

# 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 2016 Summit ~

The 2016 Mount David Summit, held on April 1, 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 all Bates students are developing as scholars in their own right, and are ready to articulate and defend their 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 commitment 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 first-years just beginning to explore ideas in depth, or they may be sophomores or juniors 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 kind of individualized education celebrated at the Mount David Summit would not be possible without the unflagging dedication of faculty advisors. Bates 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.



## ~ ABSTRACTS ~

(in alphabetical order)

**Fola Ade-Banjo '16**

*The Philosophy of Cinema*

**Susan Stark, Philosophy, advisor**

A detailed analysis of the contemporary philosophy of art, with particular focus on film and cinema studies.

**Nizamuddin Ahmady '17, Gideon Ikpekaogu '17, and Faaiz Irfan '17**

*Charity and Experimental Games: Investigating the Charitable Giving Behavior of Religious and Nonreligious Agents*

**Jean Paul Rabanal Sobrino, Economics, advisor**

Our research seeks to determine if there is a difference between the charitable giving behavior of religious and nonreligious people. As experimenters, we each have a religious background: we are either moderate Muslims or Christians. The concept of charity is important in many religions. Therefore, we want to examine the behavior of the people adhering to a particular faith that strongly recommends giving charity to those in need. We want to compare that with those people who are not religious or don't subscribe to any faith at all to examine how significant the role of religious doctrine is toward giving charity. In order to do this, we will design an economic game and our intended subjects will be Bates College students. According to the Rational Choice theory, an individual is believed to always make prudent and logical decisions that provide them with the greatest utility or satisfaction in the benefit of their highest self-interest. We will set up a model in which participants who are religious and nonreligious will interact. We will test both religious and nonreligious participants on their willingness to give charity or not give charity. This experimental game will give us insights into the giving behavior of both groups. The funding to conduct the experiment will be generously granted by the Bates Economics department.

**Hannah Albertine '16, Alexandra Berman '16, Benjamin Cuba '16, Montana Hirsch '16, Grace Kenney '16, Mary Mignone '16, and Christopher Shaw '16**

*Literary Reading by Creative Thesis Writers*

**Robert Farnsworth, English, advisor**

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

**Kenisha Allen-Daley '16**

*Children's Literature with Cultural Authenticity: Understanding the Complexities and Importance*

**Krista Aronson, Psychology, advisor**

As summarized by Hollingsworth (2009), multicultural children's literature provides children with the opportunity to gain valuable insight about their identity and the racial identity of those around them. Previous research has supported this idea that multicultural children's books are

effective as a teaching medium for identity development, creating and maintaining cross-cultural relationships, and other positive aspects. Yet, researchers such as Bertalksy (2013) and Govinnage (2014) have found minimal children's literature productions by and about people of color. Along side the lack of literature available, other researchers have looked deeply into the idea of cultural authenticity and its effect on children. This study investigated authors' processes, concerns, and specific and reoccurring theme emission and prevalence when writing multicultural children's literature.

**Maxwell Alley '16**

*Predicting Explicit and Implicit Attitudes toward Sociosexuality Using the Big-Five Personality Traits*

**Michael Sargent, Psychology, advisor**

Sociosexuality is defined as individual differences in the tendency to have casual, uncommitted sexual relationships. In this experiment I explored how the Big-Five personality traits predict both explicit and implicit sociosexuality. Explicit sociosexuality has already been measured by the Sociosexual Orientation Inventory. However, implicit biases regarding sociosexuality are explored for the first time using a newly developed Implicit Association Test. Participants completed the IAT, the Revised Sociosexual Orientation Inventory, and the NEO Five-Factor Inventory, to determine superordinate personality traits. I examined the correlation between both implicit and explicit measures of sociosexuality and if the Big-Five can predict these values.

**Joseph Alp '18, Jacob Atwood '19, Chardon Brooks '19, Jio'vanni Delvalle '19, Abby Horrisberger '18, and Rakiya Mohamed '18**

*The World, the Self, and the Poet*

**Lavina Dhingra, English, advisor**

Robert Frost said that "Poetry is when an emotion has found its thought and the thought has found words." In the spirit of Frost, we are an eclectic group of budding poets, devoted to the power, depth, and beauty of the written word and its ability to express the complex, multi-dimensional emotions that shape our humanity and beliefs. We have found inspiration, creativity, and insight in our study of poetry at Bates and the opportunity to give voice to our feelings. Working with Professor Lavina Dhingra, we have been exposed to and enlightened by many modern and contemporary poems and poets. We believe in the power of poetry to convey individual and universal feelings and ideas. We are honored to share our passion and veneration for poetry by reading our poems at the Mt. David Summit.

**Melody Altschuler '17**

*Naturalistic Social Cognition in Berlin*

**Georgia Nigro, Psychology, advisor**

Recent research in evolutionary psychology has shown that infants as young as six months old possess behavioral and

social learning strategies that are selective to plants (Wertz & Wynn, 2014). However, these social learning strategies have not yet been investigated in naturalistic settings. In this poster, I will discuss the Phillips Fellowship research project I conducted at gardens in Berlin, Germany, in the summer of 2015. Preliminary findings suggest that young children are reluctant to touch plants on their own in naturalistic settings and that they employ social learning strategies to determine if plants are safe to explore.

**Students in American Cultural Studies 100, Introduction to American Cultural Studies, and American Cultural Studies/Religious Studies 272, Islam in America**

**Analyzing Stereotypes of Muslims on Television and Their Impact on the Muslim Community**

**Aimée Bessire, American Cultural Studies, advisor Samaneh Oladi Ghadikolaei, Religious Studies, advisor**  
In addressing a Maryland mosque in 2016, President Obama highlighted negative stereotypes and called for television shows to portray Muslim characters "unrelated to national security." Muslim characters are most often cast in negative light on television shows where they are portrayed as spies, terrorists, belly dancers, or corrupt billionaires. How have such stereotypes influenced public opinion, cultural understanding, political rhetoric about Muslims and the Muslim community? Students in these courses present their research and interviews about stereotypes of Muslims on TV and the impact of these stereotypes on the larger Muslim community. Through community engagement and analysis of the ways Muslims are portrayed through such television genres as comedy, animation, crime drama, action shows, late night satire, and the televised rhetoric of 2016 political campaigns, this session confronts the stereotypes and examines their impact in both American culture and the Muslim community at large.

**Garrett Anderson '18**

**An Exploration of Nagisa Oshima's Political Filmmaking "Style"**

**Jonathan Cavallero, Rhetoric, advisor**  
Oshima Nagisa is known as one of the most controversial Japanese directors, notorious worldwide for his iconoclastic approaches to film and Japanese society. Despite his infamy, Oshima is universally praised, having received an award for best director at the Cannes International Film Festival. Describing himself as a "political filmmaker," Oshima makes films that explore social problems in Japan. This project works to understand how Oshima uses film form to encourage viewers to watch in an active fashion, exploring his use of subject matter, cinematography, and the manipulation of sound to remind viewers of their role as spectators.

**Adair Andre '18, Avery Margerum '18, and James Pardo '18**

**Comparing Nollywood and Burkina Faso Film Industries Leslie Hill, Politics, advisor**

The distinct film industries of Burkina Faso and Nigeria differ in production, funding, and distribution. We researched several African scholars of cinema, such as Diawara and Ukadike, for insight into how these

differences affect the films and audiences. The works of directors Chris Obi Rapu, the father of Nigeria's Nollywood, and Fanta Regina Nacro, of Burkina Faso, are consulted to see how such dissimilarities influence the methods of filmmakers and the challenges they face (funding, actors, technicians, distribution, etc.). We found that Nigeria's Nollywood is a more politically autonomous and individually financed industry producing high volumes of low-budget, home-grown films which appeal to a general audience on the continent and to members of the African diaspora. Conversely, the French-dominated and funded film industry of Burkina Faso produces a low volume of timely and artistic works, reaching deeper into international audiences. Such large scale distinctions appear in the works of individual filmmakers.

**Alexander Arau '16**

**Quantitative Analysis of *Borrelia burgdorferi* Ribonuclease Expression, the Means to Novel Medicinal Treatment of Lyme Disease**

**Paula Schlax, Chemistry, advisor**

*Borrelia burgdorferi* is the causative agent of Lyme disease, one of the most common vector-borne diseases in North America. Lyme disease can cause many severe conditions including both meningitis and paralysis. Differential expression of *B. burgdorferi*'s internal and external proteins are essential in mammalian infection. This protein expression is regulated by specific bacterial ribonucleases, enzymes responsible for RNA degradation in the Lyme bacterium. Through quantitative analysis of these key *B. burgdorferi* ribonucleases via western blotting, we are able to determine the essential bacterial changes involved in human infection. This approach provides novel insight for medicinally combatting Lyme disease.

