" vaccine has offered a resurgent hope for a cure for type I diabetes and the advancement of DNA-vaccine research. This vaccine encodes the β -cell producing pro-insulin autoantigen which is targeted by cytotoxic CD8+ cells. The transfected host cells inhibit the autoimmune attack on insulin producing β -cells by binding to and destroying β -cell-targeting CD8+ cells. The vaccine provided mild efficacy and complete safety through phase I studies, and recently passed phase II clinical trials. The reverse vaccine concept does not provide an immune stimulating response like most vaccine treatments, but instead selectively shuts down certain immune cells without causing widespread immunosuppression (Roep and others 2013). This paper will provide a hypothetical DNA-vaccine directed at type I diabetes, and based on Roep et al. (2013). This novel vaccine will include the most current DNA-vaccine advancements, to hopefully provide the framework for the elusive cure to type I diabetes.

Connor Bair-Cucchiario '15, Andrew Bradley '14, and Sarah Ratsimbazafy '17
*HIV/AIDS in Botswana and the Effects of President Bush's
Emergency Plan for AIDS Relief*

Patricia Buck, Education, advisor
The people of Botswana living with HIV/AIDS recognize the importance managing the virus with drugs such as AVR and AZT, but also maintaining a healthy lifestyle, keeping a positive outlook, and joining the community with those who are also

directly and indirectly affected by the virus. Botswana's elites, such as former President Festus Mogae, largely support foreign aid efforts enacted by certain U.S.-based entities, as they see them as essential in complimenting their nation's own efforts to stem the spread of HIV/AIDS. Such American efforts, which stem from the U.S. government, private foundations, and other institutes, have been instrumental in bolstering the country's HIV/AIDS prevention movement. President Bush's Emergency Plan for AIDS Relief (PEPFAR) was criticized as many people felt that American political and social groups with moral rather than public health agendas were behind several requirements, including the requirements that one-third of spending in 2006-2008 be directed toward abstinence-until-marriage programs that all funded organizations sign an anti-prostitution pledge.

**Elisabeth Baird '14, Emily Diepenbrock '14, Gretchen Kaija '14, Hannah Mitchell '14, Aisling Ryan '14,
and Simone Schriger '14**
Research and the Public Good

Darby Ray, Harvard Center for Community Partnerships, advisor
In community-engaged research, students undertake the creation of knowledge in collaboration with a community partner for the purpose of addressing a community need. This year's Community-Engaged Research Fellows have worked on projects situated at the intersection of community interests and academic areas including sociology, psychology, environmental studies, and French. Projects focus on these diverse topics: food as a tool for social change among youth; outdoor education as a catalyst for intellectual curiosity and environmental awareness; social and economic empowerment among women and children served by a non-profit organization in Madagascar; resource mapping in relation to invasive plants in Maine; effective motivational strategies for clients in Family Treatment Drug Courts; and Chilean university students' perceptions of dating violence. In this session, students share their work while highlighting the distinctive features of community-engaged research.

**Hallie Balcomb '14, Devon Brown '14, and
Courtney Doyle '14**
*Combating the Spread of Malaria with the Power of
Mathematics*

Meredith Greer, Mathematics, advisor
One in five children under the age of five in Africa today dies as a result of malaria infection. One effective prevention strategy is the use of insecticide-treated bed-nets. Previous research has shown that the use of bed-nets reduces the number of malaria cases by 50%, but these results hinge upon proper usage and genuine concern from the infected regions. Folashade B. Augusto, et al. created a mathematical model to express the transmission of the infectious disease between susceptible humans and infected mosquitos, as well as between infected humans and susceptible mosquitos. Through differential equations, reproductive numbers and backward bifurcations, the authors search for a critical threshold necessary to eradicate malaria. The authors take care to include the human component to their model, ultimately finding a result that is biologically significant.

John Barbadoro '14
Rural Health and Infectious Disease in Southern China
Stephen Sawyer, Office of Off-Campus Study, advisor
China's healthcare system has gone through significant changes in the 20th and 21st centuries. These changes have mirrored not

only the political focus of the time, but also the social issues facing China. A study of the clinics in the rural villages of the Shaxi Valley as well as research and interviews show that income inequality and mistrust in the medical system are major challenges to fair and comprehensive health coverage that affect health in this large and rapidly developing nation. The inefficiencies in Chinese healthcare have resulted in the emergence of several epidemics in South Eastern China. Avian flus, SARS and H7N9 have all emerged from this region of the world. With the advent of globalization, the spread of infectious disease is now a global problem, one that must promote change in Chinese healthcare, and healthcare systems around the world, to help prevent the spread of epidemics.

W. Evan Beinecke '14

Investigating Higher Harmonic Generation in Plasmonic Gold Nanorods

Matthew Côté, Chemistry, advisor

When light interacts with the interface between a metal conductor and a dielectric such as air, a longitudinal electron-density wave can be generated on the surface of the metal. Such an electron-density wave is termed surface-plasmon resonance (SPR). The study of SPR is a rapidly expanding field due to its potential applications in minimizing the size of data transfer components, and optimizing photovoltaic devices. The local electric field enhancement caused by SPR can be exploited to enhance higher harmonic generation (HHG), where multiple photons combine to form a photon of higher energy. Gold nanorods are frequently employed in SPR research because of their controllable SPR response to polarized light and their tunable longitudinal SPR. This thesis investigated the dependence of SPR, and its corresponding HHG signal, on incident light polarization. This was accomplished by collecting HHG maps at varying polarizations using ultrafast laser spectroscopy and spatial arrangement maps using scanning electron microscopy, which were then compared to computer generated computational models.

Daniel Bell '15, Christopher Eddy '15, Anna Lanoue '15, and Katherine Yannopoulos '15

The Effect of Environment on the Sexual Objectification of Women

Susan Langdon, Psychology, advisor

Objectification theory postulates that the sexual objectification of the female body, reducing a woman's value to that of her physical body and its sexual capabilities, exists perpetually as a sociocultural presence. Prior research has focused on how sexual objectification has caused deleterious effects on women's psychological and physiological health. To our knowledge, however, little research has examined the social environments that develop this objectification. Many men, with otherwise progressive attitudes regarding women's rights, act in ways contrary to these values when they are with male friends, sports teams, etc. Our study hypothesized that the environment created by the "bro culture" induces a mindset where men forgo some of their pro-women's rights values and are more likely to sexually objectify women. By priming participants through the use of video manipulation, we will study how the mindset created by the fitness subcategory of "bro culture" affect college-age males' scores on an interpersonal sexual objectification scale.

Jennifer Bergeron '14

mRNA Processing in *Borrelia burgdorferi*

Paula Schlax, Chemistry, advisor

The life cycle of *Borrelia burgdorferi*, the bacterium that causes Lyme disease, includes infecting several hosts. To survive in these changing environments, *Borrelia* must undergo dramatic changes in gene expression. One aspect of gene regulation that has not been well characterized is mRNA processing. Freshman year, we found multiple 5' ends in transcripts of ribosomal protein subunits, indicating that mRNA processing may occur in *Borrelia*. To further characterize the role of mRNA processing, we obtained a strain of *Borrelia* without RNase III, an endonuclease shown to mediate mRNA processing in *E. coli*. Using qPCR, we measured the decay rates of the ribosomal protein subunit mRNAs in the alpha and rpsO-pnp operons in both the wild type and RNase III knockout. We found that despite the polycistronic nature of these transcripts, the genes had different decay rates, verifying that the mRNAs are being processed. We also found rnc knockouts decay slower than wildtype mRNAs indicating that processing of these transcripts is mediated by RNase III.

Gabriella Bilotta '14

Michoacán: The Rise of Self-Defense Forces and Their Impact on Mexican Counterdrug and Security Efforts

Baltasar Fra-Molinero, Spanish, advisor

In southwestern state of Michoacán, Mexico the recent rise of "self-defense forces" has shaken the discourse surrounding the "War on Drugs." Citizens in multiple Michoacán towns have taken up arms in defense against the Knights Templar, the state's dominant drug trafficking organization responsible for countless murders, kidnappings, extortion, and the production and traffic of both marijuana and synthetic drugs. This action by citizens stands in open defiance to the state and federal police as well as the legal establishment; it reveals a clear failure of the Mexican government and its institutions to curb drug-related lawlessness. In many ways, the last decade in Michoacán serves as a "snapshot" of the drug and security situation in Mexico as a whole. Competing cartels infiltrated the state and fought for control over trade routes. Evolving from the notorious cartel La Familia Michoacana, the Knights Templar currently dominate extensive areas of Michoacán. Present in urban, rural, and even the economically crucial Lázaro Cárdenas seaport, the illicit organization undoubtedly competes with the state institutions for influence over these areas. Despite deploying federal forces during the Felipe Calderón administration (2006-2012), weak institutions, corruption among state officials, and an ineffective judicial system have ultimately prevented substantial progress in dismantling the Knights Templar. While Michoacán is in many ways unique in this unfolding crisis of its civil society, I argue that the recent events carry significant weight for the future of Mexico's national counterdrug and security efforts.

Daniel Birkhead '14

Long-term Exposure to Male Status Specific Odors Elicits Mitral Cell Synaptic and Intrinsic Plasticity in the Accessory Olfactory Bulb of Female Mice

Jason Castro, Psychology, advisor

The accessory olfactory bulb (AOB) is a sensory brain area that processes semiochemicals derived from kin and conspecifics. Notably, responses of AOB neurons are sensitive to relative social rank, and rearing of females in the odor of dominant vs. subordinate males leads to persistent bidirectional changes in the excitability and recurrent synaptic activity of AOB principal

neurons. Here, we sought to identify the precise physiological mechanisms responsible for these changes. We prepared in-vitro slices from the AOBs of females reared in either dominant, subordinate, or control odors, and obtained patch clamp recordings from AOB mitral cells. We pharmacologically isolated recurrent excitatory and inhibitory components of mitral cell activity, and are investigating how the ratio of excitation to inhibition is altered by stimuli conveying social rank.

Halward Blegen '14

Caffeine, Hyperoxia, and the Hypoxic Ventilatory Response **Ryan Bavis, Biology, advisor**

Mammals generally increase ventilation in response to hypoxia, in which the oxygen concentration in air is < 21%. The normal hypoxic ventilatory response (HVR) of neonatal rats is bi-phasic: an initial increasing in breathing is followed by a decline in breathing toward baseline values. However, neonatal rats reared in hyperoxia (60% O₂) exhibit a sustained increase in ventilation at days 4-5 of age, which resembles the more mature HVR of older rats greater than 13 days of age (Bavis et al., 2010). Several molecules have been tested for a role in the late-phase decline in the HVR. Our lab decided to test the possibility of the breathing inhibitor molecule adenosine. We administered the adenosine-receptor antagonist caffeine to neonatal rats to investigate adenosine's role in the HVR. We found insignificant differences in the late-phase of the HVR between caffeine and saline-injected rats (both at 10 and 20 mg kg⁻¹ body weight, i.p.), raised in either hyperoxia or normal air, suggesting that adenosine pathways are not responsible for the late-phase decline in the HVR of normoxia-reared rats.

Erik Bou '14

Variability of Growth Line Deposition and Growth of the Common Cockle (*Cerastoderma edule*) and Effect of Temperature in the Pool of Virkie, Mainland, Shetland **William Ambrose, Biology, advisor**

Climate reconstruction can be achieved through the use of proxies, organisms that reflect their chemical and physical surroundings, and bivalves in particular serve as ideal proxies. To establish the common cockle (*Cerastoderma edule*) in the Pool of Virkie, Shetland, as suitable proxy requirements must be satisfied such as the annual deposition of growth lines. Annual deposition can be directly tested with calcein, a chemical that is incorporated into the shell and provides an unambiguous marker for time of deployment. Twenty-six samples were marked with calcein and recollected a year later, and a single dark line between the calcein marker and ventral margin confirmed annual deposition of growth lines. With calcein providing exact temporal context, we can compare annual and subannual lines to corresponding tidal conditions. Spring was determined to be the only season significantly correlated to the yearly standard growth index (SGI) of cockles, and accounted for 74% of yearly SGI variability. This suggests that temperature is the main driver of cockle growth in the Shetlands and other factors such as food have less pivotal roles. Yearly SGI will also be correlated to yearly wind speed, precipitation, and sea level pressure to determine the effect of these other factors on cockle growth. The presence of archeological shell middens in Shetlands provides us with an opportunity to compare and contrast modern cockles with archeological samples.

Alexa Bourque '16

Coltan in the Congo: Who Makes the Call of Defining Human Rights?

Alexandre Dauge-Roth, French and Francophone Studies, advisor

For over a decade the Democratic Republic of Congo has been rocked by civil war. Although there is no singular cause to this conflict, it is clear that the issue of mining in the southeast region of Katanga is driving much of the tension in the country. Specifically, the mining of Coltan, a rare mineral used primarily in cell phones, has attracted large western companies that have been turning a blind eye to the laws of the industry and the rights of Congolese. The issue of mining in the Congo is both local and international. Locally, there is a need to address the relationship between the state and the militias that have taken control over much of the Katanga region, while thinking internationally, we must consider the needs of the global economy and its repercussions on the enduring civil war and violations of human rights in the DRC today.

Andrew Bradley '14 -- see Connor Bair-Cucchiari '15

HIV/AIDS in Botswana and the effects of President Bush's Emergency Plan for AIDS Relief

Patricia Buck, Education, advisor

Michaela Brady '14

Scotland within Empire: The Quest for Independence with or without Union

Caroline Shaw, History, advisor

Since the Acts of Union in 1707, Scotland has moved from armed insurrections against the British state (in 1715 and 1745) to public assertions of equality within the British Empire. As Scotland moves for referendum in 2014, a lively scholarly debate is questioning the terms of Scottish involvement in union and whether Scotland should or should not continue this partnership. This thesis focuses on the ambiguities surrounding the paradoxical worlds of sovereignty and equality within empire, and how Scottish involvement in empire developed from initial discussions for union in the late 17th century through the early 20th century. Other scholars have sought to explain why Scotland entered union, but fail to address how these ambiguities are framed in a larger Scottish history that allowed for continued debate since the end of open rebellion in 1745. I find that calls for independence transformed following the 1715 rebellion. Scotland ceased to exist in that moment as a singular nation and formally divided between Highland and Lowland, a divide allowing for the Highlands to participate in the 1745 rebellion, while the Lowlands participated as a partner in the Anglo-Empire. I consider themes central to debates over union: economy, religion, cultural assimilation, and the position of women.

Ashley Braunthal '14

Spatial Patterns of Anthropogenic and Forest Combustion-derived Surface CO₂ in Alaskan Boreal Ecosystems and the Urban Dome of Fairbanks, AK

Beverly Johnson, Geology, advisor

The rate of carbon emissions to the atmosphere relative to the rate of carbon uptake by boreal sinks poses challenges for quantifying the carbon cycle of boreal ecosystems. Surface measurements offer the ability to fill in gaps for compiled data sets from the air or distant regions, which may lack the ability to identify source origins or constrain spatial data. A mobile lab (truck-mounted Picarro™ CO₂, CH₄, H₂O analyzer) measured

trace gases on 5 different regional Fairbanks roads. Additionally, fireweed (*Chamerion angustifolium*) plants were collected from various sites, which overlapped with some of those road transects (representing urban, suburban, rural, and fire-affected environments). Radiocarbon (¹⁴C) and Stable Isotope (¹³C) content of boreal annual plant tissues coupled with mobile lab surface air concentration data serve as evidence for the carbon isoscape that exists in regional Fairbanks, the extent of the Fairbanks Urban Dome, and possible regional sources of CO₂.

Benjamin Breger '14

Ecological Interactions between Insects and Invasive Fallopia spp. in a Northeastern United States Urban Environment: Flower Visitation, Herbivory by Popillia japonica, and Ant-Plant Protection Mutualism

Lea Johnson, Biology, advisor

Invasive species can form biotic relationships with other species in their introduced ranges that may facilitate or hinder the invasion process. Insect-plant interaction such as herbivory, protection mutualisms, and pollination can include more than one introduced species, which may lead to invasional meltdown. Knotweed species (*Fallopia japonica* and *Fallopia sachalinensis*) are widespread invasive plants in North America and Western Europe. These species possess extrafloral nectaries (EFN) that produce a nectar reward that attracts mutualistic insect protectors. Flowers of these knotweeds attract pollinators in their introduced ranges, aiding in sexual reproduction and hybridization. The Japanese beetle (*Popillia japonica*) is an invasive insect pest in the Eastern United States that is an herbivore of invasive *Fallopia* species in their shared native range in Japan. Their introduced ranges overlap in North America, where Japanese beetle herbivory on Japanese knotweed has been shown to stimulate EFN nectar production and attract both native and nonnative, invasive ant protectors. To characterize the role of insect interactions in the success and impacts of *Fallopia* spp. in their introduced ranges, we examined ant visitation, leaf herbivory, beetle abundance, ant-beetle interactions, pollinator visits, and seed production in an urban environment in Lewiston, Maine.

Michaela Britt '17, Cora Hirschfeld '16, and McNally Lee '14

Grassroots Initiatives and Educational Equality in Post-Apartheid South Africa

Alexandre Dauge-Roth, French and Francophone Studies, advisor

How are grassroots initiatives disrupting the reproduction of educational inequality for Blacks and Coloureds in Cape Town? As a part of the Apartheid legal framework, South Africa's 1953 Bantu Education Act determined that Blacks would receive an education limited to the attainment of skills required of laborers. The act thereby isolated whites as economic and political leaders of South Africa. We use firsthand accounts of efforts to overcome the educational inequalities that are a legacy of the Apartheid era in Cape Town to compare the situations of distinct Black and Coloured neighborhoods. A specific example includes Equal Education, which campaigns on the behalf of the Coloured population in Khayelitsha. LEAP, the Langa Educational Assistance Program, gives Black youth the opportunity to study math and science in hope of decreasing inequality in the South African upper-class workforces. We hope to come to a determination of what initiatives/goals/tactics, if any, have had the most success in promoting what Fisk and

Ladd call "educational adequacy" and what the prospects for educational adequacy are in the future.