**Caran Arora '16**

**Dissonance-Based Intervention to Reduce Sexual Objectification**

**Susan Langdon, Psychology, advisor**

Sexual objectification is extremely prevalent on college campuses today and has several negative consequences. From self-objectification to mental health issues, the ill effects that result from objectification can be severely detrimental for an individual. Objectification research has typically focused on the sexual objectification of women and not much work has been done from the male lens. The current study will examine the objectification culture at Bates in hope of spreading awareness and serving as an intervention to reduce objectifying behaviors through cognitive dissonance and hypocrisy induction. It is hypothesized that through the dissonance induced, participants will change their behaviors.

**Jake Atwood '19 – see Joseph Alp '18**

**The World, the Self, and the Poet Lavina Dhingra, English, advisor**

**Jalen Baker '16, Emma Bilodeau '16, Bridget Feldmann '16, Josh Giesler '16, and Tommy Graziano '16**

**Senior Thesis Research in Sociology**

**Francesco Duina, Sociology, advisor**

Sociology students present their senior thesis work. Topics

include Black Lives Matter and color-blind racism; transracial adoption; Evangelical Christian marriages, collective memory in post-dictatorship Chile; and rugby, soccer, and South African national identity.

**Ruthie Baker '16**

***An Investigation of the Toxicity of Lake Auburn's Gloeotrichia echinulata***

**Holly Ewing, Environmental Studies, advisor**

Lake Auburn is the unfiltered drinking water source for the cities of Lewiston and Auburn, ME, and is home to the nitrogen-fixing cyanobacteria *Gloeotrichia echinulata*. The presence of *G. echinulata* in low-nutrient lakes like Auburn may pose a threat to the utilization of these water sources for drinking water and recreation because of its ability to produce the cyanotoxin microcystin-LR (MC-LR). Little is known about the factors controlling the production of MC-LR by *Gloeotrichia*, but temperature and the density of both *Gloeotrichia* and other algae were hypothesized to play a role. The concentrations of MC-LR found in *G. echinulata* bodies over a six-week sampling period in August and September 2015 were below levels of concern for consumption set by the World Health Organization. While the concentration of MC-LR varied both across sites and over the six-week sampling period, no one factor could explain the variability. Preliminary findings indicate a weak correlation between the concentration of MC-LR in *Gloeotrichia* bodies and the commonly measured water quality variables which were hypothesized to influence the production of MC-LR by this species.

**Claire Bartell '16**

***Can Robots be Moral? Machine Ethics in a Technological World***

**William Seeley, Philosophy, advisor**

Can robots be moral? While once only the topic of science fiction, autonomous robots and artificially intelligent systems are quickly becoming incorporated into our everyday lives from healthcare to military applications. The field of machine ethics has emerged to deal with the responsible use of technology and creation of artificial moral agents. Can ethics or morality be incorporated into machines as a way to interact better with us? This research aims to summarize important concepts in machine ethics, evaluate the ability of robotic systems to act according to moral theories, and more generally address the possibility of creating artificial moral agents.

**Rebecca Bassell '16**

***"This Is the Story of a Man Named Stanley": Authorship, Agency, and Narratology in The Stanley Parable***

**Jonathan Cavallero, Rhetoric, advisor**

This presentation examines the struggle for authorial control in the digital age by examining this dynamic within The Stanley Parable, a game which pits its player in direct opposition to the narrator. The Stanley Parable not only questions the way in which game stories are told, but the significance of the player interacting with a game's story, and if these choices are significant in their construction of meaning. I argue that games like The Stanley Parable show how the introduction of such technologies creates new rhetorical opportunities to explore the importance of

narrative structure, authorship, and agency within persuasion.

**Students in the Bates Fall Semester Abroad Program in Berlin**

***Fall Semester Abroad 2015: Berlin Projects***

**Meredith Greer, Mathematics, advisor**

In this session, several students from the 2015 Fall Semester Abroad program present projects they completed during their time in Berlin. These range from the historical to the current, discussing mathematical influences and cultural contributions. Topics include techno music, World War II technological innovation, Berlin's Hauptbahnhof (main train station, completed in 2006), and connecting Renaissance-era perspective drawing with contemporary art.

**Carolyn Benner '16**

***RSA and Public Key Cryptography***

**Adriana Salerno, Mathematics, advisor**

In my senior thesis I will be examining the RSA cryptosystem, the first and most secure public key cryptosystem that allows two parties to communicate without the fear of an adversary understanding their messages. In addition to analyzing the math behind the cryptosystem, I will also be investigating ways it can be attacked. To attack the system by directly decrypting the message being sent, factorization of a large number into distinct primes is required. A few methods that I will be looking at are Pollard's p-1, Pollard's rho, and factorization via continued fractions.

**Anna Berenson '16**

***Identifying RNase III Cleavage Sites in Borrelia burgdorferi***

**Paula Schlax, Chemistry, advisor**

Lyme disease is caused by the bacterium *Borrelia burgdorferi*, and the study of gene expression patterns in this organism can lead to a better understanding of this increasingly prevalent disease. Many expression changes in *Borrelia* can be traced to the degradation of messenger RNA transcripts by the enzyme RNase III. Our study intended to identify the cleavage sites of this enzyme using a variety of molecular biology and biological chemistry techniques. Using the 5' Rapid Amplification of cDNA Ends (RACE) method, in which complementary DNA fragments are tagged and separated by size, we were able to isolate and identify cleavage sites in specifically chosen mRNA transcripts. Continued work is focused on replicating successful RACE products to be sequenced in the final step of restriction site determination.

**Alexandra Berman '16 – see Hannah Albertine**

***Literary Readings by Creative Thesis Writers***

**Robert Farnsworth, English, advisor**

**Nicole Bermudez '16**

***The Relationship between U.S. Asylum and Refugee Policy and U.S. Foreign Policy***

**Clarisa Pérez-Armendáriz, Politics, advisor**

Although the United States adopted the U.N.'s definition for asylum seekers and refugees in 1980, policies intended to enforce this commitment have not been evenly

implemented. I propose that this implementation variation is best understood in light of U.S. foreign policy. I expect that U.S. national security interests, bilateral relations, and interests in the countries of origin of asylum seekers and refugees influence how U.S. asylum and refugee policy is enforced. I conduct a large-n analysis and examine quantitative asylum and refugee admissions data as well as data that measure U.S. foreign relations toward sending states to test my hypotheses.

**Emma Bilodeau '16 – see Jalen Baker '16**

*Senior Thesis Research in Sociology*

**Francesco Duina, Sociology, advisor**

**Adam Blau '18**

*The Coercive Apparatus: The Reason Bashar al-Assad Still Holds Power in Syria*

**Senem Aslan, Politics, advisor**

The objective of my paper is to determine why the Assad regime in Syria has yet to fall and a democratization of Syria has not emerged despite long years of civil war. For the last few years, Syria has experienced uprisings caused by government corruption, high unemployment, and a lack of civil liberties. Compared to other countries in the region, President Bashar-al Assad has yet to be ousted. I argue that Assad still has power in Syria as a consequence of the coherent government structure that the Assads have created and the loyalty of the Syrian military to the regime.

**Camden Bock '16**

*Mixed K-means Clustering in Computer Adaptive Learning*

**Bonnie Shulman, Mathematics, advisor**

The ASSISTments project from Worcester Polytechnic Institute provides a free web-based intelligent tutoring system including two levels of differentiation, that are manually programmed by teachers and researchers. Problems assigned through ASSISTments can be programmed in trees, where the sequence of problems adapts to the student's performance on each question. Within each problem, if a student enters an incorrect response the ASSISTments system provides scaffolded feedback to target the student's misconception. This thesis begins to develop an educational data-mining algorithm to automate this differentiation. First, an adaptation of Alshahaf's mixed k-means clustering algorithm is proposed to handle a mix of categorical and numeric data. Second, the algorithm is implemented in MATLAB and its performance is compared to Alshahaf's results on benchmark data sets. Finally, the MATLAB implementation is applied to ASSISTments data from 2009 and 2012 to develop a predictive model.

**Mary Anne Bodnar '16 and Kelsey Schober '16**

*Dance Theses, 2015-16*

**Carol Dille, Dance, advisor**

In this session, Kelsey Schober and Mary Anne Bodnar present the outcome of personal investigations made in collaborative creative processes this semester. The goal of using abstract movement to tell personal stories links together these two thematically different works.