Devon Brown '14 – see Hallie Balcomb '14
Combating the Spread of Malaria with the Power of Mathematics

Meredith Greer, Mathematics, advisor

Margaret Carey '14

Gestational Diabetes Mellitus in Somali Women of Lewiston, ME: The Creation and Assessment of Culturally Relevant Educational Material

Karen Palin, Biology, advisor

Gestational diabetes mellitus (GDM) is a disease of increasing concern among the Somali women of Lewiston, ME. The traditional educational material used for patients with GDM is not effective at relaying important nutritional information to women at risk due to high rates of non-literacy within this population. Working with patients of community partner Jean Kahn, a certified nurse-midwife from Women's Health Associates in Lewiston, I am creating more accessible educational material. The goal of this project is to increase compliance among Somali women with the accepted nutritional guidelines for GDM.

Melissa Carp '16, Michael Creedon '15, and Caroline Depew '16

Somali Perspectives on Language of Instruction

Patricia Buck, Education, advisor

How does context affect attitudes about the purpose of language instruction? Specifically, what value do students from both sides of the Somali Refugee diaspora place on the languages they speak in and out of the classroom? The value that students place on the language they learn reflects the ownership they have over their education and future opportunities. Both students in Kenyan-based Somali refugee camps and in the Lewiston and Auburn (ME) public school systems are taught in English. There are obviously differences in political motivations and pedagogical approaches to English instruction in both educational settings. Kenyan refugee instruction begins in Somali and gradually moves to English, while in Lewiston and Auburn, English proficiency is stressed from the beginning. In both educational settings, students must balance the English they are learning and the Somali they use outside the classroom. This project focuses specifically on differences in attitudes on language instruction on both sides of the Somali refugee diaspora. We interviewed students and educators from the Dadaab Refugee Camp in Kenya and in the Lewiston and Auburn school systems to gain African perspectives on the relationship between language instruction and the purpose of education.

Andrew Carranco '14

A Peruvian Japanese Mexican Tortilla Tofu Press in Texas: The Forgotten Story of Latin American Japanese Internment

Jennifer Adair, History, advisor

Latin American Japanese were deported to the United States during the World War II as part of a spoken-treaty deal. In the past thirty years, three books have been written on the subject. Most focus on the legal and governmental issues behind the situation and deportation. I concentrate particularly on the Crystal City Internment Camp. In 1945, on the border with Mexico, the small community of Crystal City, TX could boast English, Spanish, German, Japanese, and Italian speakers. Crystal City represents a microcosm of the war that no other

POW or internment camp could. I intend to chronicle the history behind Latin American Japanese internment and show how the Crystal City Internment Camp represents the successful implementation of the Geneva Convention.

Anne Carroll '14

The Effect of Grapheme-Color Synesthesia on Object Trimming and Binding

Todd Kahan, Psychology, advisor

Synesthesia is a rare condition where some individuals, when presented with a stimulus in one sensory modality, experience sensation in another sensory modality. The current experiment examined the perceptual experiences of an individual with grapheme-color synesthesia (a type of synesthesia where letters and numbers create sensations of perceiving different colors). Specially, this study sought to better understand two newly discovered visual illusions (object trimming and object binding) by examining the way these illusions are perceived by a synesthete. Experiment 1 demonstrated that our grapheme-color synesthete does in fact perceive certain numbers in particular colors using a visual search task. Experiments 2 and 3 then assessed whether or not the object trimming and object binding illusions are affected by the synesthetic color experiences of our participant. These illusions both involve situations where a number is falsely seen as another number (e.g., under certain conditions the number 8 can appear to be the number 6, or vice versa). By examining how a grapheme-color synesthete experiences these illusion we can determine whether the synesthetic experiences of the participant are occurring in stages of vision that precede or follow the stages of processing where these illusions take place. Results indicate that the object trimming illusion occurs at earlier stages of visual processing, and the object binding illusion occurs at later stages of visual processing, relative to grapheme-color synesthesia.

Joan Castellanos '14

Follow-up to Microbial Sampling at Bates Dining

Karen Palin, Biology, advisor

Over three semesters, students in BIO 315, Bacteriology, have sampled specific areas in the Bates Dining Commons, at request of the dining services director. The areas sampled include the utensils, the back door, the bathroom door handles, the silverware stations, the mug lids, the mug lid bin, and the brick oven cheese storage area. Using standard methods, students attempted identifications of microorganisms found at these sites. Changes in Commons procedures were implemented to decrease microbial load. This project seeks to evaluate the effect of these changes in procedure.

Adam Cervenka '14

Application of a Directed C-H Activation Approach to the Synthesis of Carbazole-Derived Ureas

Patrick Jokiel, Chemistry, advisor

Heterocyclic molecules possessing a cyclic urea motif are ubiquitous as drug discovery leads. The current synthetic routes to these compounds are lengthy, expensive, and are not founded upon principles of green chemistry. The application of functional group directed palladium-catalyzed carbon-hydrogen activation to the synthesis of cyclic urea derivatives promises to address these shortcomings. The objective of this thesis is to apply such an approach to the synthesis of carbazole-derived ureas. The proposed methodology involves the cyclization of an acyclic urea precursor via tandem C-H activation, aryl amination sequence. In this process, the urea group serves as both a

directing group and a nitrogen atom donor. Development of this methodology includes screening of the following key parameters: catalyst, catalyst loading, concentration, oxidant, reaction time, solvent and temperature. Although conversion remains a challenge, the viability of the urea group acting in a tandem C-H activation aryl amination sequence has been demonstrated.

Bridgette Chandhoke '14

Experiencing Time through Movement

Rachel Boggia, Theater and Dance, advisor

Barbara Hammer, a prominent filmmaker in the 1970s expressed that "time is an emotional muscle," and that our perception of the present moment is a compilation of prior histories that we experience when the metronome in our brain are triggered through visual stimulation. My thesis is focused on the audience's experience of time. The piece, *Canyon* is roughly inspired by my experience of geological time when seeing layers of rock representative of millions of Earth's history in one rock formation in a place like the Grand Canyon. Using movement exploration through varying tempos, the layering of different speeds can create a sense of time passing. Also, using movements that emphasize suspension in space can create a sense of kinetic and potential energy within the space, which then passes through the audience to create more of a physical sensation of time. Music, lighting, and the costumes also can contribute to the enhancement of time passing in a closed space.

Sara Chari '14

Permutation Polynomials over Finite Fields

Adriana Salerno, Mathematics, advisor

The ability of certain polynomials to induce a permutation over a given finite field is among the many properties of finite fields that are currently being studied. Such polynomials are called permutation polynomials over the given field F_q . The fact that these polynomials must be one-to-one and onto has led to several theorems that we will discuss, including Hermite's Criterion, that can help determine whether or not a polynomial is a permutation polynomial over a particular field. We will then classify different types of permutation polynomials including linear polynomials and polynomials of the form x^n over F_q , where $\gcd(n, q-1)=1$. Finally, we will investigate the properties of these maps as discrete dynamical systems.

Yuying Chen '16 and James Meyo '14

Transcriptional Regulation of the Nuclear Factor Erythroid-2-related Factor (nrf) Family by the Aryl Hydrocarbon Receptor (AHR).

Larissa Williams, Biology, advisor

The Ahr and Nrf transcription factors are both important in toxicant stress response during development. There has been evidence of their crosstalk, and if this is true, the effect of their interaction is of interest in development. Using 24 hour old zebrafish embryos, an in vivo Chromatin Immunoprecipitation, and technique for studying DNA-protein interaction, can be performed to test the hypothesis that the Ahr transcription factor binds to the upstream promoter sequences of nrf genes. We have successfully extracted DNA and protein from the zebrafish embryos, devising different protocols for frozen and fresh zebrafish embryos. We have also optimized the sonication protocol to fragment DNA to a desired size of 200-500 base pairs by incorporating 212-300 micron acid washed glass beads. We have also optimized the sonication protocol to minimize foaming and overheating of the sample. Currently, we are in

the process of immunoprecipitating the Ahr proteins to isolate DNA sequences that are bound to Ahr transcription factors in zebrafish during early development. We shall then compare these sequences to known sequences of the nrf promoter regions.

Helen Chyz '14

Enhanced Cognitive Control in Task-Switching for Varying Levels of Bilinguals

Katherine Mathis, Psychology, advisor

Because of a lifetime of juggling two languages, bilingual people have cognitive advantages that extend to other mental tasks. Many studies have found that bilinguals have more efficient inhibitory processes and better problem solving, working memory, and selective attention than monolinguals. There is also evidence that through the process of switching languages on a regular basis bilinguals have developed the ability to switch non-linguistic tasks more effectively. Specifically, bilinguals with more experience and higher levels of fluency will perform still better than less experienced bilinguals. In this study I aim to test the difference between conscious and subconscious language code-switchers in task switching paradigms. I expect to see that conscious code-switchers will perform the task switching paradigm with a lower switching cost than subconscious bilinguals and monolinguals. These findings would suggest that the non-linguistic cognitive advantages found in bilinguals are, in fact, related to a lifetime of practice.

Paige Collins '14

Environmental Regulation and Growth Rate Variation of Serripes groenlandicus from Bjørnøya

William Ambrose, Biology, advisor

Growth patterns of *Serripes groenlandicus* (the Greenland cockle) have been used as records of environmental climate change and to reconstruct climatic history. The utilization of *S. groenlandicus* in sclerochronology creates new marine climate archives. Marine environments are not represented well by available terrestrial data, like tree rings and ice cores. Growth rates of *S. groenlandicus* were examined from Bjørnøya in the Svalbard Archipelago (n=20). *S. groenlandicus* from Bjørnøya have not been studied previously; therefore the chronology constructed for Bjørnøya is the first for this location. Standardized growth indices (SGI) calculated for individual specimens were compared to various environmental data. In addition to SGI, stable isotope values of ^{13}C and ^{15}N from lipid-extracted tissue to analyze *Serripes* diet. All significant relationships between SGI and environmental data in Bjørnøya, were related to large scale climate oscillations, local temperature or ice cover. Preliminary results show Arctic Climate Regime Index (ACRI) correlated with annual mean SGI and accounted for 28.1% of bivalve growth. The overall results distinguish major drivers of bivalve growth in the high arctic and show that sclerochronological proxies can be used to record certain environmental variables.

Jedd Countey '14

Detroit's Development of a Rebellion: Understanding the 12th Street Rebellion in a Spatial Framework

Joseph Hall, History, advisor

Understanding the development of Detroit's built environment is necessary in order to fully grasp the roots of the 1967 12th Street Rebellion. By focusing on how the city took shape, the 12th Street Rebellion can be interpreted as the black community's response to oppressive environments. This presentation will

cover material from the early 20th century through the events of the Rebellion itself and exhibit the stages of Detroit's racialized construction of space leading up to what many refer to as the "race riot" of 1967. As cities are the truest reflection of our society's values, this study is significant because it strives to clearly delineate how Detroit manifested racial inequality within its urban fabric.

Peter Cowan '14

Food, Work, and Love: Far beyond the Forest and Survival in Post-World War II Transylvania

Raluca Cernahoschi, German and Russian Studies, advisor

This thesis explores the themes of food, work, and love and the difficulties of survival in post-World War II, Soviet-controlled, Transylvanian Saxon villages. The unique group of ethnic Germans who settled Transylvania in the 11th century suffered at the hands of the Soviets who sent many of the Sachsen men and women to forced labor camps in the USSR to help rebuild that country from the devastation of the war. With much of the work force removed, mostly children and the elderly remained and had to maintain the villages on their own. This study examines the necessities of the body, mind, and soul of the remaining Transylvanian families in conjunction with those sent to labor camps in Russia. Based on Transylvanian author Karin Gündisch's popular children's book *Weit, hinter den Wäldern (Far, Beyond the Forests)*, this study explores the daily trials, tribulations, and joys of the agrarian Saxon families, communities and culture in their struggle to retain their unique identity. Gündisch's text was chosen because of her unique identity as a Transylvanian of German heritage and her nuanced depiction of Soviet-controlled Transylvania during the post-war period. The thesis follows three major themes: food, work, and love, which together portray the post-war conditions and the necessities for survival.

Caroline Cramer '14

The Collective Effect of Appearance Change Instruction and Co-Witness Manipulation

Amy Douglass, Psychology, advisor

The legal system in the United States relies heavily on witness identifications in court trials (Laub, Wylie & Bornstein, 2013). However, mistaken identifications are the leading cause of wrongful convictions (The Innocence Project). Psychology research has found certain procedures that encourage mistaken identifications. Previous research conducted by Levett (2011) suggests that providing co-witness information can have an intense impact on one's confidence when having to make an eyewitness identification. In addition, the Appearance Change Instruction (Charman & Wells, 2007), which is used to inform eyewitnesses that the culprit's appearance may have changed since the time of the crime, has also been seen to increase rates of false identifications. The current study will attempt to specifically determine the influence of the Appearance Change Instruction (Charman & Wells, 2007) along with the effects of knowing a co-witness's decision on identifying or rejecting to identify a culprit. There will be approximately eighty participants in the study, all of whom will be undergraduate students, age 17-23. The predicted findings include increased false identifications rates for those who hear both the co-witness information and receive the ACI compared to participants in all other conditions. It is also predicted that a participant given co-witness information will have higher confidence ratings than those not given the co-witness manipulation. The implications of these findings would add to the general research on

improving the techniques and procedures used in lineups for eyewitness identifications.

Michael Creedon '15 – See Melissa Carp '16
Somali Perspectives on Language of Instruction
Patricia Buck, Education, advisor

Tara Das '16 – see John Allard '16
Women's Grassroots Organization in Africa
Patricia Buck, Education, advisor

Brendan Davidson '14
Self-Transportation in Video Games: How Musical Expectation May Facilitate the Incorporation of Character Traits by Players

James Parakilas, Music, advisor

Research has shown that playing violent video games may increase a person's tendency to engage in actual aggressive behavior (Konijin, et al. 2007). Some researchers have begun to theorize that this may be partially due to a tendency within the players of these video games to adopt the self-concepts of these characters when they highly identify with these characters and feel highly self-transported (i.e., being emotionally/mentally immersed) within the fictional world of the game (Sestir & Green, 2010; Konijin, et al. 2007). By analyzing evidence from the role of music as an inducer of emotion and bodily sensations, the immersive and aesthetic nature of modern video game music (VGM) and game play, as well as Antonio Damasio's (2010) theory of the self as an extension of bodily sensations, I developed a theoretical model for how VGM may be moderating or mediating the tendency for players to incorporate the self-concepts of fictional characters from video games into their own sense of selves. By citing specific musical examples along with psychological theories on self-transportation, I suggest that the felt experiences of the body invoked by music – in response to interactive actions made by the player and character within the game – may lead a player to incorporate the self-concepts of this character as self-relative, since the player is physically feeling something within their own bodies.

Josephine Davis '15, Lei Lei '14, and Caroline Richards '14
Modeling Diabetes through Mathematical Estimations
Meredith Greer, Mathematics, advisor

According to the World Health Organization, over 220 million people in the world have been diagnosed with diabetes. The development of an artificial pancreas would help to control blood glucose levels. Mathematical models can be used to represent the gluco-regulatory system, which is essential to the design of such devices. This paper, "Mathematical model of glucose-insulin homeostasis in healthy rats," uses a system of differential equations and parameters to describe the variation of blood glucose concentration, blood insulin concentration, and the amount of glucose in the intestine. Further validation of this model through experimentation in diabetic animals and numerical simulation will aid diabetes drug research and the development of mechanisms to control glycemia.

Mohdis Delijani '14
Horizontal Transfer of Livestock-associated Methicillin-resistant Staphylococcus aureus ST398 to Hospitals or Communities and Its Effect on Public Health
Lee Abrahamsen, Biology, advisor

Infectious diseases such as those caused by methicillin-resistant *Staphylococcus aureus* (MRSA) are a constant threat to public

health worldwide. The purpose of this study was to determine whether livestock-associated methicillin-resistant *Staphylococcus aureus*, specifically MRSA-ST398, presents significant challenges to public health through direct contact or food production. This paper also seeks our understanding of antibiotic resistance mechanisms and the spread of MRSA in a variety of settings including hospitals, communities, and farms. Although the infection continues to spread within hospitals and communities, the presence of livestock-associated MRSA currently poses minimal threat to public health but has the potential to do so in just a matter of time. MRSA-ST398 has been found to colonize many humans who have direct contact with the infected animals, however, it rarely leads to any fatal infections. Even so, it is important to take precautions when in direct contact with MRSA-infected livestock to prevent spread of the organism. This study also discusses possible solutions for reducing the use of antibiotics on livestock, thereby reducing the risk of a worldwide pandemic.

Caroline Depew '16 – see Melissa Carp '16
Somali Perspectives on Language of Instruction
Patricia Buck, Education, advisor

Emily Diepenbrock '14 – see Elizabeth Baird '16
Research and the Public Good
Darby Ray, Harvard Center for Community Partnerships, advisor

Peter Dixon '14
The Effect of Rho Kinase Inhibition on Helisoma Neuron Growth Rates

Nancy Kleckner, Biology, advisor

Although neuronal growth cones were first discovered in 1890 by a pioneer of neuroscience, Santiago Ramon y Cajal, the mechanism of how they dynamically react to their environment is a question still studied today. Growth cones are apical processes on neurites that guide the growth of the cell in specific directions, potentially toward a target thousands of cell lengths away. Rho-Kinase (ROCK) has been found to promote growth cone advance in certain systems, yet inhibit it in others. This study examines the effect of exogenous application of a ROCK inhibitor (Y-27632) on growth cone advance in buccal neurons cultured from the pond snail, *Helisoma trivolvis*. Timelapse recordings were collected using Hoffman contrast microscopy, and the growth rates were determined using kymographs with ImageJ.

Margaux Donze '14
The Effects of Breast Self-Exam Training on Breast Cancer Awareness and Prevention among Undergraduates
Kathryn Low, Psychology, advisor

Breast cancer is one of the leading causes of death among women in the United States today, and it is important for undergraduates to be aware of risk factors for and prevention of breast cancer. Although there is no way to ensure prevention of breast cancer, there are preventative measures that individuals can employ such as breast self-examination (BSE), regular mammography after a certain age, and healthy habits (American Cancer Society, 2014). While current recommendations on breast self-exam are mixed, the procedure provides an opportunity to increase awareness of breast health and to encourage screening before the age of regular mammography. This study will explore the effects of an intervention using a breast self-exam model on students' knowledge and beliefs

about breast cancer, perceived susceptibility to cancer, efficacy for performing BSE, and intended future behavior. If the students who receive the intervention have higher scores on the dependent measures, it would suggest that this improve breast cancer prevention and awareness among undergraduates.

Courtney Doyle '14 – see Hallie Balcomb '14
Combating the Spread of Malaria with the Power of Mathematics
Meredith Greer, Mathematics, advisor

Christopher Eddy '15 -- see Daniel Bell '15
The Effect of Environment on the Sexual Objectification of Women
Susan Langdon, Psychology, advisor

Tomisha Edwards '15
The Black Female Body in Dance
Rachel Boggia, Dance, advisor
This research investigates and deconstructs what it means to be a Black female dancer, with a specific focus on the fetishized nature of the Black female buttocks. I consider this question from three perspectives: the Black female body, the Black dancer, and Black dance. I also discuss the impact of this research on the creation of my dance piece, which will be featured in the spring dance concert, on Summit weekend.

Omosede Eholor '14 and Cormac Walsh '17
Kenya's National Climate Change Action Plan
Alexandre Dauge-Roth, French and Francophone Studies, advisor
Climate change has become a global phenomenon with lasting effects on various countries around the world. Kenya is among the countries that have been severely impacted by climate variability. Kenya has experienced significant adverse effects such as rising sea levels, an increase in droughts and floods, and an overall depletion of water resources. This has proved detrimental to Kenya's economic and social structure, ultimately impeding upon agricultural production and overall way of life. As of late, climate change has garnered national attention and continued support among Kenya's government and its citizens, as they work strategically to thwart climate variability in hopes of reversing many of its pernicious effects. The National Climate Change Action Plan is one of the many organizations designed to implement various tactics and interventions that hope to mitigate the longstanding effects of climate change.

Rachel Ellis '14
Assessing Spatial Distribution of Poachers' Snares to Direct Chimpanzee Conservation Efforts in Kibale National Park, Uganda

Donald Dearborn, Biology, advisor
Though it is illegal, hunters use snares to catch wildlife inside national parks in many parts of Africa. Endangered chimpanzees (*Pan troglodytes*) are often caught in these snares, which may kill the chimpanzee or cause digits, hands, or feet to be maimed or lost. For these reasons, snare removal is a conservation priority for chimpanzees. In my thesis, I analyzed the spatial distributions of snares in and around the Kanyawara chimpanzee home range of Kibale National Park in Uganda to better understand which areas pose a high risk of injury to this important population.

Students in English 121W, Image and Sound: Reading and Writing Poems, and English 395P, Worldly Women as Artists: Transnational Women Writers
Image and Sound: The Artist, the Self, and the World
Lavina Dhingra, English, advisor
Students from ENG 121W and ENG 395P will read poems, share musical and written compositions, and reflect on their creative process and learning experiences, as they connected personal growth, identity, and self-knowledge with academics.

Students in Environmental Studies 350, Environmental Justice in the Americas
Another World Is Possible: Learning from Environmental Justice Movements across the Americas
Sonja Pieck, Environmental Studies, advisor
Environmental narratives most often focus on doom-and-gloom stories of destruction and collapse. Yet across the world, communities have responded to environmental crises through creative collective action and social mobilization. In this poster session, students in ENVR 350 explore movements for environmental justice in North America and Latin America: What are their grievances and what alternate visions of a just and whole world do these movements propose? How far have these communities come in realizing their vision for justice? Ultimately, how can these movements inspire us to confront the environmental challenges of our day?

Joaquin Espinosa '16, Bisola Folarin '14, and Amanda Moore '14
Sexual Orientation Policies and Perspectives in Uganda and South Africa
Alexandre Dauge-Roth, French and Francophone Studies, advisor
Despite a shared history of British colonization and a common African identity, why have Uganda and South Africa diverged on their policies regarding gay rights? In 2006, South Africa became the first and only African nation to legalize gay marriage while Uganda's new 2014 law criminalizes homosexuality. Despite pre-colonial homosexuality, European colonialism set the foundation for a heteronormative society, supported today by internationally based Christian and Islamic organizations. Due to the recent arrival of these religious groups and the rise in Asia's global influence, Uganda has strengthened its anti-homosexual policies with nationalistic rhetoric. Unlike the rest of the continent, South Africa's post-Apartheid government legally protects homosexuals since the South African constitution was written under the pressures of Western-defined human rights. While these governments' beliefs are strong, Africans' opinions are diverse and are continuously influenced by international movements and social networks.

Tess Ferguson '14
Protein Kinase c-Src Phosphorylation Changes in Estrogen-Stressed Breast Cancer Cells
T. Glen Lawson, Chemistry, advisor
The most frequently diagnosed cancer, breast cancer, accounts for 23% of all cancer cases, with an estimated 234,580 cases in 2013. Breast cancer is unique from most other cancers in that it relies heavily on estrogen uptake. It has been suggested that the estrogen receptor is a key adapter for the activation of the protein c-Src. The activation of c-Src is modulated by two phosphorylation sites, when Tyr418 is phosphorylated the protein is considered active, while when Tyr 529 is phosphorylated the protein is inactive. The over-

expression/activation of c-Src is has been found in many cancers and is critical to the invasive reproduction, progression, and survival of cancerous cells. Currently the most prescribed breast cancer treatment, Tamoxifen, targets the estrogen receptor, which deprives the cells of estrogen. While Tamoxifen has greatly improved patients' prognoses, people still die from breast cancer every day. By further understanding c-Src regulation and its role in breast cancer, it may be possible to create cancer drugs that work by preventing the activation of c-Src. Preliminary results have shown that various estrogen concentrations have an effect on the phosphorylation of c-Src. Further experiments are currently being done to further characterize this interaction.

Heather Fisher '14

Comparing the Effects of Helisoma and Mammalian Gonadotropin Releasing Hormone on the Feeding Central Pattern Generator in Helisoma trivolvis

Nancy Kleckner, Biology, advisor

In gastropods, feeding and certain reproductive behaviors, including substrate cleaning before egg laying, are mutually exclusive, but they are thought to be controlled through modulation of the same central pattern generator (CPG), which is a group of neurons that controls repetitive behaviors. The goal of this investigation is to determine the effects of the gonadotropin-releasing hormone (GnRH) from two species and intestinal nerve stimulation, which is implicated in GnRH release, on firing patterns of the CPG in *Helisoma trivolvis*. Analysis of voltage recordings of motor neurons will determine changes in firing patterns. Comparisons of the effects of the two GnRHs will show how the function of GnRH has changed through evolution and the degree to which *Helisoma* GnRH receptors are selective for their own GnRH. Similarity in the GnRHs' effects would suggest that GnRH has been conserved through evolution to serve an important function across a diverse group of animals.

Colleen Fitzgerald '14

Contemporary Interpretations of Argentine Tango: The Complexities of Global Dance Forms and the Artists Who Choreograph Them

Carol Dilley, Theater and Dance, advisor

For my senior thesis in dance, I choreographed a piece entitled *Intricate Glances Will Meet Here* and wrote a theoretical analysis of the choreographic process. I will talk about the integration of my dance and anthropology majors to create a yearlong project rooted in cultural analysis of the Argentine tango. Alongside other dance majors, I will provide a reflexive glance into the process of composing a creative dance thesis, with a particular focus on cultural embodiment and dance ethnography as they informed my thesis.

Emily Foden '14

Growth of Softshell Clams in Coastal Maine

William Ambrose, Biology, advisor

Previous studies conducted on Maine populations of the soft shell clam (*Mya arenaria*) have found temperature and food availability to be influential in determining growth rate. My study aimed to expand on these findings by comparing growth performance indices with sediment (grain) size, and water column and benthic chlorophyll content among ten study sites. Growth rates were measured in the chondrophore. Temperature data were collected continuously, sediment once, and chlorophyll periodically during the collection time, which

ranged from 2012 to 2013. Results showed an average temperature difference of 2.39 degrees C between downeast and southwest sites, but growth differences in only 10 of 45 comparisons. This indicates that, in these habitats, environmental variables other than temperature are influential to bivalve growth.

Bisola Folarin '14 – see Joaquin Espinosa '16

Sexual Orientation Policies and Perspectives in Uganda and South Africa

Alexandre Dauge-Roth, French and Francophone Studies, advisor

Destany Franklin '14

Neuromodulators of the Feeding Behavior Network in Pond Snail, Helisoma trivolvis: Mapping of Immunoreactivity in the CNS and Digestive System

Nancy Kleckner, Biology, advisor

A central pattern generator (CPG) is a neural network that controls phases of rhythmic motor behaviors such as breathing, walking, and eating. The CPG, located in the buccal ganglia, is comprised of interneurons that excite or inhibit a subset of buccal motor neurons. The feeding CPG of the *Biomphalaria glabrata* and *Helisoma trivolvis* pond snails, switch between protraction (S1), retraction (S2), and hyperretraction (S3) phases. These phase patterns are modulated by various neuropeptides. Gonadotropin-releasing hormone (GnRH), tetrapeptide Ala-Pro-Gly-Trp-NH₂ (APGW), and small cardioactive B (SCPb) peptides are a few known modulators. The purpose of this study is to localize these peptide neuromodulators in the digestive and central nervous systems, using immunocytochemistry, in situ hybridization, and bioinformatics. This study proposes profiles of immunoreactivity of GnRH, APGW and SCPb in order to better understand neural connectivity of the feeding CPG and structures influenced by these neuromodulators.

Daniel French '14

Nutrient Consumption and Resistance Training

Larissa Williams, Biology, advisor

The dietary recommendations put forth by the United States Food and Drug Administration (FDA) suggest a daily intake of 50g of protein for all individuals, regardless of the level of physical activity. However, many individuals engaging in weight training with the intention of inducing skeletal muscle hypertrophy have embraced dietary habits including a daily protein intake significantly higher than that which is recommended. This thesis explores literature on the biochemical process underlying the induction of skeletal muscle hypertrophy in an attempt to define its mechanism and the role of protein. The results outline a pathway starting with the release of Insulin-like Growth Factor 1 caused by mechanical stress, and end with activation of the mammalian target of rapamycin signaling pathway stimulating muscle protein synthesis. The critical role of amino acids in regulating activity of mTOR is also demonstrated. Due to literature using experimental procedures that significantly reduce the application of their results to human weight lifters, the benefits of consuming higher than recommended amounts of protein can only be suggested, not confirmed. This conclusion illustrates the need for more applicable and thorough research into the biological process of muscle growth in humans; this research would provide benefit not only to weight lifters, but also for those suffering from weight related conditions, such as obesity or cachexia.

Sabina Frizell '14

The Anthropology of Think Tanks: Democracy Promotion after the 2011 Arab Uprisings

Loring Danforth, Anthropology, advisor

This thesis investigates the relationship between anthropological scholarship on democratization and the approach think tanks have adopted to promote democracy in Egypt following the 2011 uprisings. I first present an ethnography of two think tanks, International Crisis Group and the German Institute for International and Security Affairs, examining their institutional funding, internal organization, and stated goals. Further, I dissect the think tanks' reports on political transition in Egypt, analyzing them alongside the nascent body of anthropological literature on democratization. My analysis identifies where the reports' approaches to democratization align with and diverge from anthropology's focus on emic perspectives. Points of tension between think tank and anthropological conceptions of democratization include their treatment of the following questions: How is democracy defined? Does it consist of a single set of processes and institutions, or can there be multiple successful iterations that differ from a Western understanding and are shaped by local political cultures?

William Fubini '14

Advertising Death

Helen Boucher, Psychology, advisor

Mortality salience (MS) assumes that if an individual was reminded of their death, then they should become concentrated on anything that undermines their worldview and will be motivated to defend it (Greenberg et al., 1990). Schmeichel and Martens (2006) demonstrated that affirming a valued aspect of one's cultural worldview subsequently buffered the effects or mortality salience. Dar Nimrod (2012) found that participants who watched a clip of a television show containing death-related content showed greater desire for advertised products in comparison to a control group. Rindfleisch, Burroughs, and Wong (2008) demonstrated that individuals who identified as materialistic showed greater levels of brand loyalty and self-brand connection when reminded of their own mortality. It is hypothesized that participants who have MS induced will elicit higher levels of persuasion and desire for products they display; however, this effect is expected to dissipate or completely disappear when participants self-affirm (i.e., think about social support). Lastly, it is hypothesized that individuals who score high on a materialism pretest will show greater levels of brand loyalty as well as self-brand connection toward their cell phone brand after being asked to write and think about their own death. A potential implication of this study is to influence advertising strategies.

Emilie Geissinger '14

Determining Diet of Wrymouth (*Cryptacanthodes maculatus*) in Maine Mudflats Using Carbon and Nitrogen Stable Isotopes

William Ambrose, Biology, advisor

The wrymouth (*Cryptacanthodes maculatus*) is a predatory benthic fish that lives within soft sediment in burrows. Little is known about this fish and its role in mudflat ecosystems. Soft-bottom community structure often depends on the effects of predatory infaunal invertebrates and epibenthic predators. There have been few detailed studies on the role of wrymouth as an epibenthic predator in benthic ecosystems. The specific objective of my study is to generate detailed information on the diet of *C. maculatus* by using stable nitrogen and carbon isotopes. Stable isotope analysis of tissue from *C. maculatus* and

other organisms found in the same mudflat will be compared to gut-content analysis. Collections occurred in the spring and summer of 2013 in Washington County, ME, which enable us to detect seasonal differences in diet. Preliminary results indicate that wrymouth consume an array of annelids, as well as *Littorina littorea*, *Macoma balthica*, and *Mya arenaria*.

Sean Gemunden '14

Function and Effect of Ribosomal S6 Kinase 2 (RSK2) on Cell Apoptosis in Human Skin Cells

Stephanie Richards, Biology, advisor

Skin cancer is the most abundant cancer type found in humans, with over 2 million new cases being diagnosed each year. Ribosomal S6 kinase (RSK), is a family of 90 kDa kinases involved in signal transduction. One of the members of the RSK family, RSK2, is known to regulate cell proliferation and apoptosis. Studies of RSK2's function in cell proliferation have demonstrated that RSK2 is an important kinase involved in human skin cancer development. The objective of this thesis is to observe RSK2's behavior in human skin cells, and to determine its effect on cell apoptosis. Through observing the effects of RSK2 on human skin cells, we may be able to gain a better understanding of RSK2's mechanisms of action, in the context of understanding what role RSK2 may play in skin cancer development.

Caleb Glassman '14

The Role of Glutamate Receptors in the Feeding Rhythm of the Pond Snail, *Helisoma trivolvis*

Nancy Kleckner, Biology, advisor

The triphasic feeding rhythm of the pond snail, *Helisoma trivolvis*, is produced by a neural network in which excitatory and inhibitory connections between neurons produce a cyclic motor output. Previous work indicates the amino acid transmitter, glutamate, patterns the rhythm through the presence of different types of glutamate receptors on cells within the network. This study attempts to characterize glutamate receptors on motor neurons involved in the *Helisoma* feeding rhythm using electrophysiology and molecular techniques. Intact central nervous system pharmacology suggests the presence of metabotropic glutamate receptors on phase 1 or phase 2 interneurons. Direct effects on the motor neurons, B19 and B27, were not observed. Continuing work attempts to characterize these differences using single cell reverse transcriptase polymerase chain reaction (RT-PCR) to identify specific receptors within B19 and B27.

Matthew Goldfarb '14, Tessa Hathaway '14, Kayla Hertz '14, Collin McCullough '14, and Emma Timbers '14

Literary Reading by Creative Thesis Writers

Robert Farnsworth, English, advisor

In this session, creative thesis writers will read selections of their work. The reading will feature a wide range of literary works by dedicated, emerging writers.

Tamara Gonzalez '14

The Neuropsychological Validity of Mu Wave Suppression as a Measure of Theory of Mind in Autism Spectrum Disorders

William Seeley, Philosophy, advisor

Autism spectrum disorders (ASD) are characterized by deficits in motor simulation and interpreting the goals and emotions of others. Some scientists propose that these deficits are the result of a dysfunction in a controversial structure called the mirror neuron system (MNS), however, the presence of an MNS per se

is disputed. A study conducted by Ramachandran et al., aimed to demonstrate that the dysfunction of the MNS corresponds directly to the inability of individuals with ASD to interpret the goals and intentions of unfamiliar persons. Their results showed that when individuals with ASD observed actions performed by familiar individuals, MNS dysfunction was less pronounced than when asked to view the same actions performed by unfamiliar individuals. The results of this study could be a crucial in the understanding of ASD, if they are well-founded and legitimate. The present aim of this review is to scrutinize this study for scientific, theoretical, and methodological validity, in order that we may assess the soundness of their results before moving forward on the basis of their data.

April Graham '16 – see John Allard '16
Women's Grassroots Organization in Africa
Patricia Buck, Education, advisor

William Green '14 and Albert Shi '14
Fair Division of Desirable Commodities
Pallavi Jayawant, Mathematics, advisor
How do we divide a cake among a number of people such that each person feels he or she got a "fair" share of the cake? Using mathematical techniques, we discuss protocols that provide solutions to such fair division questions. We also consider a measure, known as the degree of guaranteed envy-freeness (DGEF), to determine how fair the final division is. We then use this measure to calculate how well the protocols guarantee mutual satisfaction. Current research conducted by scholars such as C. Lindner and J. Rothe entails finding more desirable protocols using these concepts.