**Kiria Borak '19, Malcolm Delpeche '17, and Alexia Sahue '19**

*All Lives Matter ... Really?*

**Leslie Hill, Politics, advisor**

Unequal attention given to the terrorist attacks in Paris and in Nigeria by both western and African news outlets and political leaders indicates that location dramatically influences the world's reactions to terrorism. This suggests that not all deaths are equal and, by extension, not all lives matter equally. This results from disparities in compassion given to French and Nigerian citizens as evident in our analysis of various perspectives from African government officials, journalists and citizens. We identified two major explanations for these discrepancies: the international community's failure to agree on a common definition of terrorism and how the colonial legacy and post-colonial dynamics inform the gaze of political leaders in contemporary Africa. These two factors shape representations of political violence and the perceptions of an "acceptable" versus a "reprehensible" death.

**Pete Boyer '19, Adrianna Fano '19, and Marisol Hernandez '19**

*Women in Politics: Rwanda's Successes and Remaining Challenges*

**Leslie Hill, Politics, advisor**

Currently, Rwanda boasts the highest percentage of female legislators in the world at 64%. Through post-genocidal reform and quotas reserving 30% of seats in government for women, Rwanda has created opportunities for women to be elected to public office. However, critics describe these policies as heavy-handed enforcement of equality and elevating mostly privileged women. By examining Rwanda's history, post-genocide policy changes, and a range of voices in and outside of politics, we assess the nation's success and for whom it matters most. Are uneducated women or those from low socioeconomic backgrounds well represented within the political structures? Do Rwandans think political equality is achieved or that there is room for improvement?

**Chris Bradbury '16**

*An Experimental Study of the Metal-Silicate Partitioning Behavior of Fe, Mn, Cr, and V*

**Geneviève Robert, Geology, advisor**

Metal-silicate partitioning experiments simulate how chemical elements fractionated between the Earth's metallic core and silicate mantle during differentiation. In this study, the influence of pressure and temperature on the partitioning behavior of iron, manganese, chromium, and vanadium is analyzed at temperatures of 1823 - 2023 K and pressures of 1 - 4 GPa. Results indicate that pressure has no influence on partitioning behavior, while moderate temperature dependences are observed for iron, chromium, and vanadium. These results, in combination with data from previous studies, are used to extrapolate to the temperatures and pressures at which the core may have formed.

**Mikaela Bradley '16**

***Functional Consequences of BRCA1 Polymorphisms in Northern Indian Women***

**Larissa Williams, Biology, advisor**

Breast cancer is a disease that arises due to the inhibition of cell regulation and causes uncontrolled growth of breast cells. A gene that is crucial for the repair of damaged DNA and cell regulation is BRCA1. If this gene is mutated, BRCA1 can predispose men and women to breast cancer. Roughly 85% of BRCA1 mutations occur because of frameshift, nonsense, splice, or regulatory mutations. These mutations cause variation in an individual's DNA, known as a polymorphism. These variations in DNA can be harmful and increase the risk of developing breast cancer. In Northern India there has been minimal research surrounding the polymorphisms of BRCA1 high-risk mutations. A recent study found four common BRCA1 polymorphisms: lysine to arginine on exon 11, serine to glycine and methionine to isoleucine on exon 16, and lysine to arginine on exon 17. Through comparative modeling, amino acid changes found in the BRCA1 gene were analyzed to better predict the functional consequences of BRCA1 polymorphisms in Northern Indian women. In the comparative BRCA1 protein model, hydrogen bonds and clashes with neighboring residues were computed before and after mutation to determine the impact of these mutations on the stability and protein folding of the BRCA1 protein. After mutation occurred, fewer hydrogen bonds and more neighboring residue clashes were observed. These interactions between hydrogen bonds and neighboring residue clashes were due to electrostatic interactions and steric hindrance, respectively. Future studies should focus on the amino acid substitution from serine to glycine and the impact this polymorphism has on BRCA1's ability to undergo phosphorylation.

**Benjamin Brimelow '16, Tommy Fitzgerald '16, and Christopher Van Hare '16**

***Putin's Russia: Memory, Image, and Motive***

**Dennis Browne, Russian, advisor**

This panel examines contemporary narratives which are shaping Russia's national identity. Participants present their research on diverse cultural and political texts which are in the center of current public discourse in Vladimir Putin's Russia. These include monuments and memorials, films and events produced by state media, and narrative arguments presented by political figures surrounding President Putin. Using documentaries and press conferences portraying the president to the Russian people, investigating national landmarks preserving the memory of the country imagined as Russia, and analyzing Russian cultural and historical claims to Crimea, presenters deconstruct Russia's search for identity.

**Constance Brimelow '16, Katrina Buchta '16, Britta Clark '16, Laurel Meyer '16, Megumi Milla Achahue '16, Alexandra Morrow '16, and Joe Tulip '18**  
***Knowledge and the Public Good: Community-Engaged Research across the Disciplines***

**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 or interest. This year's Community-Engaged Research Fellows worked on diverse projects situated at the intersection of community interests and academic areas including mathematics, theater and dance, sociology, environmental studies, philosophy, neuroscience, psychology, and documentary studies.

**Andre Brittis-Tannenbaum '16**

***Monitoring Marine-Derived Nitrogen Inputs Due to an Alewife Migration in Nequasset Lake, Woolwich, ME***

**Beverly Johnson, Geology, advisor**

The 2015 migration of alewives (*Alosa pseudoharengus*) in Nequasset Lake, Woolwich, ME is estimated at 126,395 fish, increasing from 40,841 fish in 2013. Increases in fish populations are predicted to bring an increase in nitrogen influx due to fish excretion, decomposition, and gamete deposition. To assess the impact on the nitrogen budget at Nequasset, nitrate concentrations were compared to changes in the ratio of  $^{15}\text{N}$  ( $\delta^{15}\text{N}$ ) in sampled nitrate from the Top of the Dam, the outlet of the lake. 2015  $\delta^{15}\text{N}$  values were then compared to previous years in order to monitor the effect of the fish on the lake.

**Chardon Brooks '19 – see Joseph Alp '18**

***The World, the Self, and the Poet***

**Lavina Dhingra, English, advisor**

**Nat Brown '19**

***Arbitration in Major League Baseball***

**Susan Langdon, Psychology, advisor**

Currently in Major League Baseball there is a distinct divide, due to economic factors, on how to build a successful baseball team. For big-market teams, spending money on expensive, lengthy contracts is a method to success, while for small-market teams, focusing on developing talent and exploiting the cheap, early years of professional contracts is the means to building a team. Arbitration allows these teams to pay players far less than their actual worth, resulting in bitter relations among teams and players, revolutionary contracts, the potential for intentionally losing, and exploitation of the Collective Bargaining Agreement.

**Ashley Bryant '16**

***Making Americans: Negotiating the Boundaries of Somali Identity in the Public Education System of Lewiston, ME***

**Loring Danforth, Anthropology, advisor**

With the rise of political discourse on immigration in America and the resulting linguistic, religious, and cultural diversity, American public schools must negotiate the boundaries of accommodation and assimilation for their diverse student populations. By analyzing the English Language Learner (ELL) program, religious observances in school, and the Blue Devils Soccer Team, I argue that schools are where the ideology of the "nation" is imagined and that the Lewiston Public School system defines "American-ness" through the inclusion and exclusion of Somali identity. I hope to use these findings of institutionalized American national identity to elicit educational reform and social change.

**Katrina Buchta '16** – see **Constance Brimelow '16**  
*Knowledge and the Public Good: Community-Engaged Research across the Disciplines*  
**Darby Ray, Harvard Center for Community Partnerships, advisor**

**Camille Campion '16**  
*Synthesis of Substituted Benzimidazolones via Oxidative C-H Amination: Optimization of Substrate Synthesis and Examination of Substrate Scope*  
**Patrick Jokiel, Chemistry, advisor**  
Benzimidazolone is an effective molecular scaffold in drug discovery. Functional derivatives of benzimidazolone possess diverse biological properties. Traditional chemical syntheses of these compounds could be optimized in terms of atom economy, a key metric of the environmental sustainability of a chemical process. Our group has demonstrated palladium (II)-catalyzed C-H amination as an atom efficient to such methods. This research project examines "green" methods of synthesizing new substrates for this reaction and the performance of these substrates in this reaction. Toward this end, a diversely substituted set of trisubstituted urea derivatives was synthesized. These were converted to the corresponding benzimidazolone derivatives.

**Cheyenne Cannarozzo '16, Jeremy Glover '17, Michael Horowicz '17, Sam Myers '16, Theodore Pender '18, Max Petrie '18, and Roderick Pratt '18**  
*Everything You Always Wanted to Know about Chaucer But Were Afraid to Ask: Gender, Politics, and Sexuality in The Canterbury Tales*  
**Sylvia Federico, English, advisor**  
A set of papers about gender, politics, and sexuality in Chaucer's poetry, including a variety of theoretical and historical perspectives on late medieval culture.

**Melissa Carp '16, Esperanza Gilbert '16, Wendy Goldman '16, Emilie Muller '16, and Alex Tritell '16**  
*Perspectives on Jewish Religion and Culture*  
**Thomas Tracy, Philosophy and Religious Studies, advisor**  
This panel presents five religious studies majors who wrote their theses on the social and political implication of Judaism in a modern context. Topics include Divine Command Theory and the model of faith in the Binding of Isaac, community-based research on the former Jewish Community Center of Lewiston, Jewish humor in shaping millennial Jewish identity, the practice of wig-wearing as head covering in Orthodox Judaism, and the conquest narrative of Joshua 1:12.

**Elsa Case '17, Tayla Duarte '17, Katherine Stevenson '17, and Katherine Van Patten '17**  
*Negotiating Cultural Difference Abroad*  
**David Das, Office of Off-Campus Study, advisor**  
You are studying abroad. Your home stay mother, whom you really like, regularly makes xenophobic comments. What do you do? Humor her? Confront her? Suggest she run for President of the United States? Four students discuss how they responded to cultural difference while studying abroad in Japan (Katherine Van Patten), Jordan

(Katherine Stevenson), Denmark (Tayla Duarte), and Cuba (Elsa Case).

**Gretchen Cates-Carney '16**  
*Examining the Role of Birth Plans and Locus of Control in Childbirth Satisfaction*  
**Rebecca Fraser-Thill, Psychology, advisor**  
This study seeks to determine how locus of control and adherence to birth-plan impact women's childbirth satisfaction. Pregnant women were recruited to complete an extended prenatal and brief postpartum survey. Participants responded to a number of questionnaire measures and provided details about their desired birth scenario, and were asked postpartum about their delivery outcomes. Satisfaction with childbirth has the potential to impact the mother's health, relationship with her child, ability to breastfeed, and attitude toward future childbirth experiences.

**Timothy Chamberlin '16**  
*Quadcopter Dynamics*  
**Eric Wollman, Physics, advisor**  
Quadcopters, sometimes referred to as drones, are inherently unstable systems. They require the use of a gyroscope and accelerometer, control algorithms, and quick computing in order to fly with stability. My thesis examines the underlying physics required to stabilize such a system.

**Mark Chatkin '16**  
*Examining the Scope of Benzimidazolone Synthesis via C-H Amination: Effect of N-Substitution*  
**Patrick Jokiel, Chemistry, advisor**  
Benzimidazolone derivatives possess diverse biological properties. An efficient and environmentally sustainable means of synthesizing benzimidazolone derivatives offers considerable utility to drug discovery and pharmaceutical chemistry. Existing synthetic methodologies, while suitable, could be further optimized to improve efficiency and environmental sustainability. Previous efforts in this group demonstrated that palladium (II) catalyzed oxidative C-H amination is a viable alternative to current methodologies. The purpose of this research is to examine the scope of this method, specifically focusing on nitrogen substitution. Toward this end, several urea substrates were synthesized and their performance in the C-H amination reaction examined.

**Yuying Chen '16**  
*High-throughput Ras Degradation Compound Screen*  
**Paula Schlax, Chemistry, advisor**  
In this study, we attempted to find compounds that mediate the selective degradation of the Kras oncoprotein using a bio-luminescent luciferase assay. Kras has a driver role in various cancers as well as congenital defects such as Noonan's syndrome. Previous attempts to find drugs that deactivate Kras proteins have failed due to the high affinity of Kras and its substrate GTP. However, recent reports that Kras can be degraded by the ubiquitin ligase  $\beta$ -trcp may mean that this ubiquitination process can be manipulated to have therapeutic benefits against cancer cells with K-ras mutations (Shukla 2014). We identified five potential compounds from our screen that could potentially mediate



the selective degradation of the Kras. Surprisingly, in validation experiments, the five compounds did not show selective degradation of Kras. Rather, one compound showed a selective activation of Kras. Investigating the potential mechanism of activation and expanding the library of compounds tested can aid in further elucidating therapeutic strategies against the Kras oncoprotein.

**Britta Clark '16 – see Constance Brimelow '16**  
*Knowledge and the Public Good: Community-Engaged Research across the Disciplines*  
**Darby Ray, Harvard Center for Community Partnerships, advisor**

**Marquise Clarke '19, Olivia Fried '19, and Anissa Kersche**  
*The People's Revolution: Democratization in Northern Africa*

**Leslie Hill, Politics, advisor**

In the winter of 2011, a political revolution coined as the Arab spring proliferated various forms of contestation against authoritarian regimes across Northern Africa and the Middle East. Through a comparative approach, we analyze why Tunisia was a breeding ground for political transformations while Algeria was left unaffected. We explore what conditions need to exist in a country for political change to occur, be effective, and endure by reviewing a collection of North African perspectives. Through this analysis, we identify the factors needed for emergence of a political consensus and collective action to support successful reform of North African constitutional and political landscapes.

**Mallory Cohen '17**  
*Creative Intervention: Arts Education for Incarcerated Youth*

**Michael Rocque, Sociology, advisor**

This exploratory research project analyzes the use of arts education programming in juvenile correctional facilities in the United States. The argument will be made that this type of intervention works in a therapeutic manner to build decision-making skills and provide a healthy outlet. There is a focus on dance programming in this research, however it will include arts education ranging from musical theater, to poetry writing and the visual arts. A case study will be presented of a dance program that is conducted in a juvenile detention center in the Boston area. This will include the findings from in-depth interviews with the teaching artists, the developers of the program, and the correctional staff involved.

**Dana Cohen-Kaplan '16**  
*Methane Emissions from a Hydrologically Altered Region of the Sprague River Salt Marsh, Phippsburg, ME*  
**Beverly Johnson, Geology, advisor**

This study examines the bulk density and carbon density of the soil and methane emissions coming off of a human-altered portion of Sprague Marsh, in Phippsburg, ME. It was found that in areas upstream of the alteration, a "ditch-plug," methane emissions are significantly higher than in areas downstream of the ditch-plug, indicating abnormal bacterial productivity, which implies impacted hydrology. The emission of methane, a powerful greenhouse gas, is

concerning, and may negate the carbon sequestration that salt marshes provide. Additionally, the soil above the ditch-plug exhibits lower density and carbon content in the top few centimeters, implying negatively impacted accretion rates, likely the a result of standing water and poor drainage over the past few decades. We conclude that the alterations made to this portion of the marsh degrade the hydrological health of the marsh.

**Meredith Colleary '16**  
*Sexual and Reproductive Health Education for Boys in Kapchorwa, Uganda*

**Stephen Sawyer, Office of Off-Campus Study, advisor**

This study examines the systems by which adolescent boys receive sexual and reproductive health (SRH) education in rural Kapchorwa, Uganda. Teenage pregnancy and early marriage are epidemics that hinder Uganda's development. As girls have consistently been the targets of interventions, this study considers how boys are included in these strategies. Through interviews and focus groups with students, parents, NGOs, and government officials, this research explores the ways that boys receive SRH education, identifies the successes and shortcomings of these education systems, and seeks ways for these systems to be improved.

**Emma Conover '16**  
*The Psychology of Eating Animals: How Pro-Environmental Attitudes Inform Choices*

**Georgia Nigro, Psychology, advisor**

Research suggests that animal agriculture leads to enormous environmental harm. Through careful analysis of a range of environmental ethical theories, the current study explores whether environmentalists have a moral obligation to eliminate consumption of animal products. Additionally, through a series of qualitative interviews, the study examines the psychological mechanisms at work when individuals with pro-environmental attitudes consider how their thoughts about nonhuman life relate to their behavior.

**Jacqueline Cooper '17, Alanna Morque '18, Alexandra Nason '18, and Mallory Turner '17**

*Family Matters: The Pros and Cons of Child Marriage in Northern Nigeria*

**Leslie Hill, Politics, advisor**

In Northern Nigeria, Hausa and Fulani women marry early to support their families by maximizing their labor and fertility. Despite a family's desire to reap these benefits, child marriage has detrimental effects on productivity: obstructed labor decreases safe births while increased vulnerability to abuse shortens the longevity of marriage. What, then, are the circumstances that encourage Nigerians to regard child marriage as beneficial? Through our research into Northern Nigerian perspectives, we analyze how at-risk women are challenging the practice of child marriage and the regional norms, religious beliefs, and economic barriers they encounter. We expect to create a complex multifaceted narrative as this is a contentious issue that touches the foundations of family structure and social reproduction. The at-risk women, their families, community leaders, and other interested groups all have a stake in changing or maintaining norms of child marriage in Hausa and Fulani societies.