Logan Greenblatt '14
Plasmonic Behavior of Gold Nanorod Self-Assemblies
Matthew Côté, Chemistry, advisor
Interactions of light with metal nanoparticles, ultrafine metal particles ranging in size from 1 to 100 nm, cause the collective, non-propagating oscillations of electrons. These collective oscillations are generally known as localized surface plasmon resonances (LSPRs). LSPRs give rise to a drastic alteration of the incident radiation pattern and to striking effects such as the sub-wavelength localization of electromagnetic energy, the formation of high intensity hot spots at the nanoparticle surface and much more. Plasmonic nanostructures show great technological promise with applications including bioimaging, chemical sensing, and solar cell enhancement. Realizing their full potential will require convenient means for characterizing their optical and electronic properties and comparing those properties to theoretical predictions. Through a combination of total internal reflection darkfield microscopy and nonlinear optical microscopy and spectroscopy, I studied the second harmonic and third harmonic signals generated when femtosecond infrared laser pulses were focused on self-assembled gold nanoparticle structures. Following the survey I used scanning electron microscopy to correlate nonlinear optical signals with the detailed shapes and sizes of individual gold nanoparticles and the geometries of gold nanoparticle assemblies.

Cameron Griffin '15, Krista Prouty '15, and Martha Schnee '15

Visual Narratives of Lewiston

Myron Beasley, American Cultural Studies and African American Studies, advisor

Situated as a visual methods research course, INDS s30, Visual Narratives, built on theories of urban studies, critical ethnography, and the cultural politics surrounding the photographic documentation of people engaged in the activities everyday life in the context of the city of Lewiston. Particular attention was given to the development of photography both as a mode for representing culture and as a site of cultural practice. The exhibition *Seeing Lewiston* was the culminating visual project for the Short Term course.

Patrick Griffin '17, Max Millsagle '17, Nathan Moreau '17, and W. Parker Nelson '17

The Symbolism of J. R. R. Tolkien: Reading the Lord of the Rings

Sylvia Federico, English, advisor

This panel offers four papers written in fall 2014 during First-Year Seminar 420, Reading the *Lord of the Rings*. Each paper delves into symbolism used by J. R. R. Tolkien in his epic novel. Topics include messianic symbolism, universalizing metaphors, family values, and Sam's cooking skills. A brief response will be offered by Professor Sanford Freedman of the English department.

Taylor Guss '14

Effects of Power and Money Priming on Empathy
Helen Boucher, Psychology

Previous research has found that individuals high in power exhibit lower levels of empathy, and suggests that individuals primed with money also exhibit lower levels of empathy. This study aims to provide further research on the relationship between priming money and priming power in relation to empathic behavior. There were approximately 80 participants in the study (40 males and 40 females), all of whom are undergraduates aged 17-22. Participants were randomly and evenly divided into three experimental groups: money prime, power prime, and neutral prime. Participants were given a word-descrambling task to prime one of these three cognitions, and then will take two empathy measures. The first empathy measure measured empathy in a real-world behavior setting wherein participants were be asked to interpret the sarcastic tone of an email message. The second empathy measure was a combination of questions taken from the Empathy Assessment Index (EAI) and the Interpersonal Reactivity Index (IRI), adapted into one questionnaire. It was predicted that those higher in power would exhibit the least empathy compared to those primed with money and with nothing.

Angeleque Hartt '14

Synthesis of Ashitabaol A

Jennifer Koviach-Côté, Chemistry

The ashitaba plant has been used to treat disease in traditional Japanese medicine. One of the active ingredients in this plant is the radical scavenging compound ashitabaol A. Free radicals are classified as highly reactive compounds that have a single unpaired electron in their outer orbit, which causes these molecules to be highly reactive. Under normal circumstances, some free radicals are beneficial in killing bacteria and viruses, but when the number of free radicals cannot be controlled, oxidative stress occurs. When oxidative stress occurs, lipids,

DNA, and proteins can be altered, cellular communication can be disrupted, and human diseases can be triggered. Antioxidants such as ashitabaol A encompass the ability to neutralize or deactivate free radicals. Due to the wide medicinal application of ashitabaol A, we have undertaken its synthesis, and efforts toward that end are presented here.

Evelyn Hartz '14

Social Entrepreneurship and the New American Sustainable Agriculture Project (NASAP)

Heidi Taylor, Sociology, advisor

The terms "social entrepreneurship" and "social innovation" are gaining increased traction in mainstream rhetoric. In January 2014, Forbes released its first "30 Under 30: Social Entrepreneurship Edition." In addition, the White House under the Obama administration has created a new Office of Social Innovation and Civic Participation. My thesis applies a social entrepreneurial lens to the New American Sustainable Agriculture Project (NASAP), a Maine organization focused on creating economic opportunity for refugee farmers. I apply matrices from several non-profit organizations in the social entrepreneurship/innovation field including the Ashoka, Echoing Green, and Skoll foundations in order to assess both levels of social impact and innovation in NASAP. Because social entrepreneurship is a new and emerging field, I simultaneously assess the matrixes themselves and whether they succeed in measuring the impact and innovation of an organization like NASAP.

Tyler Harwood '14

The Effect of Athletic Identity on Susceptibility to Stereotype Threat Associated with the "Dumb Jock" Stereotype

Helen Boucher, Psychology, advisor

Stereotype threat is a phenomenon by which individuals fear the risk of confirming a negative stereotype associated with their social group, and may therefore demonstrate declines in performance on a given task as a result of subjective experiences of anxiety related to the threat of confirming this stereotype. Studies have suggested that student athletes are at particular risk for experiencing stereotype threat, particularly as it pertains to the "dumb jock" stereotype, or the idea that student athletes do not demonstrate the same academic aptitude as other students. The current study will attempt to determine if individuals who have high athletic identity, but do not necessarily participate in varsity athletics, are susceptible to stereotype threat associated with the dumb jock stereotype. Approximately 100 male students from a variety of athletic backgrounds (varsity, club, intramural, independent exercise, etc.) will participate in this study. Participants will first complete an assessment in order to determine their athletic identities. Participants will then be randomly assigned to one of three conditions: one priming athlete-identity, one priming student-identity, and a control condition that will not prime any identity in particular. Lastly, participants will complete a 10-item math test in order to determine if the identity prime manipulation induced stereotype threat based on each participant's reported athletic identity. Implications of this study may suggest that the "dumb jock" stereotype personally affects many individuals on campus, and is not just limited to varsity athletes.

Tessa Hathaway '14 – see Matthew Goldfarb '14

Literary Reading by Creative Thesis Writers

Robert Farnsworth, English, advisor

Kayla Hertz '14 – see Matthew Goldfarb '14

Literary Reading by Creative Thesis Writers

Robert Farnsworth, English, advisor

Mitchell Hildreth '17

A Comparative Glance at the Arab Springs in Tunisia, Egypt, and Algeria

Patricia Buck, Education, advisor

Through a Western perspective, the Arab Spring in Tunisia is viewed as a model for progress and reform. The transition to a new government and constitution responds to many of the protesters' demands, including the promotion of religious freedoms and progress toward gender equality. In contrast, the Arab Spring in Algeria was comparatively moderate in that the government was not overthrown, whereas the two coup d'états sparked by the Arab Spring in Egypt continue to bring violence and instability to the country. Our project explores the parallels and differences in these protests within each country's political, social, and cultural history, and how these respective factors cause and affect the definition of human rights. Specifically, we will investigate each country's education system, role of religion, gender equality, economic state and political landscape over time in order to better understand the changes – or lack thereof – that continue to affect North African citizens.

Alexandra Hill '14

Afro-Colombian Displacement in Colombia's Civil War

Baltasar Fra-Molinero, Spanish, advisor

Understanding Colombia's armed conflict requires not only an acknowledgement of drug violence and guerrilla warfare within the nation, but also the effects of a prolonged civil war in which violence has had insidious effects in everyday life of all Colombian citizens. As the cocaine trade grew in the late 1970s, the fight for territorial control emerged between the various organizations involved in the nation's armed conflict. Paramilitaries and guerrillas sought to establish strongholds in areas conducive to the cultivation and production of coca. Nevertheless, as the guerrillas and paramilitaries increasingly participated in the cultivation and production of coca, the Afro-Colombian communities of these areas were uprooted from lands that were historically and tangibly related to social and racial resistance and resilience. As of 2011, between three and five million Colombian citizens had been displaced from their homes, re-locating from rural to urban areas and finding themselves without the community and the history on which their society was previously formed. Through cultural production of documentaries, Afro-Colombian women, in particular, are demonstrating their experiences of the armed conflict and offering a representation that challenges their status as a marginalized and ignored group. Such movements have successfully inserted displacement into international awareness, bringing attention to the issue and giving Afro-Colombian women the opportunity to re-narrativize certain apertures in the history of Colombia's armed conflict.

Caroline Hinkle '14

Analysis of Cognitive Mediators in the Relationship between Peripheral Oxytocin and Affective Processing

Nancy Koven, Psychology, advisor

Social cognition refers to a multifaceted set of skills, including emotion recognition, mentalization, and pair bonding. The neuropeptide oxytocin seems to be a key mediator of social competence, both in clinical and non-clinical subjects. While oxytocin has shown therapeutic promise for those with impaired

social cognition, it is unclear if elevated endogenous oxytocin has negative clinical correlates. It is speculated that, for individuals who are already socially attuned, oxytocin makes emotional stimuli overly salient, prompting a hypersensitivity to and withdrawal from social situations. The present study explores this possibility by examining the direction and degree of association between peripheral oxytocin levels and affective processing skills in a sample of young adults and tests for cognitive mediators of this relationship. The relationship between oxytocin level and affective processing is expected to follow an "inverted-U" pattern such that very low and very high levels of oxytocin are functionally counterproductive.

Cora Hirschfeld '16 – see Michaela Britt '17
Grassroots Initiatives and Educational Equality in Post-Apartheid South Africa
Alexandre Dauge-Roth, French and Francophone Studies, advisor

Jocelyn Hoye '15
Background Subtraction in Fluorescence Photoactivation Localization Microscopy

Travis Gould, Physics and Astronomy, advisor
Using single-molecule imaging and localization, fluorescence photoactivation localization microscopy (FPALM) and similar techniques are able to image structures with subdiffraction spatial resolution. With repeated cycles of activation, readout, and bleaching, large numbers of photoswitchable probes can be precisely localized to obtain a map (image) of labeled structures with an effective resolution of tens of nanometers. Reconstructing an FPALM image therefore requires post-acquisition data analysis to identify the images of single molecules and determine their position. Raw images typically require background subtraction before the process of molecule localization can occur. However, the performance of different background subtraction algorithms has yet to be compared quantitatively. Here we characterize the performance of the Rolling Ball Algorithm in which a sphere of a pre-determined radius is "rolled" along the underside of the surface generated by the pixel intensities of an image to determine the background profile.

Molly Huffaker '14
Community Response to Sexual Assault: A Study of the Sexual Assault Nurse Examiner Program in Lewiston, ME

Heidi Taylor, Sociology, advisor
This thesis looks at the response services that are provided to victims of sexual assault and rape, specifically focusing on the Sexual Assault Nurse Examiner (SANE) program in Maine hospitals. The SANE program was developed in the 1970s to provide victims of sexual assault with medical care, forensic evidence collection, and emotional support. Research shows that victims treated by SANE nurses receive better care and have better long-term medical and emotional outcomes. It also shows that SANE nurses collect better forensic evidence than non-SANE nurses, and convictions are more likely if a SANE nurse has collected the evidence. While there are more than 600 SANE programs in the United States, hospitals in Lewiston and Auburn, ME, have few certified SANE nurses. In central Maine, the SANE program has been regionalized and SANE nurses are shared among five hospitals. Through interviews with SANE and non-SANE nurses in Lewiston, Augusta, and Waterville hospitals, I compare nurses' perceptions of the care that they are able to give based on the training they have or have

not received. I examine how nurses feel about their ability to care for the sexual assault patient population, how prepared they are to perform sexual assault forensic examinations and the support that they receive from their hospital's administration. I argue that SANE nurses feel better equipped to perform sexual assault forensic examinations and work with sexual assault patients than non-SANE nurses; however, they lack enough support from hospital administrations in order to perform their work to the best of their ability.

Stephanie Jefferson '14
Correlation between Variation in Working Memory Capacity and Feature-Based Attention Only for the Ipsilateral Presentation of Visual Stimuli During 200-240ms Time Interval

Jesse Bengson, Psychology, advisor
People have varying working memory capacities. Because working memory capacity and attention are closely linked throughout the literature, we are using this knowledge to determine the individual correlates of working memory and attention using ERP data. This information will then be analyzed for differences among ERP components. These differences will determine which stage of the attentional selection process is related to individual differences in working memory capacity. These stages include sensory processing or higher order cognitive processing. There was a strong correlation found between variation in working memory capacity and feature-based attention during the 200-240ms time interval but only for the ipsilateral side. This will indicate whether variation in working memory capacity can be attributed to differences in sensory processing suggesting practical implications for improvements of career training for traffic controllers and educators as well as clinical implications for diagnosing and treating attention-related disorders.

Cody Jenkins '14
The Effect of MHC Class II Genes on Mate Choice in Vertebrate Populations

Donald Dearborn, Biology, advisor
The major histocompatibility complex is a group of genes present in all vertebrates that code for proteins that present peptides to T cells to facilitate an effective immune response. MHC diversity can greatly affect fitness in response to selection pressure applied to pathogens present in the environment. Thus, populations that are heavily influenced by the selection pressure of pathogenic microbes could potentially respond by changing the allele frequency of successive generations in favor of MHC haplotypes that result in increased fitness. One way this change in allele frequency can be explained is through preferential mate choice. This study presents the data collected from several published research projects on the degree of genetic diversity in different populations.

Justin Johal '14
Use of a Microfluidic Chamber to Study the Biology of Bacteria

Paula Schlax, Chemistry, advisor
Chemotaxis plays a major role in a cell's ability to survive and is important in several pathogens that pose a problem to the clinical world. A cell uses its chemotaxis to recognize chemical stimuli in the environment and elicits a response, either moving towards or away from that stimulus. By using bacteria, like *Escherichia coli* or *Borrelia burgdorferi*, we can understand how chemotactic function in causing a specific infection.

Pharmaceutical agents can then be used to modify the chemotactic ability of these microorganisms and potentially decrease the apparent infection rate. We decided to use microfluidics to investigate microbial chemotactic responses in chambers that created a linear concentration gradient. We used 10mM of glucose as a chemoattractant to establish a gradient at a flow rate of 100 μ l/hr, and found that *E. coli* cells were able to migrate towards the higher concentration of the gradient. Although chemotaxis was observed in this microfluidic chamber, the chamber may be better suited to explore the effects of environment changes on gene expression.

Daniel Jordan '14

Control of the Developmental Hedgehog Pathway through the Transcription Factor Nfe2

Larissa Williams, Biology, advisor

The transcription factor Nfe-2 has been shown to significantly affect the development of juvenile zebrafish. This project aims to trace the control of the genes that direct many of these processes, specifically the developmental Hedgehog pathway, to this transcription factor in the hopes of constructing the chain of events that is instrumental in all vertebrate organisms.

Gretchen Kaija '14 – see Elizabeth Baird '14

Research and the Public Good

Darby Ray, Harvard Center for Community Partnerships, advisor

Linnea Kaye '14

Construction of a STED Microscope

Travis Gould, Physics and Astronomy, advisor

Stimulated emission depletion (STED) microscopy is an optical nanoscopy technique used to image fluorescently-labeled samples with spatial resolution below the traditional diffraction limit. Incorporating a second beam into a confocal microscope geometry, red shifted from the excitation wavelength, forces excited molecules back to their ground state, thereby reducing the area where molecules can fluoresce. This confinement of fluorescence improves spatial resolution beyond the conventional limit, and in practice resolution on the order of tens of nanometers is typically achieved. Here we present the optical design and construction of a STED microscope for deep tissue imaging in live cells.

Erin Kelley '14

Public Health Awareness of Tuberculosis in the Lewiston-Auburn Community

Lee Abrahamsen, Biology, advisor

Tuberculosis is a respiratory disease caused by the organism *Mycobacterium tuberculosis*. The disease is preventable and treatable yet it is one of the world's leading causes of death among communicable diseases. TB infection can be either active or latent. Both forms have recently been diagnosed in the Lewiston-Auburn area; the primary drug used for treatment of either is Isoniazid. This presentation examines the non-compliance issues that arise from the drugs' side effects, the biochemical mechanisms of Isoniazid, and the educational interventions that could improve patient understanding and compliance. The B Street Health Clinic affiliated with Saint Mary's Medical Center receives most of the Somali patients who may be infected with latent TB. Doctors, nurses, and cultural brokers collaborate to continually educate each patient on the importance of compliance but the system is not perfect. A pamphlet will be presented that was created to assist the cultural

brokers on how to best explain the initial infection, stages of the disease, and the side-effects of the drug.

Brian Kennedy '14

A Contribution Analysis for Maine's Rockweed Fishery

Lynne Lewis, Economics, advisor

This project is an economic contribution analysis of Maine's rockweed industry through the distribution of a survey instrument and IMPLAN economic modeling software. 15.3 million wet pounds of seaweed were landed in Maine in 2012 and the vast majority of the harvest is composed of rockweed. As harvests and the associated industry grow, stress on management and incidents of use conflict increase simultaneously. In this context, it is important for policy makers, industry, and stakeholders to understand the importance of the seaweed sector to the state's economy. Using a bill of goods approach this project will describe in dollar terms the significance of the rockweed sector to Maine's economy. Results will be anonymous and in aggregate.

Bo Ra Kim '14

Why Protest? A Look into Causes of Protest Bids in Contingent Valuation Willingness to Pay Surveys

Lynne Lewis, Economics, advisor

My thesis is a study on the effect of government-based payment vehicles versus donation-based payment vehicles on protest bids using a Willingness to Pay (WTP) survey on alewife restoration on the Androscoggin and Kennebec rivers in Maine. Replacing the government-based payment vehicle in the survey with the proposed donation-based payment vehicle question may decrease the likelihood of protest bid responses. This change in probability will be analyzed through the use of a probit regression. Data will be obtained by implementing the last leg of the already ongoing alewife restoration WTP survey, while also adding an additional survey that is identical in all ways except for the payment vehicle in the WTP question. My thesis tests the effects of changing the payment vehicle on protest bids, and has the potential to influence others implementing WTP surveys in the future on their choice of payment vehicles.