**Tiago Correia '17**

*Progress toward Spatially Resolved Single-atom Imaging of 6Li in a Multi-well Potential*

**Nathan Lundblad, Physics, advisor**

We prepared low-entropy samples of a few atoms in a multi-well potential. To image them with spatial resolution we made them fluoresce by resonant laser beams, collected the emitted photons with a high-resolution objective and detected them on a sensitive camera.

**Benjamin Cuba '16 – see Hannah Albertine '16**

*Literary Reading by Creative Thesis Writers*

**Robert Farnsworth, English, advisor**

**William Curley '16**

*EEG Evidence of Command Following in Patients with Severe Brain Injury and Healthy Controls*

**Jason Castro, Psychology, advisor**

Patients with disorders of consciousness (DOCs) following severe brain injury often have severe motor deficits, limiting their capacity for behavioral output and often leading to misdiagnosis. Electroencephalographic (EEG) assessment of mental imagery is a strategy to assess the level of conscious awareness that bypasses the motor system. In an ongoing study of DOCs, multichannel video-EEG was recorded in 10 severely brain-injured patient subjects (PSs), and 15 healthy controls (HCs) while they were asked to perform four different motor imagery tasks. Power spectral estimates were then compared during task and rest conditions and we found changes in spectral power in all HCs and 9 of 10 PSs, indicating task performance. Our findings have important implications for the use of EEG motor imagery in the assessment of cognitive reserves in severe brain injury.

**Camille Cushman '16**

*Attenuation of Ubiquitin E3 Ligases Causes a Delay in EMCV Virion Production in Mouse Fibroblast Tissue Culture*

**Glen Lawson, Chemistry, advisor**

The interaction between the ubiquitin system and encephalomyocarditis virus (EMCV) in mammalian tissue culture was examined to evaluate the possibility that the ubiquitin-proteasome degradation pathway acts as an antiviral mechanism. Previous research has found that three ubiquitin E3 ligases, E6AP, DTX3L, and Atrh1, have the ability to target the viral 3C protease for ubiquitination and subsequent degradation. The rate of virion production in E3 ligase knockdown cells was determined to identify whether the ubiquitin system promotes or inhibits viral replication. We found that knocking down E6AP causes a delay in the rate of production of virions, which suggests that the virus manipulates the ubiquitin system early in the viral replication cycle.

**Tara Das '16, Graham Leathers '16, and Kei Matsunami '16**

*The Francophone Faces of Lewiston: An Exploration of the Spindle City's French-Speaking Past, Present, and Future*

**Mary Rice-DeFosse, French and Francophone Studies, advisor**

Lewiston has a long history of Francophone presence.

From the migration of French-Canadians to Lewiston in the nineteenth century to the migration of Congolese, Chadian, Rwandan, Burundian and Djiboutian refugees within the past five years, Lewiston's cultural and linguistic landscape has changed drastically over the years. Three Bates students explore elements of this change through interviews with community members focused on the role of the French language in the community today.

**Lucia De Rose '16**

*Use of Fourier Analysis in Edge Detection for Applications in Image Processing*

**Katharine Ott, Mathematics**

Edge detection is an image processing technique with many applications. Imagine you are processing a picture of an apple on a table. The transition from the region that depicts the apple to the region that depicts the table is generally discontinuous. In order to determine the edges of the apple, it is necessary to determine the curves along which the function that represents the image is discontinuous. In this project, we describe an edge detector that uses Fourier spectral data about a function to "concentrate" the function about its discontinuities, and ultimately detect the edges present in the image.

**Malcolm Delpeche '17 – see Kiria Borak '19**

*All Lives Matter ... Really?*

**Leslie Hill, Politics, advisor**

**Jio'vanni Delvalle '19 – see Joseph Alp '18**

*The World, the Self, and the Poet*

**Lavina Dhingra, English, advisor**

**Mary Deneen '16**

*Four-Dot Object Substitution Masking and the Depth of Processing of Masked Words*

**Todd Kahan, Psychology, advisor**

Four-dot object substitution masking is a type of visual masking that interferes with target perception, but there is little known about the depth of processing of the target object. The current study looks to uncover if masked words are processed unconsciously by using both color words and color-related words. There will be approximately fifty participants in this study, all of whom will be undergraduates aged 17-22. If the data finds that reaction times are faster for congruent color-related masked words and slower for incongruent color-related masked words, then this will prove that masked objects are unconsciously processed in the brain. Implications for these findings could show how deeply masked words are processed, even when participants are not consciously aware of them.

**Roberto Diaz III '16**

*Human-Induced Pluripotent Stem Cell Therapy Coupled with an Increased Consumption of Organic Nitrates Displays Potential in the Treatment of Avascular Necrosis of the Femoral Head*

**Stephanie Richards, Biology, advisor**

Avascular necrosis of the femoral head (ANFH) has proven to be a difficult disease to both treat and understand. The study examines current forms of treatment, core decompression, and autologous stem cell treatment of ANFH and reviews new and upcoming treatment options

for ANFH. The study found that while although core decompression exhibited disease relief, it never led to eradication of the disease. Thus it was devised that core decompression, coupled with induced pluripotent stem cells and diet alteration, could prove promising in treating patients of the disease.

**Robert DiFranco '16**

***Self-Regulatory Theory and Green Advertising***

**Georgia Nigro, Psychology, advisor**

According to self-regulatory theory, some individuals are more likely to act toward achievement; these individuals are promotion-based. Other individuals are more likely to act towards avoidance; these individuals are prevention-based. My study compared preferences of promotion-based and prevention-based people for green advertising. Participants filled out a personality questionnaire and then looked at two advertisements for personal care products. A new scoring method allowed me to compare individuals high in both promotion and prevention to individuals low in both as well as to individuals who score high in one but not in the other. The results have implications for marketing techniques.

**Tanner Dirstine '16**

***Chronic 30% Hyperoxia from Birth Causes an Early Development of the Hypoxic Ventilatory Response in Neonatal Rats***

**Ryan Bavis, Biology, advisor**

Clinicians have long given preterm infants supplemental oxygen therapy to increase the oxygen saturation in their tissues to avoid cell death. Previous studies have shown that 60% oxygen from birth causes an early development of the hypoxic ventilatory response (HVR) in neonatal rats. This study investigates whether the same early development of the HVR is seen in a more clinically relevant (30%) level of supplemental oxygen. Results indicate that 30% oxygen causes a maturation of the HVR, but less severe than in 60% oxygen.

**Becky Dobbin '16**

***Manual Denervation of the Caudal Fin in Zebrafish (Danio rerio) Impairs Regeneration***

**Nancy Kleckner, Biology, advisor**

The purpose of this study was to investigate the neural dependence of regeneration in the teleost zebrafish (*Danio rerio*) by manually denervating the caudal fin. The main nerve was resected approximately 1mm from the caudal fin bifurcation. Caudal fins were amputated, and fish were imaged for the following seven days. Fish underwent an immunohistochemical protocol to visualize anterior growth factor 2 positive (Agr2+) gland cells and peripheral axons. Sham zebrafish demonstrated greater regrowth relative to manually denervated fish, though a smaller mean number of Agr2+ gland cells. This research is a valuable inquiry of nerve-dependent regeneration, and allows for later characterization of the signaling and biochemical pathways that underlie successful regeneration.

**Elizabeth Dolgicer '16**

***Turkey's 2010 Constitutional Referendum: Consolidating Democracy or Authoritarianism?***

**Senem Aslan, Politics, advisor**

On September 12, 2010, Turkey's governing Justice and Development Party (AKP) put forth a constitutional referendum of twenty-six amendments. These proposed reforms encompassed a wide range of issues, from providing collective bargaining rights for government employees to that of restructuring Turkey's judicial system. Though the amendments were considered to be a marker of Turkey's evolving democracy, many considered the proposed judicial reforms as the AKP's covert attempt to "pack the court." It is the goal of this paper to establish whether or not such claims are accurate. This paper argues that the 2010 judicial reforms must be understood as a response to the ideological clashes that unfolded, vis-à-vis the Turkish Constitutional Court (TCC), between the AKP and Turkey's Kemalist coalition, who sought to protect the state's secular establishment. By transforming Turkey's judicial appointment process, the AKP has extended its political dominance within the Judiciary, thereby consolidating its authoritarian rule.

**Fan Dong '17**

***The Diyanet under alla Turca Laicism***

**Senem Aslan, Politics, advisor**

As the sole authority managing religious affairs, the Presidency of Religious Affairs, or the Diyanet, plays a significant role in both public and religious spheres in Turkey. In a state where secularism serves as a founding pillar, why has the Diyanet enjoyed such prestige as a state institution? I argue that the Turkish secularism is not a strict separation of religion and state, but in essence *alla Turca* laicism, which renders religion under lay control. Under this context, the Diyanet serves as an institutional tool to promote a dominant and homogeneous Sunni Islam, which acts as an instrument to consolidate Turkish national identity.

**Nina Doonan '16, Elise Emil '17, Mary Krathwohl '16, and Nina Sevilla '16**

***Environmental Justice in the Americas***

**Melinda Plastas, African American Studies,**

**Environmental Studies, Women and Gender Studies, advisor**

What is environmental justice? What does it look like in the Americas? Members of ENVR 350, Environmental Justice in the Americas, discuss case studies that explore several environmental movements and the theoretical frameworks that influence them. Topics include the Green Party in Brazil, neoliberalism and mining in Peru, Filipino farmworkers in the United States, and privileged access to green space in U.S. classrooms. They address questions about theorizing environmental justice, growing successful environmental movements, and navigating the overwhelming and oppressive force of global capitalism.

**Callum Douglass '16**

*Nanopositioning Gold Nanoparticles for the Study of Plasmonics*

**Matthew Côté, Chemistry, advisor**

Through the use of atomic force microscopy, photon counting, and Fourier plane imaging, the plasmonic properties of gold nanoparticles were investigated. Plasmons, the collective oscillation of electrons within a conductor, can be excited by light shone on a nanometer-scale gold structure. Plasmons enhance the oscillating electric field of the incident light, driving electron motion with sufficient force so that the electrons no longer simply track the electric field, but instead oscillate at integer multiples of the incident field's frequency, an effect called nonlinear optical harmonic generation. The sensitivity of this nonlinear optical harmonic generation to the gold nanoparticles' plasmonic behavior makes it ideal for studying the plasmonic behavior of gold nanostructures.

**Tayla Duarte '17 – see Elsa Case '17**

*Negotiating Cultural Difference Abroad*

**David Das, Office of Off-Campus Study, advisor**

**Phillip Dube '16**

*Street Actors, Dancers, and Musicians: An Examination of Public Performances in São Paulo, Brazil; Ahmadabad, India; and Cape Town, South Africa*

**Stephen Sawyer, Office of Off-Campus Study, advisor**

You might have encountered people who sing, act, speak, dance, and/or play instruments in public urban spaces without explicitly charging a fee – public performances. These public performers have different motives and use a wide variety of methods to engage the urbanites. In this study, the author traveled to São Paulo, Ahmedabad, and Cape Town and observed public performances and analyzed the the gender distribution of the performers, the relationship between the space in which the performance takes place and the type of performance and the performers' costumes. This paper argues that public performances employ aural and visual techniques to engage urban folk and therefore alters enhances public life in cities of the twenty-first century.

**Elise Emil '17 – see Nina Doonan '16**

*Environmental Justice in the Americas*

**Melinda Plastas, African American Studies, Environmental Studies, Women and Gender Studies, advisor**

**Arianna Fano '19 – see Pete Boyer '19**

*Women in Politics: Rwanda's Successes and Remaining Challenges*

**Leslie Hill, Politics, advisor**

**Bridget Feldmann '16 – see Jalen Baker '16**

*Senior Thesis Research in Sociology*

**Francesco Duina, Sociology, advisor**

**Students in First-Year Seminar 345, Classical Myths and Contemporary Art**

*Ovid's Metamorphoses and Trigger Warnings*

**Lisa Maurizio, Classical and Medieval Studies, advisor**

This panel explores how and why Ovid presents violence against women and considers recent arguments, most notably from students at Columbia University, that Ovid's *Metamorphoses* should come with a trigger warning.

**Julia Fisher '16**

*Red Maple and Red Oak Exhibit Spatial and Temporal Variation in Vulnerability to Embolism*

**Brett Huggett, Biology, advisor**

Drought-induced embolism formation in plant vascular networks restricts photosynthesis and growth. Variation in vulnerability to embolism between species is well documented, but spatial and temporal patterns in xylem vulnerability and structure have not been thoroughly explored. This study evaluates vulnerability of vascular networks along the root-to-leaf pathway in sapling and mature red maple and red oak. Results highlight differences in vulnerability to embolism related to xylem structure and reveal the weakest portions of the vascular architecture of two temperate tree species. Considering projected increases in drought intensity, these data have important implications for future timber management plans and conservation strategies.

**Tommy Fitzgerald '16 – see Benjamin Brimelow '16**

*Putin's Russia: Memory, Image, and Motive*

**Dennis Browne, Russian, advisor**

**Allie Freed '16 and Jessica Plotnikov '16**

*Can Women Paint? Can Women Write? Worldly Women as Artists*

**Lavina Dhingra, English, advisor**

In Professor Lavina Dhingra's seminar, Worldly Women as Artists (English/Women and Gender Studies 395P), students explored the works and lives of transnational female artists, in attempts to answer the contentious question of what (or who) qualifies a woman to be regarded as an author or artist. Throughout the term, students worked on an independent creative portfolio in the medium of their choice (visual arts, performance, writing, etc.) in attempts to become conscious of the journey one takes to become an artist. Simultaneously, students worked on scholarly papers analyzing the role of female artistry in literary texts. The course included in-class visits from contemporary female artists who work with a variety of mediums including oil and acrylic paints, watercolor, textile, and sculpture.

**Sarah Freyd '19, Kathleen Gildea '19, and Tomas Jurgensen '17**

*"Trash" as Means of Economic and Environmental Renewal in Africa*

**Alexandre Dauge-Roth, French and Francophone Studies, advisor**

In studying the diverse concepts and managements of trash in Africa, we aim to understand its dynamic role in the economies and environments of African societies. Our

research considers various narratives of trash, ranging from African scholarly and media sources to local perspectives and policies. We compare how different Africans in diverse parts of the continent perceive trash as a resource and analyze how they transform it into means of economic prosperity and environmental renewal. We strive to explore how Africans envision "trash" as more than simply "waste," expanding beyond Western "consumerist" ideology and broadening understandings of this concept in the context of several African "ecologies."

**Olivia Fried '19 – see Marquise Clarke '19**

*The People's Revolution: Democratization in Northern Africa*

**Leslie Hill, Politics, advisor**

**Katharine Gaillard '19**

*What is Intelligence?*

**Robert Strong, English, advisor**

Through interviews with students, faculty, staff, and alumni, I have realized that this question is fundamental to why we find ourselves connected to a place like Bates College. Most would agree that this institution's goal is developing each student's "intelligence," but what does this mean? I hope to share the insights I have found from around and beyond campus through this poster, addressing everything from "Why are we here?" to "What sort of world are we creating through our time here?" and "Are we satisfied with that world?"

**Colby Galliher '18**

*The Khat Problem: Socioeconomic Degradation and Policy Enforcement in Yemen*

**Senem Aslan, Politics, advisor**

In Yemen, a drug colloquially referred to as *khat* has become so widespread and so frequently abused that it now poses serious economic, political, and social hindrances to the further development and stability of the country. What has motivated the Yemeni state in its approach to *khat* curtailment? Additionally, is the state's inaction conscious, or are there limiting factors that constrain its ability to meaningfully enforce its policies and reduce *khat*'s presence across the country? Research and scholarship from the last three decades will be analyzed to illuminate the unique challenges that *khat* poses to the contemporary Yemeni state.

**Matt Gee '16**

*Empathic Emotional Responses and Cortisol Reactivity Independently Predict Charity and Social Justice-Oriented Volunteering*

**Georgia Nigro, Psychology, advisor**

Previous research suggests that health benefits accompany volunteering if done with an other-oriented motivation, as opposed to a self-oriented one. This study explored whether empathic emotional responses are related to a health index—cortisol reactivity—and likeliness to do charity versus social justice volunteering. Participants rated their emotions and provided saliva samples for cortisol assay before and after watching an emotional video. Empathic emotional responses were positively related to charity work, whereas cortisol reactivity was positively related to

social justice work. These results suggest that antecedents of charity and social justice volunteering are differentiable.

**Josh Giesler '16—see Jalen Baker '16**

*Senior Thesis Research in Sociology*

**Francesco Duina, Sociology, advisor**

**Esperanza Gilbert '16 – see Melissa Carp '16**

*Perspectives on Jewish Religion and Culture*

**Thomas Tracy, Philosophy and Religious Studies, advisor**

**Livie Gilbert '19, Henry Loeffler '17, Abbey Nolan '19**

*Humanitarian Work's Hidden Agendas: Treating HIV/AIDS in Tanzania and Swaziland*

**Leslie Hill, Politics, advisor**

In 2014, 28% of the population in Swaziland and 5% of the population in Tanzania lived with HIV/AIDS, bringing about the question of why such a small country as Swaziland has such a high prevalence in comparison to a larger country like Tanzania. We examine the intersection of the practices of government agencies, NGOs, and local communities in order to compare social, political, and medical responses to the HIV/AIDS crisis and their effectiveness within various communities. We aim to learn how cultural, economic, and political contexts play a role in developing treatment options and cultural acceptance of people living with HIV/AIDS. By exploring the various programs, campaigns, and resources being mobilized and implemented in both nations, we not only aim to explore how the responses compare in Southern and Eastern Africa, but also to evaluate their potential innovative contributions to the fight against HIV/AIDS in Sub-Saharan Africa.