Hope King '14

Attention Deficit Disorder and the Event-Related Potential Correlates of Cross-Modal Attention

Jesse Bengson, Psychology, advisor

Attention-deficit/hyperactivity disorder (ADHD) is a disorder characterized by the behavioral symptoms of inattention, impulsivity, and hyperactivity. The disorder places individuals at an increased risk for academic and social dysfunction. Studies investigating data collected by electroencephalogram during attention paradigms within a single modality have shown that event related potentials differ between individuals diagnosed with ADHD and non-diagnosed individuals. The high temporal resolution of event-related potentials (ERP) and their characteristic form of peaks and valleys allows researchers to examine changes in voltage over time in response to specific reference events in time. In this study ERP components were examined during a cross-modal attention paradigm in attempts to identify a stage in which disruptions occur during the attentional selection process. We failed to reject the null hypothesis as we did not find an interaction between diagnosis and ERP responses to valid versus invalid cues during the cross-modal task.

Taylor Kniffin '14

Localization and Expression of μ Opioid Receptors in the Mouse Accessory Olfactory Bulb

Jason Castro, Psychology, advisor

The olfactory system is modulated constantly as a result of feedback from downstream brain areas, and these changes affect how smells are perceived, as well as the way we interact socially. While several of the systems that play a role in neuromodulation within the olfactory bulb are well understood, preliminary studies show that there are a high number of opioid receptors present there as well, a system whose role in olfaction has been understudied. Opioids in other brain areas are known to play a role in reward and in social interaction, so their presence within the olfactory bulb would likely influence the same areas, particularly given the accessory olfactory bulb's role in processing social odors. In this study, slices of the mouse olfactory bulb were immunolabeled to quantify the location and density of μ opioid receptors. Receptors were found within the glomerular and granule cell layers of the accessory olfactory bulb, with a higher density of receptors in the granule cell layer. Finding the location of these receptors gives us a better understanding of how they may be functional in olfaction.

Sarah Krischer '14

Evidence of "Romanization" in Pottery Assemblages from Early Roman Britain

Gerald Bigelow, Anthropology, advisor

The years following the Roman conquest of Britain were a time of rapid change as the native population came into direct contact with the occupying Roman population. In the second part of the 1st century two material traditions can be detected running parallel. Both kinds are visible in ceramic assemblages found at these sites. Those that had been urban settlements during the Late Iron Age continued to use the same types of domestic and imported pottery. It was slowly replaced with a more "Roman" style that melded traditional British Iron Age ceramic traditions and those of the Empire. In contrast, towns founded by Roman immigrants started out with stereotypically Roman pottery styles, and moved towards a "Romano-British" pottery style. As such this demonstrates how the divides between "Roman" and "native" in occupied Britain became less pronounced even during the first century of occupation, at least among the urban population.

Olivia Kronemeyer '14

The Influence of Cultural Display Rules on Expression of Emotions in Collectivistic and Individualistic Cultures

Jill Reich, Psychology, advisor

Previous research suggests that cultural display rules, which are consistent with the behavioral norms and values of a culture, influence the emotional expression of people from different cultures. Studies have found that members of collectivistic and individualistic cultures differ in the extent to which they express emotions. The current study extends investigations of emotional expression among members of collectivistic and individualistic cultures, examining the influence that interaction persons, social situation, and perceived closeness to interaction persons may have on the expression of emotions.

Kelly Kruger '14 – see Mildred Aroko '14

The Highs and Lows of My Study-Abroad Experience in 6 Mins. and 40 Secs.

David Das, Office of Off-Campus Study, advisor

Anna Lanoue '15 – see Daniel Bell '15

The Effect of Environment on the Sexual Objectification of Women

Susan Langdon, Psychology, advisor

Andrea Lauden '14

A Sedimentary Core Analysis for Evidence of Anadromous Alewife Runs of Nequasset Lake, Woolwich, ME

Beverly Johnson, Geology, advisor

The nitrogen input of anadromous fish into fresh water bodies can be tracked through of the stable isotopic signal of the dissolved nutrients and sedimentary record. Part of the marine derived nitrogen input deposited by anadromous alewives (*Alosa pseudoharengus*) becomes part of the sedimentary record, allowing stable isotope analyses of sediment cores to hold signals of migrations. The purpose of this study is to examine the stable nitrogen isotope composition of a sediment core and determine if there is a signal of anadromous alewives over time in Nequasset Lake, Woolwich, ME. This study also seeks to quantify the baseline fish runs and understand the major environmental and anthropogenic factors that have changed the alewife migration through inorganic and organic methods. This provides insight into the ecological potential of restoring the fish ladder at Nequasset Lake to accommodate baseline fish runs.

Kyoung-June Lee '14

Defining Promise: Optional Standardized Testing Policies in American College and University Admissions

William Hiss, College Advancement, advisor

This study examines the outcomes of optional standardized testing policies in the admissions offices at 33 public and private colleges and universities, based on cumulative GPA and graduation rates. The study also examines which students are more likely to make use of an optional testing policy, and how optional testing policies can offer important enrollment and financial planning benefits. Four cohorts of institutions are examined: 20 private colleges and universities, 6 public universities, 5 minority-serving institutions and 2 arts institutions, with a total of just under 123,000 student and alumni records. Few significant differences between submitters and non-submitters of testing were observed in cumulative GPAs and graduation rates, despite significant differences in SAT/ACT scores. Optional testing policies also help build access to higher education: non-submitters are more likely to first-generation-to-college students, minorities, Pell Grant recipients, women and students with learning differences.

McNally Lee '14 – see Michael Britt '17

Grassroots Initiatives and Educational Equality in Post-Apartheid South Africa

Alexandre Dauge-Roth, French and Francophone Studies, advisor

Lei Lei '14 – see Josephine Davis '15

Modeling Diabetes through Mathematical Estimations

Meredith Greer, Mathematics, advisor

Rachel Levine '15

Nurturing the Whole Body: The Benefits of Supplementing Tuberculosis Chemotherapy with Traditional Chinese Medical Practices

Steven Kemper, Anthropology, advisor

Although modern medicine has found a cure for Tuberculosis (TB), it remains a worldwide health threat. Due to poor adherence to TB chemotherapy, a multi-drug resistant strain of the TB bacteria (MDR-TB) has developed. It has been found that poor adherence is caused by many factors, two of which include the high cost of treatment and the many uncomfortable side-effects. Through a month of research based in Kunming, China, including interviews, observations and surveys, I studied the potential benefits traditional Chinese medicine (TCM) holds for TB patients. TCM improves TB patients' physical and emotional well-being, holding the potential to improve their adherence to TB drugs, reduce relapse rates, reduce costs, and slow down the TB and MDR-TB epidemic. The Chinese medical system deeply separates TCM and Western medical practice and therefore underutilizes the many benefits of TCM in treating MDR-TB. Improved integration of the different approaches in medical training for both TCM doctors and biomedical Chinese doctors, could benefit TB treatment in China and worldwide.

Sarah Logan '14

Intermittent Hyperoxia and the Developing Respiratory System

Ryan Bavis, Biology, advisor

In current medical practice, preterm and extremely low birth weight infants are placed on supplemental oxygen, and frequently experience bouts of intermittent hyperoxia. Published literature has well-documented various adverse consequences of chronic postnatal hyperoxia, such as bronchopulmonary dysplasia, retinopathy of prematurity, and blunted hypoxic ventilatory response (HVR); the purpose of this current study was to assess the effect of intermittent hyperoxia on the HVR. This experiment was performed by exposing 4, and 6-7 day old rats to intermittent 30% and 60% hyperoxia from birth, and by measuring normoxic breathing and response to 12% hypoxia. There was no statistically significant difference in the HVR of treated and control pups at 4, or 6-7 days. This indicates that intermittent hyperoxia, in contrast to chronic sustained hyperoxia, may not provide the sufficient duration of time for plasticity in the peripheral respiratory system to occur.

Scotland Long '14

Christianity and the Inca Past: Writings of Post-Conquest Peru

Claudia Aburto Guzmán, Spanish, advisor

Following the Spanish conquest of the Inca Empire in what is now Peru, the Catholic Spaniards began to impose a new religion on the people who used to inhabit that civilization. Jesuits, and other chroniclers arrived from Spain, trying to document in writing the history of this imperial society that had been previously unknown to the Western world. In spite of the conquest, the Inca continued to maintain a deep interest in their cultural inheritance, especially their myths, language, political organization, and intellectual achievements. Peruvian intellectuals had to justify an ongoing connection to the past that transcended a simple documentation of Inca history. Writers such as Guaman Poma de Ayala and Garcilaso de la Vega were forced to ask themselves how converting to a new religion changes one's relationship to the past. With this question in

mind, the Inca writers expressed their worldview through the media of their conquerors, namely the Spanish language, the written word, and Christian belief.

Lindsey Loy '14

When Eating Healthy Becomes Unhealthy: Exploring the Definitional Aspects and Distinguishing Factors of Orthorexia Nervosa

Susan Langdon, Psychology, advisor

Originally theorized by Bratman (1997), orthorexia is characterized as an inflexible obsession with healthy foods and healthy dieting. While orthorexia has garnered recent attention in the field of psychology, it has yet to be comprehensively researched, understood, and psychometrically measured. Many psychologists contend that orthorexia is not a legitimate psychological disorder, claiming that the apparent comorbidities with other pathologies constrain its legitimacy as a separate, uniquely diagnosable disorder. To further add to the understanding of orthorexia, the current study investigates the unique definitional aspects of orthorexic tendencies. Additionally, the relationships between orthorexia and other psychological disorders/issues are explored to determine how orthorexia can be delineated as a separate pathology. We developed items for an orthorexic scale, necessary for analyzing how orthorexia is associated with existing eating disorders, obsessive-compulsiveness, and poor body image issues. Together, these diagnostic scales were comprised in a single survey, which was administered to students at private liberal arts colleges in the Northeast. Research findings from these data indicate that while orthorexic tendencies are related to a presence of anorexic, obsessive-compulsive, and poor body image, these traits do not entirely account for the definitional and diagnostic aspects of orthorexia. We conclude that orthorexic tendencies have unique manifestations of psychological dimensions, ultimately suggesting that orthorexia could have a pathological nature. Further research on orthorexia is necessary to legitimize orthorexia as a separate psychological disorder.

Emmaleigh Loyer '14

An Investigation of the Trends of Neural Noise and Its Potential Role in the Impairment of Attentional Brain Circuitry

Jesse Bengson, Psychology, advisor

Several of the causal factors contributing to Attention Deficit Disorder (ADHD) remain unknown, leaving many struggling with the neurodevelopmental disorder. Past electroencephalographic (EEG) studies have suggested that a functional disconnect within attentional brain networks may underlie the generation of abnormal behavior exhibited by individuals with ADHD. In this study, a novel computational data analysis technique was utilized to evaluate the EEG activity recorded from subjects with and without attention deficits in an experiment conducted by Mazaheri et al. in 2010. The slope, $1/f$, relating frequency to power, was calculated for all participants as they performed a cross-modal attention task. Contrary to the initial hypothesis, a flatter slope was found at all electrodes sites for participants in the typically developing group. It is suspected that the greater brain variability observed in typically developing children allows them to dynamically adjust to stimuli presented in the cross-modal attention task. It is further hypothesized that the lack of variation found in the brain signal of ADHD subjects may be due to a delay in brain maturation.

Emma Lutz '15

Baseline Assessment of Early Childhood Caries and Malnutrition, Cusco, Peru

Karen Palin, Biology, advisor

Early Childhood Caries (ECC) poses a serious disease burden to children worldwide. Systemic side effects of caries include pain and inflammation that significantly lower quality of life. While treatment is expensive, ECC can be successfully prevented with simple interventions such as nutrition and oral health education, tooth brushing, and fluoride varnish application. In Peru, the rate of this childhood disease is high and its nature is rampant, but little effort has been made to address this problem through prevention, especially among young children. This study assessed the prevalence and severity of ECC, mouth pain, and malnutrition among children aged 0-6 in four communities around Cusco, Peru. It also evaluated the risk factors for these outcomes, including parents' socio-economic-status and oral health, dental hygiene practices, consumption of sugary snacks, and access to dental care. A second objective was to assess parents' knowledge and attitudes about ECC and malnutrition, as well as the level of interest among parents and community leaders for developing a future preventive intervention based on oral health and nutrition education by community health workers and fluoride varnish application on children aged 0-6.

Clara Maeder '14

La Educación para la Liberación: The Chilean Student Movement in 2011

Stephen Sawyer, Office of Off-Campus Study, advisor

In 2011 a historic period of student demonstrations known as the Winter of Discontent began in Chile. I witnessed these demonstrations when I studied abroad in Chile in 2013 and revisited Chile last fall. Although these student actions were not unprecedented, they had not occurred since the Pinochet dictatorship. My thesis investigates why these events took place in 2011 and what these events tell us about broader social movement and contentious politics patterns in Latin America in periods following dictatorships. My research shows that the 2011 events were rooted in a history of tensions around economic and education inequality in Chile, and that the organizations and networks that enabled students to mobilize effectively during the Winter of Discontent date back to the 1950s. I argue that it was President Piñera's election in 2010 that gave rise to a series of political opportunity structures for the movement to resume contentious action.

Mariya Manahova '14

How Do We Visually Perceive Objects?

Todd Kahan, Psychology, advisor

This series of experiments examined how people perceive objects visually. Object features (e.g., color, orientation, motion) are processed in different brain areas but then are somehow bound to form a unified object representation. It is hypothesized that feedback processes in the brain help in the formation of an object representation. This hypothesis can be tested by employing different types of masking which change the object representation at different stages of visual processing. Comparing the effects of different masking types on the object representation can elucidate how feature binding happens and whether reentrant processes are necessary for binding. I tested this by studying the binding of color and orientation. My results offer intriguing implications for object recognition theories and inform us about the ways in which we perceive the world.

Michael Martin '14

Effects of Di-(2-ethylhexyl)-phthalate (DEHP) and Mono-(2-ethylhexyl)-phthalate (MEHP) on the Embryos of Zebrafish (Danio rerio)

Larissa Williams, Biology, advisor

Phthalates, common phthalic acid esters used to improve plasticity in consumer products, are contributing to the toxicity in the environment. One of the most commonly used phthalate esters di-(2-ethylhexyl)- phthalate (DEHP), a polyvinyl chloride (PVC), and its hydrosylated metabolite mono-(2-ethylhexyl)-phthalate (MEHP) have been publicized to cause adverse developmental effects in animals, including humans. While the exposure to DEHP and MEHP has been studied in adult models, exposure during embryonic development to the chemicals is essentially uncharacterized. Zebrafish embryos, up to 96 hours post fertilization, were analyzed for change in morphology and gene expression post-exposure to DEHP and MEHP.

Talia Mason '15

Repetition: Investigating Artistic, Musical, and Choreographic Methodologies

Rachel Boggia, Dance, advisor

I explore repetition through the lens of postmodern choreography and music focusing on composer Steve Reich and choreographer Anne Teresa De Keersmaecker's collaborative partnership, specifically *Fase, Four Movements to the Music of Steve Reich* (1982). I will argue that repetition can transgress traditional values of performance, forcing audiences into the realm of discomfort and discovery. I will discuss the impact of this research on my solo, (*Écho*) () (), which is featured in the Spring Dance Concert.

Jane Mayer '14

Neurocinematics: An Empirical and Theoretical Investigation of Visual Attention and Event Segmentation during Dynamic Scene Viewing

William Seeley, Philosophy, advisor

Empirical studies have identified cognitive and affective processes as key, influential components of human perception; yet, an understanding of the complex relationships underlying perception in the context of everyday life has been impeded by methodological constraints. Recent research indicates that the utilization of movie stimuli provides a more naturalistic method for studying perceptual processing. Endowed with the ability to control the presentation of information, and thus develop and manipulate perceptually salient information, movie stimuli provide an accessible way to understand the interrelations between vision, attention, cognition and affect. This meta-analysis focuses on the ecological value of movie stimuli in understanding the perceptual processing of spatiotemporal sensory information. Of specific concern to this discussion is the modulation of spatiotemporal perceptual processing via exogenous and endogenous influences. The perceptual processes involved in i) visual attention and ii) the segmentation of events' temporal structure will be the focus of this paper.

Collin McCullough '14 – see Andrew Goldfarb '14

Literary Reading by Creative Thesis Writers

Robert Farnsworth, English, advisor

Kaitlin McDonald '14

What Should We Call Me?

Emily Kane, Sociology, advisor

My thesis combines gender, the sexual culture on campus, and

everyday language college students use to discuss these topics. I explore the question: "What are the social forces that influence the perceptions of heterosexual college women's sexual behavior?" By, putting sexual behavior in the context of the virgin-whore dichotomy, I was able to identify peer pressure/first-year college transition, sexual agency, hookup culture, and the role of alcohol as the social forces that impede sexual behavior. Though this research topic could be considered within the LGBTQ community, this study is geared toward understanding heterosexual relations.

Alexander McKenzie '14 – see Mildred Aroko '14
The Highs and Lows of My Study-Abroad Experience in 6 Mins. and 40 Secs.
David Das, Office of Off-Campus Study, advisor

Emily Meade '14
The Economic Cost of Childhood Lead Poisoning in Maine
James Hughes, Economics, advisor

This study estimates the cost of childhood lead poisoning in Maine for seven birth cohorts from 2006 through 2012. By using individual blood lead test results collected by the Maine Department of Health and Human Services, both aggregate and individual costs can be calculated. These aggregate estimates are then used to calculate the return on investment that the State's Lead Poisoning Prevention Programs have created by their work to reduce the blood lead exposure of children in Maine. Over seven years, the economic cost of lead poisoning for each yearly cohort of children has been reduced by \$293,699,852, or, yielding a return on investment of 1640%.