**Kathleen Gildea '19 – see Sarah Freyd '19**

*"Trash" as Means of Economic and Environmental Renewal in Africa*

**Alexandre Dauge-Roth, French and Francophone Studies, advisor**

**Jeremy Glover '17 – see Cheyenne Cannarozzo '16**

*Everything You Always Wanted to Know about Chaucer But Were Afraid to Ask: Gender, Politics, and Sexuality in The Canterbury Tales*

**Sylvia Federico, English, advisor**

**Wendy Goldman '16 – see Melissa Carp '16**

*Perspectives on Jewish Religion and Culture*

**Thomas Tracy, Philosophy and Religious Studies, advisor**

**Julia Gordon '16**

*The Influence of Lineup Procedures on Eyewitness Decision Making*

**Michael Sargent, Psychology, advisor**

Eyewitness identifications are a leading cause of wrongful convictions. Two experiments examine how lineup procedures impact identification rates. In Experiment 1, participants are given a warning about the adverse consequences of a misidentification, or no warning at all, and are subsequently presented with a target-absent or target-present lineup. Experiment 2 examines the impact of

unbiased instructions, informing eyewitnesses the perpetrator could or could potentially not be in the lineup, and an explicit "not there" option at the time of the lineup presentation on choosing rates in target absent lineups. These experiments can potentially inform procedural recommendations.

**Hannah Gottlieb '16, Elizabeth Laverghetta '16, Michela Moscufo '16, and Lindsey Prelovick '16**  
*Museological Experience and Independent Projects in Art Museums*

**Anthony Shostak, Museum of Art, advisor**  
The Bates Museum of Art has an internship program for students interested in the curatorial, education, and collections management fields. Additionally, Bates offers opportunities for students to intern at museums worldwide. Interns worked closely with the museum staff to fulfill hands-on projects that were essential to the Museum's programming. Lindsey and Elizabeth merged their academic preparation with practical experience through conducting in-depth research, learning the latest technologies for installation, and publishing abstracts, labels, and guides. Their final projects included curating, installing, and creating digital audio labels for the current exhibitions. For her Education Studies capstone, Hannah conducted research on best practices in art museum education. She applied what she learned by planning and running family and school programs at the Museum. Finally, Michela worked overseas at the Peggy Guggenheim Collection in Venice, where she coordinated weekly educational events and gave tours of the museum.

**Tommy Graziano '16 – see Jalen Baker '16**  
*Senior Thesis Research in Sociology*  
**Francesco Duina, Sociology, advisor**

**Shannon Griffin '16**  
*The Effect of Social Media and Activism Hashtags on Black College Students' Sense of Belonging and Perceived Academic Self-Efficacy*

**Helen Boucher, Psychology, advisor**  
This study examined whether activism hashtags, such as #BlackLivesMatter, served as collective affirmations and had beneficial impacts on Black college students. Half of the participants read a passage that threatened their sense of belonging at Bates College, while the other half served as a control group. Included within this, half of the participants received a collective affirmation from an ingroup member, while the other half were affirmed by an outgroup member. We hypothesized that participants' sense of belonging and anticipated academic performance would change as a function of threat and source of collective affirmation.

**Paige Guevarra '18, Madeline McGonagle '18, Nathan Stephansky '18, and Dylan Thombs '18**  
*Dendrology Course Project: The Bates Canopy*  
**Brett Huggett, Biology, advisor**

In the fall of 2015, students enrolled in Dendrology and the Natural History of Trees (BI/ES 271) assisted in establishing, designing, and launching Bates Canopy, an online resource that, with interactive GIS mapping, documents many of the tree and shrub species on campus. This resource is intended for general use by the Bates

community with the goal of deepening everyone's appreciation and knowledge of trees on campus and in New England. With contributions by future Bates students, Bates Canopy will continue to expand in coverage and deepen as a resource for dendrology and the natural history of trees.

**Cailene Gunn '16**  
*Methane Fluxes along a Salinity Gradient on a Restored Salt Marsh, Harpswell, ME*

**Beverly Johnson, Geology, advisor**  
This study functions to understand the relationships among salinity, vegetation, and methane emissions on a restored salt marsh in Casco Bay, ME, that was subject to ~100 years of tidal restriction due to anthropogenic alteration. CH<sub>4</sub> concentrations of samples obtained from static CH<sub>4</sub> gas chambers were determined using a gas chromatograph (GC-FID). Findings suggest reintroduction of healthy tidal flows into the marsh inhibits CH<sub>4</sub> production. These data are complemented by sediment analyses of δ<sup>13</sup>C, % organic carbon and bulk density using isotope-ratio mass spectrometry, and decomposition rates using a tea bag index to understand carbon sources and stocks.

**Justin Haley '16**  
*Diamond Disaster: The Institutional Development of Sierra Leone*

**Alero Akporiaye, Politics, advisor**  
How have the natural resources in Sierra Leone, particularly diamonds, affected the institutional development of the state? Since the age of colonialism, Sierra Leone has long been a victim of resource exploitation. Although the state gained independence in 1961, the government was unable to capitalize on its rich diamond resources and create any long-term development initiatives. Sierra Leone deteriorated over the next thirty years, culminating in civil war. The conflict was brought to international attention due to the use of child soldiers in combat by the Revolutionary United Front and the rampant illicit diamond trade that was found to be funding various conflicts in West Africa and around the world. In order to understand why Sierra Leone was unable to take advantage of its diamond industry, I offer a descriptive analysis of how its state institutions were compromised. By tracing Sierra Leone's institutional development from precolonial to modern times I hope to explain the effect of diamonds on the institutions of the state.

**Robert Haran '16**  
*Change Localization versus Detection in the Other-Race Effect: Another Failed Attempt to Show Changes in Holistic Processing for Other-Race Faces*

**Todd Kahan, Psychology, advisor**  
The other-race effect is a deficit in memory that people remember faces of their own race better than those of other races. The current research sought to determine why this effect occurs. Specifically, this study sought to determine whether the other-race effect reflects differences in holistic versus feature-based processing using a change localization versus change detection task. The other-race effect was replicated in a following memory task and results of the change detection and change localization task are discussed in terms of differences in processing styles for faces of own- and other-race faces.

**Porter Harrast '16**

***The Role of Buccal-A Cluster Cells in the Central Pattern Generator Controlling Rasping Tooth Movement in *Helisoma trivolvis****

**Nancy Kleckner, Biology, advisor**

Feeding behaviors in pond snails like *Helisoma trivolvis* are directed by a central pattern generator, a precisely timed system involving interneurons, motor neurons, and modulatory Buccal A cluster neurons (BACs). BACs release a steady rhythm of sub-threshold EPSPs of unknown origin that coincide with the second phase of feeding. We hypothesized that BACs have a reciprocal relationship with CPG interneurons and/or motor neurons. We are still evaluating whether depolarizing and hyperpolarizing the interneuron, B2, or the motor neuron, B27, changes the potential of these EPSPs, indicating a direct connection with BACs, and the inverse, indicating bidirectional communication. CPGs are vital for species with neurons.

**Gregg Heller '16**

***Rearing in Male Odor Decreases Signal Propagation in the Mouse Olfactory Bulb***

**Jason Castro, Psychology, advisor**

Social odors, such as pheromones, can cause electrophysiological changes in the accessory olfactory bulbs (AOBs) of conspecifics resulting in specific behavioral responses. Previous work on this project has shown that rearing female mice in cage bedding taken from male mice changes the balance of reciprocal inhibition and self-excitation seen in AOB mitral cells, shifting the balance to favor an excitatory after-current. I have used calcium imaging techniques alongside in vitro whole cell patch clamping to investigate whether this excitatory shift may be caused by increased dendritic action potential back propagation.

**Jake Henderson '16**

***Utilizing Chromatin Immunoprecipitation (ChIP) to Investigate Transcriptional Regulation in Zebrafish (*Danio rerio*) during Early Development***

**Larissa Williams, Biology, advisor**

Chromatin Immunoprecipitation (ChIP) is a molecular biological technique that allows for the detection and analysis of protein-DNA interactions. Previous research identified that the aryl hydrocarbon receptor (Ahr) is a regulator of an important gene family known as nuclear factor erythroid 2-related factor (nrf). This thesis utilized ChIP on 24 hours post fertilization zebrafish (*Danio rerio*) embryos in order to explore the protein-DNA interactions occurring between Ahr1b and the XREs found within the cis-promoters of nrf genes. This thesis also aimed to further develop the ChIP protocol in order to utilize quantitative polymerase chain reaction for DNA analysis following ChIP.