Kathryn Meade '14
The Relationship between Self-Efficacy and Performance Satisfaction: An Investigation of Labor Method, Childbirth Satisfaction, and the Cold-Pressor Task
Amy Douglass, Psychology, advisor

Two studies explored the relationship between self-efficacy and performance satisfaction. It is important to research the factors that are associated with satisfaction because of its developmental, cognitive, and emotional outcomes in a wide variety of contexts (Walters et al., 2000). Study 1 used a sample of primiparous women (N = 31) recruited from childbirth education classes at Maine Medical Center in Portland, ME, to examine how prenatal self-efficacy and labor method interact to affect childbirth satisfaction. Study 2 used a sample of undergraduate students (N = 75) at Bates College in Lewiston, ME, to examine how self-efficacy is related to pain tolerance and how these variables interact to affect performance satisfaction. Data from both studies show a trend toward a relationship between self-efficacy and performance satisfaction. In Study 1, women who had low prenatal self-efficacy felt marginally more satisfied with their childbirth experience when their birth plan matched their actual labor experience, however women with high prenatal self-efficacy were equally satisfied regardless of whether their experience matched their labor plan. Similarly, in Study 2, participants with low pre-task self-efficacy felt marginally more satisfied with their performance on a cold-pressor task the longer they kept their hand in the water, however for participants with high pre-task self-efficacy, their satisfaction was unrelated to their performance. These data suggest interventions to increase self-efficacy may be useful tools for enhancing performance satisfaction.

James Meyo '14 – see Yuying Chen '16
Transcriptional Regulation of the Nuclear Factor Erythroid-2-related Factor (nrf) Family by the Aryl Hydrocarbon Receptor (AHR)
Larissa Williams, Biology, advisor

Meredith Miles '15 – see Mildred Aroko '14
The Highs and Lows of My Study-Abroad Experience in 6 Mins. and 40 Secs.
David Das, Office of Off-Campus Study, advisor

Ali Millard '14
The More the Merrier: An Exploration of the Effectiveness of Using Foreign Supernatural Agents as Methods of Compensatory Control
Helen Boucher, Psychology, advisor

According to the compensatory control model, when individuals are in a state of "control threat," i.e., when they feel that they lack personal control over a situation, they are motivated to seek external or, compensatory sources of control. God is a particularly strong source of compensatory control. Thus, in moments of control threat, people are more likely to believe in the controlling power of God (Kay et al., 2008). This study is examining whether foreign supernatural agents, agents that are outside of a person's religious tradition, can also serve as sources of compensatory control. To explore this question, we conducted two experiments on undergraduate students at Bates College. In the first study we began by manipulating participants' feelings of control through a memory task. Half of the participants were thus in a state of control threat while the other half were not. Then, in a procedure similar to Norenzayan and Hansen (2005), we measured how strongly participants believed in the controlling power of a foreign supernatural agent, the Buddha (Buddhist participants were excluded from analysis). The second study was primarily a replication of the first with a few changes to the procedure in places where we identified weaknesses. Overall, we found that individuals in the control threat condition believed in the controlling power of the Buddha significantly more than participants in the neutral condition. This research suggests that when personal control is threatened, people may be willing to look to foreign supernatural agents to provide a source of compensatory control.

Hannah Miller '14
Within the Words of the Mothers of the Plaza de Mayo
Claudia Aburto Guzmán, Spanish, advisor
In 1977 in Buenos Aires, Argentina the Madres of the Plaza de Mayo first stepped into the plaza to strike back against the disappearance of their children. A plethora of literature exists analyzing the nonlinear path these women constructed as their organization evolved, but close readings of their words are rare. In my thesis, I took the academics' arguments about politics, gender, feminism, and social change and incorporated them into a greater conversation about collective identity, solidarity, and the multitude of emotions that provoked their actions. My presentation focuses on a specific section where I dug deep into the mothers' personal words in relation to theories concerning emotions and social protest, the politics of solidarity, and the construction of place and memory. Here I provide a model through which to re-examine what led to that sense of community, internal strength, and urgency that motivated the efforts of these women.

Jillian Miller '14

Testing Propositions of the Blackmail Hypothesis in Birds: Avian Nesting Habits and Conspicuous Egg Coloration

Donald Dearborn, Biology, advisor

The blackmail hypothesis is a proposition regarding the evolution of conspicuous egg coloration in birds. Conspicuous eggs (that is, eggs that don't match their background in coloration or pattern) are thought to be more costly because they increase the risk of predation and brood parasitism. The hypothesis proposes that females lay conspicuous eggs to coerce the male into providing better parental care to offset these increased risks. Males may share in incubation or feed the incubating females, ensuring that the colorful eggs are left unattended for a minimal amount of time. I am testing two predictions of the blackmail hypothesis; (1) parents in species with conspicuous eggs should spend more time concealing their eggs and (2) across species of cowbird hosts, the difference in the number of host eggs in parasitized and unparasitized nests should be smaller in species with conspicuous eggs. (This is because parents should increase attendance at nests with conspicuous eggs, thereby preventing cowbirds from removing host eggs from these nests.) To test these predictions I used Adobe Photoshop and ImageJ to analyze the photos from the Peterson Field Guides of Eastern and Western Birds' Nests by Hal Harrison in terms of conspicuousness by looking at the contrast between nest appearance and egg appearance using grayscale luminance and color measurements. I examined the level of parental care and incubation patterns of males and females in species with conspicuous eggs compared to species with inconspicuous eggs. I then examined the number of host eggs in parasitized nests with conspicuous eggs compared to parasitized nests with inconspicuous eggs, followed by the number of host eggs in unparasitized nests with conspicuous eggs compared to unparasitized nests with inconspicuous eggs.

Max Millslagle '17 – see Patrick Griffin '17

The Symbolism of J. R. R. Tolkien: Reading the Lord of the Rings

Sylvia Federico, English, advisor

Hannah Mitchell '14 – see Elizabeth Baird '14

Research and the Public Good

Darby Ray, Harvard Center for Community Partnerships, advisor

Heather Monty '14

Understanding the Gendered Construction of Birth among the Amish in Lancaster, PA

Heather Lindkvist, Anthropology, advisor

This thesis explores Amish cultural constructions of childbirth. How is knowledge about childbirth from one generation to the next transmitted and how does this process construct gender expectations during pregnancy and birth? Fieldwork among the Amish serves as the foundation while feminist anthropology and the theory of authoritative knowledge guide this analysis.

Amanda Moore '14 – see Joaquin Espinosa '16
Sexual Orientation Policies and Perspectives in Uganda and South Africa

Alexandre Dauge-Roth, French and Francophone Studies, advisor

Easton Morang '14

The Functions of Reference and Cultural Capital in Hip Hop

Dale Chapman, Music, advisor

One of hip hop's most salient defining traits is its highly intertextual nature. Rap songs are constantly pointing outside of themselves toward various aspects of the broader culture at large. These references could take on any of numerous forms, which range from musical samples to lyrical quotations. Such references function by drawing upon the value or "cultural capital" of preexisting ideas and images. Through the act of reference, this cultural capital may then be redirected toward the development of a new concept. I examine the ways in which several hip-hop artists, like Jay Z and the Wu-Tan Clan, use reference to establish a coherent identity by situating it among social, economic, and cultural developments.

Nathan Moreau '17 -- see Patrick Griffin '17

The Symbolism of J. R. R. Tolkien: Reading the Lord of the Rings

Sylvia Federico, English, advisor

Wil Muller '14

Images of the 2004 Eastward Expansion of the European Union in the German Press: A Case Study of Poland

Jakub Kazecki, German and Russian Studies, advisor

This study analyzes how the German public opinion was shaped by the press reports of the integration process of Poland into the European Union, as presented in three weekly newspapers: FOCUS, Der Spiegel, and STERNI from 1994 to 2004. In order to understand the implications of the formal access to the European Union in 2004, I offer a brief history of the geopolitical relations between Germany and Poland following World War II, and examine the progression of Poland's integration preceding its access to the European Union between 1989 and 2004. Prior to the finalization of Poland's membership into the European Union, European policy makers – primarily the institution responsible for European integration (the European Commission) – raised questions about Poland's fulfillment of all criteria requisite to join the union. Would Poland's economic transition from a communist, state-controlled market to a liberal market economy meet the standards established by the European Union? If a country were not able to fully liberalize its market and produce goods competitive with other European lands, the influx of foreign investment and goods could cripple the burgeoning free market. The sentiments shared by policy makers were echoed by the three publications. After opening negotiations with the European Union in 1994, the further liberalization of the Polish economy was chronicled by the three weekly publications. This study finds that the press' presentation of the integration mirrored the concerns issued forth by the governing bodies of the European Union.

Sarah Murphy '14

A Comparison of Two Sanitation Methods for Stainless Steel Test Thermometers Used in Institutional Food Service Departments

Lee Abrahamsen, Biology, advisor

Test thermometers are routinely used to measure commercial food temperatures to minimize microbial growth. In order to avoid cross-contamination with bacteria and allergens between tested foods, it is important to disinfect the device between food samples. The generally accepted cleaning method is vigorous scrubbing of the thermometer probe with 70% isopropyl alcohol wipes. The CleanTEMP system is a new product that instead

uses a standard sanitizing solution, quaternary ammonium compound, in which the thermometer is stored. This represents a cheaper, more convenient, and less waste-generating method. Recently, the accepted cleaning system for stainless steel test thermometers approved by the National Association of College and University Food Service (of which Bates College is a member) has come into question. This thesis will provide information to Dining Services to help the staff in Commons decide what disinfection protocol to employ in order to minimize thermometer transfer of bacteria and allergens.

Sean Murphy '15 – see Mildred Aroko '14

The Highs and Lows of My Study-Abroad Experience in 6 Mins. and 40 Secs.

David Das, Office of Off-Campus Study, advisor

Gabrielle Naranja '14

I Kissed A Girl...Did I Like It? Understanding the Role of Sexual Attitudes and the Media on Perceptions of Girl-on-Girl Kissing

Kathryn Low, Psychology, advisor

Research suggests that girl-on-girl kissing between women who identify as heterosexual has increased on college campuses and in the media (Yost & McCarthy, 2012; Diamond, 2005). The present study will attempt to determine whether men and women differ in their comfort and arousal levels in response to a same-sex kiss, and whether their comfort and arousal levels are mediated by their sexual attitudes. Approximately 100 students (50 men and 50 women) will complete an online survey including demographics, the Brief Sexual Attitudes Scale (BSAS), and questions on a vignette describing either two women kissing or two men kissing. The predicted findings include: 1) a difference between men's and women's comfort and arousal ratings when observing same-sex kissing, depending on the kissers' gender and 2) participants with more liberal sexual attitudes will have higher comfort and arousal ratings when observing a same-sex kiss.

W. Parker Nelson '17 – see Patrick Griffin '17

The Symbolism of J. R. R. Tolkien: Reading the Lord of the Rings

Sylvia Federico, English, advisor

Mitchell Newlin '17, Briana Silva '17, and Jessica Wilson '17

Impact of Colonialism on Education in Kenya

Patricia Buck, Education, advisor

What are the lasting colonial legacies/impacts on the systems and ideologies that shape Kenyan education today? From the late 1800s until the country gained independence in 1963, Kenya was colonized by the British Empire. During this colonization, Western values, ideologies, and beliefs were imposed on educational systems in Kenya. Today, this colonial influence can be seen impacting education through many lasting colonial legacies. These legacies include the undertones of Christian religion apparent in Kenyan classrooms and, most prevalently, altering Kenyan ideology from a communal-based, wealth-in-people mentality, to a more competitive and individualized structure. We examine Kenyans' perspectives in these legacies and lasting impacts.

Bong Nguyen '14

The Influence of Stereotyping in the Judicial System

Jill Reich, Psychology, advisor

Previous research has indicated that stereotypes influence

people's judgments of crime sentences that can be detrimental for the defendant. Sunnafrank, M. U., & Fontes, N. E. (1983) found that certain crimes are more likely to be associated to certain races. For example, participants mostly associated the crime of burglary with Blacks while the crime of embezzlement was mostly associated with Whites. Gordon, R.A., Bindrim, T.A., McNicholas, M. L., & Walden, T.L. (1988) demonstrated that these associations are correlated with more severe punishment for both White and Black defendants. That is defendants who committed a crime that is mostly associated with their race received longer jail sentences. Eberhardt, J. L., Davies, P. G., Purdie-Vaughns, V. J., & Johnson, S. L. (2006) described another influence of stereotypes on death penalty judgments. They illustrated that Black defendants who were rated to be more stereotypically Black (big nose, thick lips, etc.) were more likely to receive the death penalty but only when their victim was White. They explained that this was because the defendant's stereotypical Black features made race salient and jurors used race as useful heuristics for their decision making. Based on these two studies, the current study will examine the effect of Black-stereotypical crimes and Black-stereotypical features on participants' judgment of a Black defendant's guilt. In addition, the study will also measure participant's confidence in their judgment and the severity of punishment they believe to be appropriate for a Black defendant. Based on earlier research, results can be expected to indicate that Black defendants with more stereotypical Black features who committed a Black stereotypical crime will receive the most number of guilty sentences with participant's highest confidence rate in the decision. Moreover, these Black defendants will probably also receive the most severe punishment measured in the amount of bail and length of jail sentences.

Camilla Nivison '14

Population Genetics of Invasive European Green Crab in the Gulf of Maine

Larissa Williams, Biology, advisor

Invasive species pose one of the four greatest threats to biodiversity of the world's oceans. The European green crab, *Carcinus maenas*, is one of the most successful invaders. It first arrived to the East Coast in 1817, and subsequently spread north along the coast. The past few years have seen a surge in the abundance and destructive behavior of *C. maenas* from Long Island to Nova Scotia, which may reflect a new strain of *C. maenas* introduced into the region from Northern Europe. As a marker of genetic diversity and gene flow between populations, I studied haplotypes caused by silent mutations of the mitochondrial cytochrome c oxidase I (COI) gene. Prior to 1980, individuals from Canada had the haplotype of the southern populations, however 1980, this region had many new haplotypes, which were all present in European populations, indicating recent additional invasion events to the Canadian coast. The most recent genetic study shows the northern haplotypes present in only the most northern of the Maine sites, however it is based on crabs collected in 2007, giving ample time for further movement of the northern strain South along with the prevailing currents. In my study, I analyze the COI haplotypes to elucidate the current spread of the northern strain and the population structure of the species in the Gulf of Maine.

Tara Notarianni '14

E6AP/UBE3A-Catalyzed Ubiquitylation of EMCV E3 Protease

T. Glen Lawson, Chemistry, advisor

The 3C proteases of encephalomyocarditis virus (EMCV) and

hepatitis A virus (HAV) are rapidly degraded by the cellular ubiquitin-26S protease system, which limits the 3C protease concentration that develops in infected cells. At least one UbcH7-dependent ubiquitylation pathway has been discovered that is important for EMCV replication success determination. To identify the UbcH7-dependent E3 ubiquitin-protein ligase(s) involved in tagging the 3C proteases for destruction, a protein purification scheme has been developed that begins with mouse cell lysate and ends with a ubiquitin-UbcH7 affinity column. Analysis by mass spectroscopy of the proteins eluted from the affinity column revealed the presence of four E3s, one of which is the HECT E3 E6AP/UBE3. The ability of this E3 to recognize the EMCV 3C protease as a substrate was confirmed using reconstituted mixtures containing purified E6AP. The major product of these reactions was monoubiquitylated 3C protease, with little polyubiquitylation being evident. Whether this accurately reflects E6AP action in vivo remains to be determined, but it is possible that E6AP must function with other E3s to catalyze 3C protease polyubiquitylation in infected cells. Both UbcH7 and UbcH5 support E6AP-catalyzed EMCV 3C protease ubiquitylation. The HAV 3C protease was discovered not be an E6AP substrate, indicating specificity in the association of E6AP with the EMCV 3C protease.

Jacqueline Ordemann '15

Motorcycle Safety in Rural Thailand

Stephen Sawyer, Office of Off-Campus Study, advisor

Thailand is ranked first in the world for annual motorcycle-related deaths. There is a particularly high rate of incidences among the rural poor. In the village of Lawa Lake, located in Northeastern Thailand, 50 community members were surveyed about helmet use, drunk driving, underage driving, knowledge of road rules, prevalence and cause of accidents, and opinions of road safety in the village. Additionally, 551 motorcycles were observed and helmet use, number of passengers per motorcycle, and approximate age of drivers were recorded. We found helmet use, reckless driving by teenagers, and poor road conditions were the main problems in the village. Additionally, most villagers reported that road safety is a major concern and that improvements need to be made. These results were used to inform a modest intervention to improve road safety in Lawa Lake.

Rebecca Otley '14

Kinetic and Product Determination of Phenylpropanoid Glycoside Analogs with DPPH

Jennifer Koviach-Côté, Chemistry, advisor

Kinetic and Mechanism Determination of Phenylpropanoid Glycoside Analogs with 1,1-diphenyl-2-picrylhydrazyl Phenylpropanoids, naturally occurring compounds, are radical scavenging antioxidants. Free radicals in biological systems have been linked to diseases like Alzheimer's and Parkinson's as well as many cancers, cardiovascular and inflammatory diseases, making the study of antioxidants a growing area of research. Phenylpropanoids belong to the largest group of secondary metabolites, non-enzymatic free radical scavengers. Phenylpropanoids make up a subset of phenylethanoids, characterized by a hydroxyphenylethy group linked to a glucopyranose core through a glycosidic bond. Phenylpropanoids more specifically have one or more phenylpropyl (PP) groups as substituents. For the purpose of this study the focus has been placed on analogs with caffeic acid as the PP substituent. The antioxidant ability is measured spectrophotometrically through a DPPH assay. Preliminary

kinetics showed an extremely rapid first step leading us to use a SFA-20 Rapid Kinetics Stopped-Flow Accessory. The stopped-flow accessory allows spectrophotometer reading to be recorded while the two reactants are mixed, making kinetic data extremely accurate. When complications in the stopped-flow compromised its ability to produce significant data the focus was shifted toward determining the products of the DPPH assay. It is the hope that products determination will shed light on the mechanism of this free radical scavenging reaction.

Marisa Palacio '14

The Relationship between Hypoxia and Chemoresistance in Leukemic Cells

Stephanie Richards, Biology, advisor

Multi-drug resistance (MDR) resulting in failed chemotherapy treatments was found in 33% of acute myeloid leukemia (AML) patients younger than 56 and in 57% of patients older than 75. MDR can be explained as the cross-resistance or insensitivity of cancer cells to cytostatic or cytotoxic actions of various anticancer drugs that have target different molecular pathway points. This has posed a problem for many patients with hematological malignancies and has become a serious issue in the treatment of AML. Hypoxia is emerging as a common obstacle for cancer treatment and understanding the role of hypoxia in chemotherapy resistance is critical. The effect of the hypoxic bone marrow environment on the failure of chemotherapy treatment in killing leukemia cells is of growing interest. The purpose of this study is to explore the effects of hypoxia on AML cell lines' response to treatment with different mTOR pathway and MAPK/ERK pathway inhibitors.

Matthew Perejda '14, William Pollard '14, and

Ansel Tessitore '14

A Declaration on Vaccination Relations

Meredith Greer, Mathematics, advisor

Recent vaccine frights and demand spikes serve as a reminder of the correlation between vaccination programs and the public's perception of vaccination. Previous work substantiates the claim that the propensity of individuals to optimize self-interest often serves as a catalyst for suboptimal, communal-vaccination levels. This paper utilizes a game theoretical approach that relates population-level demand for vaccines to decision making by individuals who possess a variegated sets of beliefs about the costs and benefits of vaccination and infection. The paper continues to couple these game models with standard epidemic models to show a dichotomy in the result set; it is shown that the population's pursuit of self-interest often leads to stable-dynamics but also has the potential to lead to oscillations in vaccine uptake over time.

Emma Perkinson '14

Mothers, Homemakers, and Moral Keepers of the American Race: An Exploration of Women's Negotiation, Consumption, and Engagement with the American Eugenics Movement 1900-1930

Melinda Plastas, American Cultural Studies and Women and Gender Studies, advisor

Eugenics, the crusade to strengthen family and save civilized America from "race suicide" through the regulation of motherhood, emerged in the United States as a cohesive movement in the early 20th century. The eugenics movement and the coinciding development of eugenic feminism have largely been studied. Where analysis is lacking, however, is the role of women who were unattached to the official, organized

groups in early 20th-century America. How did these women participate in the establishment of eugenic ideas as a popular social and cultural norm in the period from 1900 to 1930? This thesis will study the dissemination of eugenic ideas to women beyond the formal structures of eugenic feminism by analyzing the presentation of eugenic topics in popular women's journals and magazines, two major newspapers, and at state fairs. Using these three media to gauge popular culture in the early 20th century, this thesis will demonstrate how white middle-class homemakers negotiated, consumed, and engaged with eugenic ideas. This thesis will explore how print media informed the thoughts of American women and the actions they took in public spaces in response to eugenic messages. Through this study we can understand the movement's powerful appeal to this generation of women to be the mothers and moral keepers of the "American race."

Students in Politics 215, Political Participation in the United States

Political Participation in the United States Engaging with Maine: Documentaries on Ten Political Organizations

John Baughman, Politics, advisor

Much of our political process occurs through political organizations that mobilize voters, promote issues, and lobby legislators. Students in PLTC 215 investigate ten Maine-based groups through short documentaries to understand how and why they do what they do to shape our politics. The organizations range in political outlook from the Maine People's Alliance to Maine Heritage, from Maine-specific groups like the Maine Women's Lobby to chapters of large national organizations like the Maine Civil Liberties Union.

William Pollard '14 – see Matthew Perejda '14

A Declaration on Vaccination Relations

Meredith Greer, Mathematics, advisor

Simone Prioli '14

Are Emotion-Laden Words Identified More Easily than Non-Emotional Words When Seen in Continuous Flash Suppression?

Todd Kahan, Psychology, advisor

The visual processing system in the brain can be separated into the ventral or "what" pathway and the dorsal or "where/how" pathway. Researchers have used a technique known as Continuous Flash Suppression (CFS) in order to separate these pathways into two distinct regions. Under this tactic, the ventral stream is suppressed while the dorsal route is able to express activity and visually process a given stimulus. Further research on this topic has led to evidence showing that the dorsal stream has faster reaction times to negative human facial expressions than positive emotions (Yang et al., 2007). In addition, the capture of attention by negative stimuli may also occur for negative emotion-laden words. A study by Yang and Yeh (2010) found that negative words required a longer time to release from suppression than did neutral words. The current experiment found that under CFS, participants took longer to detect negative words over positive and neutral words. However, in the control experiment, there was no significant difference in the time it took viewers to detect negative, positive, and neutral words. This supports that the discrepancy in reaction time is due to the CFS paradigm.

Krista Prouty '15 – see Cameron Griffin '15

Visual Narratives of Lewiston

Myron Beasley, American Cultural Studies and African American Studies, advisor

Sarah Ratsimbazafy '17 – see Connor Bair-Cucchiario '15

HIV/AIDS in Botswana and the Effects of President Bush's

Emergency Plan for AIDS Relief

Patricia Buck, Education, advisor

Matthew Record '14

Measuring the Performance of Photo-Voltaic

Panels and Materials

Mark Semon, Physics and Astronomy, advisor

For my senior thesis I am designing a house that runs completely off the electrical grid and relies solely on renewable energy sources to power it. Recent advances in photovoltaic (PV) materials have resulted in PV systems being the most efficient and practical way to deliver electrical power to an off-grid house. There are three kinds of solar panels which are commercially available: those made of monocrystalline materials, those made of polycrystalline materials and those made of amorphous materials. In my thesis I measure various properties of these three kinds of panels under various conditions in order to determine which kind of panel would be the best for providing residential power.

Emma Reichart '14

The Videotape Inoculation Technique: Eyewitness Self-Awareness and the Post Identification Feedback Effect

Amy Douglass, Psychology, advisor

There have been extensive research efforts in the field of legal psychology to better understand eyewitness identifications in our criminal justice system. Previous research by Wells and Bradfield (1998) revealed a robust post-identification feedback effect on eyewitness confidence. Essentially, it was found that post-identification feedback inflated eyewitness confidence reports. The current study, as a methodological adaptation from previous thesis projects, explored whether videotape inoculation (viewing a video of an eyewitness's own identification process) could reduce the post-identification feedback effects on decision certainty. It was predicted that using the videotape inoculation technique in eyewitness identifications would significantly reduce the enhancing effects of the confirming post-identification feedback.

Curtis Rheingold '14

Investigation of an Opioid Antagonist on Rat Olfactory Social Memory

Jason Castro, Psychology, advisor

Rat social interactions are mediated by chemical signals called pheromones that can convey unique information about each rat such as age, gender and mating status. The neural circuitry of pheromonal detection and interpretation is mainly localized to a brain region called the accessory olfactory bulb (AOB). Several studies have shown that the AOB contains receptors for a class of neuropeptides called endogenous opioids, but the function of opioids in pheromonal processing is unknown. This project investigated the role of opioid transmission in pheromonal-dependent social memory. Naloxone, a drug that blocks the effects of opioids, was injected directly into the rat AOB. Comparing results from rats with blocked opioid signaling to unaffected control rats may allow for a better understanding of the role of opioids in rat olfactory social memory.

Caroline Richards '14 – see Josephine Davis '15
Modeling Diabetes through Mathematical Estimations
Meredith Greer, Mathematics, advisor

Deanna Rivkin '14
An Analysis of Transmedia Storytelling in Contemporary Webseries

Stephanie Kelley-Romano, Rhetoric, advisor
Web shows are taking over. Stories are no longer confined to one medium any more, and transmedia has become the new trend. This thesis presentation examines the concept of transmedia in relation to webseries with emphasis on its possibilities as a new form of narrative storytelling. I analyzed the webseries, *The Lizzie Bennet Diaries*, a modern online adaptation of Jane Austen's beloved novel, *Pride and Prejudice*. The thesis itself is also a transmedia experiment, utilizing blog, social media, and video as the primary platform for analysis. It is an innovative attempt to break out of the traditional boundaries and modes of thinking that are standard in schools today. It may pave the way for future online projects.

Rebecca Rosen '14 and Madeline Smit '14
Organizing Exhibitions in Academic Museums: The Role of a Curatorial Intern

William Low and Anthony Shostak, Bates College Museum of Art, advisors
Our presentation focuses on our time spent interning at the Bates College Museum of Art and how our pre-professional training and academic coursework have led to our interest in curatorial studies. We will discuss the process of researching, selecting, and installing two exhibitions, *Remix: Selections from the International Collage Center* and *Polish Poster: Art and Allusion*. We will reference prior internships and employment and how these experiences have prepared us for our independent curatorial projects at Bates. The conversation will also include our evolving plans for future careers in the art world.

Aisling Ryan '14 – see Elizabeth Baird '14
Research and the Public Good

Darby Ray, Harvard Center for Community Partnerships, advisor

Zena Sabath '14
Synthesis of Novel Phenylpropanoid Glycosides and Determination of Radical Scavenging Activity in vitro and in vivo

Jennifer Koviach-Côté, Chemistry, advisor
Free radical scavengers protect against molecular decay. While still a far cry from a fountain of youth, many newly-discovered compounds provide mechanisms which terminate otherwise endless series of reactions known to cause cellular damage and tissue necrosis. This thesis characterizes the influence of catechol-O-methyl transferase on the radical scavenging activity of novel phenylpropanoid glycosides in vivo. To do so, the antioxidants were first synthesized and tested for radical scavenging activity in vitro using a DPPH assay. Then, zebrafish embryos (*Danio rerio*, 96 hpf), a model vertebrate organism, were used to gauge in vitro scavenging activity by characterization of morphological and genetic responses in the presence of both the antioxidants and tBOOH. Success of the novel phenylpropanoid as a biological antioxidant in vertebrates will be evidenced by significant ΔA_{517} , as well as decreased expression of Nrf2a induced genes, reduced physiological

deformities, and overall increased survival of the zebrafish embryos.

Rebecca Sale '14
The Musical Emotionality of Baz Luhrmann's Adaptation of The Great Gatsby

James Parakilas, Music, advisor
Films provide an interesting context in which to study the role of music with regard to the human mind. In film, the music is not only handpicked, but placed in precise relation to the film and its narrative. Looking at Baz Luhrmann's 2013 adaptation of *The Great Gatsby*, I explore the role of the film score and the soundtrack within the film. I investigate notions of memory and how the mind can be programmed by classic techniques such as the *leitmotif*. I examine the ways music can evoke emotion through the medium of film, and highlight the importance of the use of music throughout the film.

Jacob Sandor '14
Opioidergic Modulation and Role of the Accessory Olfactory Bulb in Social Recognition Memory in Rats

Jason Castro, Psychology, advisors
For most mammals, social behaviors depend critically on the ability to identify particular kin and conspecifics on the basis of odor cues. Such "recognition memories" are formed in the circuits of the accessory olfactory bulb (AOB), and are potently gated and modified by behavioral state. Here, we were interested in the potential role of opioids in modifying odor recognition memory, owing to the involvement of this transmitter system in a broad range of social behaviors. We tested adult rats on their ability to discriminate between novel vs. previously encountered juveniles, and examined whether focal infusions of morphine, an opioid agonist, to the AOB via implanted cannulas affected recognition memory. Our preliminary results indicate that recognition memory is enhanced with morphine delivery, pointing to a potentially important role of the opioids in olfactory memory and social recognition.

Keyana Sandridge '14
Cationic Cyclodextrins as Chiral NMR Solvating Agents
Thomas Wenzel, Chemistry, advisor

Cyclodextrin is an important chiral NMR solvating agent. Cationic β -cyclodextrin was prepared by reacting neutral cyclodextrin (CD) with (S)-(-)-(3-chloro-2-hydroxypropyl) trimethylammonium chloride (S-TMAC). Reaction conditions were varied in order to alter the degree of substitution of S-TMAC units on the cyclodextrin. The neutral CD became considerably more derivatized when tetrabutylammonium iodide (TBAI) was introduced into the reaction mixture as a catalyst. CD derivatives with a degree of substitution as high as 1.7 were synthesized with TBAI. The substituted CD derivatives are to be evaluated as water-soluble chiral NMR solvating agents.

Anabel Schmelz '14
Maine Summertime Blooms: Variability in Populations of Gloeotrichia in Three Maine lakes

Holly Ewing, Environmental Studies, advisor
Gloeotrichia echinulata, a toxic species of cyanobacteria, is present in at least 22 Maine lakes. This study examines *G. echinulata* abundances at 15 sites across three Maine lakes: Panther Pond in Raymond, Pleasant Lake in Casco, and Lake Auburn in Auburn, during summers 2011-13. In 2013, Lake Auburn, consistently the lake with the coolest temperatures and highest chlorophyll a levels, experienced a *G. echinulata* bloom

(median 9 colonies/L) from early July-August, three weeks prior to the major bloom in Panther Pond (median 50 colonies/L). Meanwhile, Pleasant Lake experienced its highest *G. echinulata* levels (0.2 colonies/L) in early September. There was no evidence that within-lake variation in populations at Panther Pond or Pleasant Lake was a result of wind patterns. At Lake Auburn, the sites with the highest *G. echinulata* abundances were in the southeastern end. These southeast sites experienced the highest abundances when sampled within 72 hours of a north-northwest wind ≥ 9 km/h. An in-lake mesocosm experiment in Panther Pond revealed that population growth rates depended on both *G. echinulata* density and the time of year but not the addition of phosphorus. These findings suggest no one major driver or indicator of *G. echinulata* populations but rather a dependence on many factors including the cyanobacterium's life cycle, weather patterns, lake temperature, nutrient levels, and light availability.

Martha Schnee '15 – see Cameron Griffin '15
Visual Narratives of Lewiston
Myron Beasley, American Cultural Studies and African American Studies, advisor

Simone Schriger '14 – see Elisabeth Baird '14
Research and the Public Good
Darby Ray, Harvard Center for Community Partnerships, advisor

Alexandra Sejersted Bodtker '14
Breasts without Borders: A Pentadic Analysis of the Ukrainian Feminist Group Femen

Stephanie Kelley-Romano, Rhetoric, advisor
Many media sources have criticized Femen's use of nudity and how it fits into their ideals as a feminist organization. However, there is a lack of academic literature that analyzes Femen for deeper cultural meaning. This article argues that through a Pentadic analysis, motivations behind Femen's protest can be evaluated as well as their need to deploy nudity as their political medium. Additionally, the Pentad can be used to contextualize Femen within the larger International Feminist Movement. Through this four major conclusions arise about Femen. First, it is dependent on nudity to further their cause. Second, Femen is able to reclaim the female body through the use of strategic visual tactics. Third, Femen fits into the subset of the International Feminist Movement. Fourth, even though Femen fits into the larger feminist movement, its abrasive tactics and disregard for other cultures, hinders the overarching cause of international feminism.

Gabrielle Sergi '14
Stress and Physical Health Behaviors in Parents of Children with Autism Spectrum Disorders

Georgia Nigro, Psychology, advisor
This study investigates how the stresses of raising a child with an autism spectrum disorder are related to specific physical health-enhancing behaviors in parents, such as nutrition and physical activity. Participants are approximately 100 parents of children with autism, ranging in age and symptom severity. Parents complete the Motivators of and Barriers to Health-Smart Behaviors Inventory (MB-HSBI) in order to assess physical health behaviors. Results indicate how the age of the child and severity of symptoms affect levels of healthy eating and physical activity in parents. These findings are of great importance

because physical health is directly associated with lowering the risk for disease and increasing longevity of life.

Albert Shi '14 – see William Green '14
Fair Division of Desirable Commodities
Pallavi Jayawant, Mathematics, advisor

Briana Silva '17 – see Mitchell Newlin '17
Impact of Colonialism on Education in Kenya
Patricia Buck, Education, advisor

Sarah Mae Silverberg '15
The Morphological History of Patella vulgata at Sandwick, Unst, Shetland Islands
William Ambrose, Biology, advisor

The size and density of *Patella vulgata* (common limpet) was investigated along two opposing rocky intertidal shores at Sandwick, Shetland, UK, using photographs taken in 1997, 2012, and 2013. Variation in growth between years was found to be a stronger influence on the limpet size and density than the difference between sites. The observed increase in size structure from 2012 to 2013 could be linked to the decrease in limpet density that year as *P. vulgata* populations have been found to display population regulation by compensating sporadic recruitment success with growth rates. The size of *Patella vulgata* from the 12th to 15th centuries, excavated from a late Norse archeological site at Sandwick, was investigated. The mean *P. vulgata* length in the 12th century was 40.35 +/- 0.53 mm, in the 15th century mean length was 29.20 +/- 0.47 mm, and in 2013 mean length was 30.05 +/- 0.58 mm. The *P. vulgata* from the 12th centuries were found to be larger than those in the 15th century and those in the current population suggesting the current population is under some kind of pressure that results in sizes similar to that of a population under human exploitation.

Noah Sleeper '14
Resources and Identity in the Aroostook Conflict
Joseph Hall, History, advisor

Between 1838 and 1839, the state of Maine mobilized its militia in preparation for waging a war in the interest of controlling the valuable timber and rich farmland located in the disputed borderland that it had shared with British Canada since the Treaty of 1783. Although the war ultimately proved to be bloodless and crisis was averted with the involvement of the federal government, this land and resource dispute came perilously close to igniting a third Anglo-American war. This thesis examines the roots of the conflict, paying particular attention to elements of identity in Maine and British Canada that led to an exacerbation of the conflict beyond the relatively nonviolent border dispute that it had been prior to the Aroostook War. Although the frontier settlers who "fought" the war had had their own share of tensions with rich landowners prior to Maine gaining statehood, it was only after Maine became a state that its inhabitants felt the need to defend the disputed territory in a series of escalating encounters with their British Canadian neighbors. I argue that the Aroostook War came about due to the evolution of the conflict from simply being between frontier settlers over access to white pine and fertile soil to an assertion of power over the resources the disputed territory had to offer between the newly minted State of Maine and her British neighbors.

Madeline Smit '14 – see Rebecca Rosen '14

Organizing Exhibitions in Academic Museums: The Role of a Curatorial Intern

William Low and Anthony Shostak, Bates College Museum of Art, advisors

Conor Smith '14

Operant Novelty and Personality in Canines and Humans

Donald Dearborn, Biology, advisor

Personality factors can influence a wide range of behavioral factors and is responsible for a number of differences between individuals within a species. Personality may also have an effect on the novelty of behavior in the context of operant conditioning. This study investigates the effects personality has on operant novelty in both humans and domestic dogs.

Santina Snow '14

*Factors Affecting mRNA Degradation in *Borrelia burgdorferi*, the Causative Agent of Lyme Disease*

Paula Schlax, Chemistry, advisor

During the transfer of hosts in the enzootic life cycle of *Borrelia burgdorferi*, the causative agent of Lyme disease, changes in environmental stimuli cause a change in gene expression necessary for bacterial survival. An important gene regulatory mechanism is mRNA degradation. In model bacteria such as *E. coli* and *B. subtilis*, mRNA degradation is aided by the endoribonuclease RNase III. In this study, mRNA degradation rates of transcripts encoding RNA polymerase subunits (rpoA and rpoS), a flagellar protein, and a nucleic acid binding protein were measured in a wild-type strain and an RNase III null strain of *B. burgdorferi*. Secondly, this project analyzed degradation rates for mutated leader regions that sterically inhibited the rpoS Shine-Dalgarno sequence exposure in wild-type *B. burgdorferi*. For both experiments, qPCR measured relative mRNA levels at varying time points after transcription was stopped by actinomycin D. In the RNase III null mutants, there was significantly less mRNA decay as compared to the wild-type, indicating a possible role in the mRNA degradation pathway. Secondly, the varying accessibility of the SD sequence resulted in varying rpoS mRNA degradation rates.

Rachel Spence '14

Victorian Sexual Scandals: Understanding the Fragility of Moral Codes and National Reputation

Caroline Shaw, History, advisor

In the Victorian era, sexual scandals threatened the sense of superior morality integral to British national character. This paper uses scandals involving sexual transgressions as a way to study social norms, values, and the impact of their disruption on the upper class, whose position in society made them especially vulnerable to public disgrace. Court reporting made secrecy impossible; newspapers pounced on the sordid evidence from trials involving sexual transgression, specifically adultery and homosexuality, and circulated it. Previous scholarship has dealt with either divorce trials and their disruption of public and private spheres or homosexuality scandals and their threat to masculinity. My thesis brings this scholarship together to question the broader impact of scandals on society. By examining editorials about these trials, I show the discrepancy between professed beliefs and actual behavior. I further explore how scandals necessitated punishment of transgressors in order to protect vulnerable moral codes.

Kara Stefaniak '14

Consequences of Concussions at Bates College: Awareness, Incidence, Reporting, and Impact on Student Daily Life

Karen Palin, Biology, advisor

Recent research shows that at least 5-10% of college athletes will experience a concussion in any given sport season, and concussions are one of the most common injuries in college sports. This study focuses on the issue of concussions among students at Bates College. I assess students' awareness of concussions, identify specific risk factors, determine concussion incidence, and examine the discrepancy between reported and unreported concussions. This study also examines the effects of having multiple concussions, and how ongoing symptoms continue to impact students' lives. Data are collected via an online survey, as well as through interviewing volunteers to discuss how concussions have impacted their daily lives.

Fiona Stuart '14

Exploratory Evaluation of the Purposeful Work Infusion Project

Jill Reich, Psychology, advisor

As colleges seek to create environments in which students can flourish academically and personally, research has indicated that tailored college courses have the ability to shape engaged learning experiences in ways that enhance student well-being. Bates College's Purposeful Work Infusion Project is an intervention aimed at promoting student well-being through a model that tailors college courses through curricular infusion. The Project exposes students to topics regarding meaningful work, an area of particular interest for college students. This study serves as a pilot test, evaluating the effects of the Purposeful Work Infusion Project on students' levels of engaged learning, flourishing, career decision-making self-efficacy, and career identity development by looking at these measures pre- and post-curricular infusion exercise. The findings of this study will inform the future directions of the Purposeful Work Infusion Project as well as provide insight into the underpinnings of college student well-being.

Sarika Subramaniam '14

The Boston Bombing: An Analysis of Media Framing and Conspiracy

Stephanie Kelley-Romano, Rhetoric, advisor

Since September 11, 2001, much scholarly attention has been paid to the media coverage following terrorist attacks. One salient aspect has been the construction of suspects and the role the media plays in defining and confirming stereotypes based on race, ethnicity, or religion. The recent attack at the Boston Marathon provided another opportunity to examine media coverage and tragedy. National news coverage exploded following the bombing at the Boston Marathon. Continual "on-the-scene" coverage allowed viewers to stay abreast of the latest information in the "man hunt" that ensued as law enforcement worked to find those responsible. In this presentation, based on my thesis work, I explore how the coverage on CNN in the days following the attack engaged tropes of conspiracy to advance a characterization of the suspect(s) as unknowable, affiliated with terror, and foreign.

Ryan Symancek '14

The World of Motorsport Journalism

Michael Reidy, Theater and Dance, advisor

Internet sites such as Youtube are a popular platform for short documentary film viewing today. Automotive review and

adventure shows make up a good percentage of films devoted to motorcars. Some programs follow a basic informational formula, but others hold themselves to a much higher filmmaking standard. I set out to find what makes unique automotive journalism successful by studying films on racing, car history, and car culture, and with this research, I will develop a six-episode webseries documenting my experiences of finding a cheap car and racing it in an event called rallycross. The series will be broadcast worldwide, via the Internet, to enthusiasts who find that the *car* is a character in and of itself. I aim to bring that character to life on screen, and tell a story that could not be told if it were not for good structure and proper planning.

Devin Tatro '14

***Tribe* (TM): An Investigation of Ethnic Agency in Sebei, Uganda**

Loring Danforth, Anthropology, advisor

This thesis investigates the politics of representation, the construction of identity and the marketing of ethnicity for the Sebei people in the Mt. Elgon Region of Eastern Uganda. Specifically, how have perceptions of a "traditional" tribal past changed for the Sebei in our contemporary world? Why are tourists, aid workers, and religious leaders so concerned with preserving cultural tribal heritage? I begin by discussing the scholarly discourse constructing "tribalism" and explain how the Sebei "tribe" becomes a "TribeTM" through "tribal trademarking," developing my concept to describe a complex process of identity construction and commoditization within a "modernizing" African society. Drawing on my ethnographic work from two visits to Kapchorwa and the surrounding Bukwo, Kween, and Sipi Districts in October-December 2012 and May 2013, I proceed to examine a local pursuit to build a regional Sebei "Cultural Center." This case frames my analysis of shared ethnic and cultural heritage as consumable product marketed to tourists and international aid organizations. My thesis questions the notion that ethnic commodification is necessarily debasing and that tourism is inherently destructive: I argue that the Sebei carry great agency within the process of "tribal trademarking," motivated to market their own "peoplehood" as an ethnic brand. This work challenges earlier anthropological literature based on evolutionist study of the Sebei, engaging in representation from a contemporary, relativist perspective.

Ansel Tessitore '14 – see Matthew Perejda '14

A Declaration on Vaccination Relations

Meredith Greer, Mathematics, advisor

Emma Timbers '14 – see Matthew Goldfarb '14

Literary Reading by Creative Thesis Writers

Robert Farnsworth, English, advisor

Sheryl Todman '14

Dying with Support: History Chapter

Jonathan Cavallero, Rhetoric, advisor

Indeed, "anorexia nervosa" as a term is relatively new, but as a clinical entity it can be traced back hundreds of years. During the 12th and 13th centuries, dominant interpretations of self-starvation were religious, particularly in Western Christianity. From the Hellenistic period to contemporary culture, anorexia has moved from religious groundings to a lifestyle choice. Western media has been saturated with images of sociocultural standards of feminine beauty. The preoccupation with food and body shape is widespread among many women. Simultaneously, the incidence of eating disorders is on the rise. These behaviors

have been prompted by many factors including the desire to reach, to some, the unattainable physical perfection that has been idealized. This paves way for the adoption of harmful lifestyles involving disordered eating. As a result, there has been an online presence of young girls seeking emotional support and validation for their lifestyle choice of anorexia nervosa. These communities and movement have come to be known as ProAna or the ProAna Movement. Featuring images from media, often of emaciated figures, these online communities view their lifestyle as a choice rather than a medical disorder.

Emmanuel Toroitich '15

Urban Lead Pollution

Rachel Austin, Chemistry, advisor

Lead poisoning incidences has substantially declined in much of the country, and in much of Maine. Lewiston, however, remains an exception despite much innovative work to develop productive relationship between landlords and tenants and to educate Lewiston residents, especially new Mainers, about the risk of lead exposure and approaches to minimize lead dangers. The reason why Lewiston levels are still high remains the case is still a mystery. The purpose of the study was to investigate the lead levels in soil in Lewiston and relate to blood lead levels and health effects. Elevated levels of lead, above 400 ppm, were found in where buildings were built before 1970's. The results also showed correlation between high lead levels in soil and elevated blood levels in children.

Allison Tsomides '14

Transcriptional Regulation of Nfe2 Suggests Interaction with Hematopoietic/Erythropoietic Pathways in Developing Zebrafish

Larissa Williams, Biology, advisor

Establishment and maintenance of the blood system relies on self-renewing hematopoietic stem cells (HSCs) [1]. HSCs yield blood precursors responsible for unilineage differentiation and the production of mature red blood cells [1-2]. Nuclear factor-erythroid 2 (Nfe2) is a transcription factor thought to be responsible for regulating genes associated with red blood cell production [3]. In zebrafish, *Danio rerio*, nfe2 may control the activation of genes such as scl/tal-1, lmo2, cbfb, fog-1, runx-1, flk-1, fli-1, hbbe, and hbae [1-2]. The potential function of Nfe2 as a transcription factor and its involvement in blood cell differentiation will therefore be investigated in this project.

Benjamin Vanasse '14

Hip Hop and Copyright

Dale Chapman, Music, advisor

Hip-hop music, continuing in the tradition of jazz and blues, combines numerous African diasporic traditions creating a rich musical culture. The main mode of musical production in hip-hop music is sampling, the compositional technique of taking pre-existing recorded material then remixing and recontextualizing the sample creating a new track. Copyright law exists to protect the rights of the composer and incentivize artists to create. Sampling directly challenges many fundamental culturally embedded aspects of the copyright law. Courts have responded with increasingly draconian decisions, which have limited the creativity of hip-hop artists. Copyright must be revised to reverse this unfortunate trend.

Grace VanNoy '14

Effects of Hyperbaric Oxygen Therapy on Chronic Wound Biofilms Grown with Normal Human Skin Fibroblasts

Lee Abrahamsen, Biology, advisor

Chronic wounds affect millions of people around the world every year. They are a common issue for people suffering from diabetes mellitus and can be difficult and costly to heal. Chronic wounds are often infected with bacterial biofilms, which further complicates the healing process. Hyperbaric oxygen therapy (HBOT) has been shown clinically and experimentally to help chronic wounds heal by increasing the amount of oxygen delivered to damaged tissue. While the dynamics of biofilm-infected chronic wounds treated with HBOT have been studied in vitro, not much is understood about how biofilm bacteria respond to HBOT. In this study, biofilms containing *P. aeruginosa*, *S. aureus*, and *A. faecalis* were grown according to the Lubbock model and overlaid onto a confluent culture of human skin fibroblasts. Cells and bacteria were quantified before and after exposure to 100% oxygen at 2 atm for 90 minutes. These experiments will allow us to determine the growth rates of chronic wound biofilms in HBOT-treated cultures compared with untreated controls.

Connor Ventling '15

The Following Sea: Cultural Perceptions and Knowledge on Traditional Sailing in Samoa

Stephen Sawyer, Office of Off-Campus Study, advisor

Traditional Polynesian voyaging techniques, which rely solely on the surrounding natural environment, have been undergoing a revival in the past 50 years. This study examines the Aiga Folau o Sāmoa, or the Sāmoa Voyaging Society, a modern entity which accurately undertakes traditional sailings around the world, and the cultural perceptions and knowledge on traditional voyaging lore and techniques in Sāmoa. Research efforts included primary interviews, visits, participant observation, as well as secondary sources. The study investigated not only how traditional sailing techniques enabled a watercraft to be navigated accurately over the open sea but also current cultural knowledge and perceptions of this information in present-day Sāmoa. The study revealed that most of this knowledge lies with the Aiga Folau o Sāmoa. Currently the Ministry of Education, Sports, and Culture (MESC) is documenting words in the Sāmoan language pertaining to sailing culture, however this has not been finalized for publication. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has also published a draft of an education module on traditional voyaging in the Pacific, but it too remains in draft form and has yet to be implemented.

Cormac Walsh '17 – see Eholor Omosede '14

Kenya's National Climate Change Action Plan

Alexandre Dauge-Roth, French and Francophone Studies, advisor

Abigail Weinreb '14

The Effect of Brief Mindfulness Meditation on Working Memory Capacity

Helen Boucher, Psychology, advisor

Mindfulness Meditation (MM) is a form of meditation intended to cultivate non-judgmental attention to present experience. Research suggests that MM is effective in improving cognition in a number of ways, including through the improvement of Working Memory Capacity (WMC). The current two studies investigate the impact of a one-session MM training on WMC.

In the first study, the Mindfulness Attention Awareness scale (MAAS) was used as a mindfulness manipulation test to ensure the meditation used in the experiment was effective in producing a state of mindfulness in the participants. Pre-manipulation and post-manipulation mood was measured using the Profile of Mood States (POMS) questionnaire. WMC was measured using the Paced Auditory Serial Addition Test (PASAT). The Modified Tellegen Absorption Scale (MODTAS) was administered to investigate the relationship between the character trait "absorption" and MM susceptibility. Results from study one indicated that a 15-minute auditory mindfulness meditation manipulation resulted in significantly higher PASAT scores, and thus increased WMC, than a 15-minute control auditory manipulation. No relationship between absorption and mindfulness susceptibility was found. The purpose of study two is to replicate the results from study one using different methods to measure WMC and momentary mindfulness. Study two also includes a measure of mind-wandering in order to explore the relationship between mindfulness and attention.

Emily White '14

The Slope Relating Neural Frequency to Power and Attentional Control

Jesse Bengson, Psychology, advisor

The slope of the power spectrum of an electroencephalogram (EEG) reveals the presence of a 1/f¹ relationship, as is often present in complex dynamic systems. Although the deployment of attention has been shown to recruit large neuronal networks throughout the brain (Edelman, 2004), very little research has been conducted relating the spectral slope of the EEG to the deployment of attention. The present study uses an EEG data set recorded while subjects followed variants of a classic attentional cueing paradigm (Posner, 1980), to compare the slopes of the pre-cue and post-cue power spectra in different cortical locations. Compared to pre-cue, the post-cue spectral slope became significantly more negative in occipital regions contralateral to cue presentation. This is indicative of an increased amount of order in the visual cortex, or a lower possibility for information representation, with the deployment of attention.

Gabriel Whitehead '17 – see Alexa Bourque '16

Coltan in the Congo: Who Makes the Call of Defining Human Rights?

Alexandre Dauge-Roth, French and Francophone Studies, advisor

Jessica Wilson '17 – see Mitchell Newlin '17

Impact of Colonialism on Education in Kenya

Patricia Buck, Education, advisor

Lucas Wilson-Spiro '15

The Edinburgh Fringe Festival: The World's Largest Arts Festival from a Technician's Perspective

Michael Reidy, Theater and Dance, advisor

For the past two years, I have worked in Edinburgh over the summer as a theater technician at the annual Edinburgh Fringe Festival, the largest arts festival in the world and one of the two main components of the larger Edinburgh Festival. The festival runs for most of the month of August, and for the duration there are over 1,000 shows per day in around 250 venues. I was employed by the production company, ZOO Venues, and worked in two different performance spaces. My duties included running tech for up to six shows a day, typically with only a 15-

minute interval between different shows. As a theater major with a concentration in technical theater, this was a significant learning experience for me. My presentation will focus on my work and impressions of the Fringe Festival as compared to my work on shows for the Bates Theater Department, and how Fringe Festival theatre differs from collegiate productions.

Nina Wineburgh '14 – see Mitchell Hildreth '17

A Comparative Glance at the Arab Springs in Tunisia, Egypt and Algeria

Patricia Buck, Education, advisor

John Wisener '14

Stereoselective Aldol Reaction of 3-Methyl-2-Cyclohexen-1-one Using (-)DIP-Cl

Jennifer Koviach-Côté, Chemistry, advisor

Free radicals are molecules that contain one unpaired electron which makes them highly reactive. These free radicals can react with intercellular structures when produced in cells and can prevent normal cellular functions. In recent years, the free radical scavenger ashitabaol A has gained attention due to its high antioxidant properties. Through research it is known that ashitabaol A is only found as one enantiomer in nature. We have therefore undertaken an enantioselective synthesis of ashitabaol A. The chiral reagent (-)DIP-Cl facilitates an aldol reaction, the first reaction in the synthesis by joining 3-methyl-2-cyclohexen-1-one to ethyl glyoxylate stereoselectively. A 4:1 ratio of syn:anti products was accomplished, which was determined by NMR peak integration. A 53:1 syn:anti product ratio was achieved using different purification techniques. The enantiomeric excess was then calculated using Mosher's ester.

Katherine Yannopoulos '15 – see Daniel Bell '15

The Effect of Environment on the Sexual Objectification of Women

Susan Langdon, Psychology, advisor