**Marisol Hernandez '19 – see Pete Boyer '19**

***Women in Politics: Rwanda's Successes and Remaining Challenges***

**Leslie Hill, Politics, advisor**

**Saya Higano '16**

***Knowledge of Negative Consequences of Diet Influenced by Masculinity***

**Susan Langdon, Psychology, advisor**

The definition of masculinity is still underdeveloped in comparison to femininity, but the internalization of masculine norms has led males to indulge in unhealthy eating habits, which consists of high protein intake to help develop muscle. Society perceives these habits as positive and promotes them for a muscular body, driving males to put stresses on their bodies in order to become masculine. The study sought to determine the level of knowledge of the negative consequences of masculine diets in order to develop a way to intervene this internalization from society.

**Montana Hirsch '16 – see Hannah Albertine '16**

***Literary Reading by Creative Thesis Writers***

**Robert Farnsworth, English, advisor**

**Caroline Holme '16**

***Confirming Regulatory Regions in *flaB* and *bpuR* Transcripts and RNase III Cleavage Sites in *Borrelia burgdorferi****

**Paula Schlax, Chemistry, advisor**

The causative agent of Lyme Disease is the bacterium *Borrelia burgdorferi*, and the study of gene expression in this organism can lead to a better understanding of this increasingly prevalent disease. Many expression changes in *Borrelia* can be traced to regulation of RNA transcripts through three-dimensional structural changes and degradation by RNase III. Our study intended to examine the regulation regions of two important RNA transcripts, *bpuR* and *flaB*, and confirm predicted RNase cleavage sites. Using a variety of cloning procedures we attempted to insert sites of interests into known plasmids to be later transformed into *Borrelia*. Continued work is focused on identifying successful cloning procedures so as to confirm cleavage sites and suspected regulatory regions.

**Andrew Hoopes '16**

***Modeling Calcium Dynamics in Dendritic Spines***

**Nancy Kleckner, Biology, advisor**

Dendritic spines are small protrusions along neuronal dendrites and function as the major sites of excitatory connections in the brain. Calcium ion flux through these spines influences various mechanisms of synaptic plasticity; however, small spine compartment size has limited the capability to study the kinetics of this signaling. In order to evaluate these events in more detail, this study focused on the development of a mechanistic model of the spine to be used alongside two-photon fluorescent imaging of rapid voltage and calcium transients. Both experimental and simulated data can be investigated with the model in attempt to characterize various signaling processes, such as calcium rise kinetics, methods of calcium buffering, and ionic flux through synaptic channel proteins.

**Michael Horowicz '17 – see Cheyenne Cannarozzo '16**

***Everything You Always Wanted to Know about Chaucer But Were Afraid to Ask: Gender, Politics, and Sexuality in The Canterbury Tales***

**Sylvia Federico, English, advisor**

**Abby Horrisberger '18 – see Joseph Alp '18**  
*The World, the Self, and the Poet*  
**Lavina Dhingra, English, advisor**

**Eleanor Hough '16**  
*Protective Factors against the Internalization of Body-Image Ideals*

**Susan Langdon, Psychology, advisor**  
Many studies show that men and women, athletes and non-athletes alike, are affected by society's messages regarding body ideal. No studies, however, have looked at whether focusing on the functionality of the body in comparison to the appearance of the body serves as a protecting factor against society's body ideal. The first study looks at whether or not priming body functionality helps protect against decreased body appreciation after viewing images of models. The second study examines whether or not female athletes in high-feminine sports are more protected against society's body ideals and whether or not these athletes are as affected when viewing images of high-feminine athletes compared to images of low-feminine athletes. The third study tests whether or not high-self determination and priming individuals to think about female athletes as opposed to female models serves a protective factor against society's body ideals. This study also examines whether or not viewing a film with a central theme of body-functionality has less of an affect on body appreciation than a film with a central theme of body-objectivity.

**Gideon Ikpekaogu '17 – see Nizamuddin Ahmady '17**  
*Charity and Experimental Games: Investigating the Charitable Giving Behavior of Religious and Non Religious Agents*  
**Jean Paul Rabanal Sobrino, Economics, advisor**

**Faaiz Irfan '17 – see Nizamuddin Ahmady '17**  
*Charity and Experimental Games: Investigating the Charitable Giving Behavior of Religious and Non Religious Agents*  
**Jean Paul Rabanal Sobrino, Economics, advisor**

**Raja Junaid Jahangir '16 and Lydia Merizon '16**  
*Exploring the Fourier Transform*  
**Katharine Ott, Mathematics**  
The Fourier transform is used to decompose a signal into its constituent frequencies, translating the signal from the time domain to the frequency domain. This is done by writing a signal function of period T in the form of complex exponentials of the same period. Unlike Fourier series, which are used to analyze periodic functions, the transform can be used to analyze both periodic and aperiodic functions. As such, it is useful for applications in fields ranging from the physical sciences to applied mathematics.

**Hannah Jeffrey '16, Jia-Ahn Pan '16, Elena Schroeder '16, and Mi Hui Wong '16**  
*An Application of Fourier Series to the Most Significant Digit Problem*  
**Katharine Ott, Mathematics**

The most significant digit problem expresses the idea that the first significant digit for naturally arising numbers is skewed toward smaller digits. For instance, numbers

beginning with 1 appear 30% of the time, whereas numbers beginning with 9 appear 5% of the time. Mathematically speaking, the first digit of a number follows a log distribution:  $\log((n+1)/n)$  for  $n = 1, 2, \dots, 9$ . We show that the log distribution is the limiting distribution when random variables are repeatedly multiplied, divided, or raised to integer powers. We achieve this by using tools including Fourier analysis, Parseval's theorem, and modular arithmetic.

**Tomas Jurgensen '17 – see Sarah Freyd '19**  
*"Trash" as Means of Economic and Environmental Renewal in Africa*  
**Alexandre Dauge-Roth, French and Francophone Studies, advisor**

**Katie Kaplan '16**  
*Examining Potential Biomarkers of Breast Cancer Risk Marker Lesions*

**Stephanie Richards, Biology, advisor**  
Studying biological markers is crucial because it allows for less invasive testing for cancer. The global proteomic approach was used to examine potential urinary biomarkers by mass spectroscopy and followed by validation. Breast cancer precursor lesions studied were Lobular Carcinoma In Situ (LCIS), Atypical Ductal Hyperplasia (ADH), and Ductal Carcinoma in Situ (DCIS). Significantly increased levels of NOV were observed in the urine of patients with LCIS, ADH, and DCIS, compared to normal urine samples. Congruent cell culture experiments were performed. The concentration of NOV in the cell lines, MCF10a (noncancerous), MCF12a (derived from hyperplasia), and T47D (cancerous) was studied.

**Michelle Kelley '16**  
*A Confocal Analysis of the Morphological Changes in Neuromasts and the Inner Ear of Danio rerio in Response to Oxidative Stress and Absence of nfe2 Protein*  
**Larissa Williams, Biology, advisor**

The Nfe2 protein is of particular importance in the zebrafish, as well as other vertebrates, for its suggested role in the regulation of the oxidative stress response. Absence of Nfe2 in zebrafish causes malformations in the inner ear, especially around 36-48 hpf when it is thought to regulate genes involved in ear development due to its presence as a transcript. Utricular and secular otoliths become deformed with little separation between them, and the respective neuromasts elongate and can fragment, indicating hair cell death. Treatment with the aquatic herbicide diquat yields similar results. Morphological analysis of embryos treated with both Nfe2 morpholino and diquat shows a worsening of these adverse effects in the ear, specifically the semicircular canal system. While zebrafish can regenerate hair cells, other vertebrates like mammals do not have the capacity and this can cause auditory problems in the developing organism. Understanding the Nfe2 protein as it relates to oxidative stress regulation is key in discovering targets for treatment in models that cannot regenerate hair cells.

**Grace Kenney '16 – see Hannah Albertine '16**  
*Literary Reading by Creative Thesis Writers*  
**Robert Farnsworth, English, advisor**



**Hugh Kenny '18, Paul Runyambo '17, and Robben Tian '19**

***Mozambique's Discovery of Natural Gas: Opportunity or Curse?***

**Leslie Hill, Politics, advisor**

The discovery of natural gas in resource-poor Mozambique in 2012 introduced the prospects of not only increased employment and investment opportunities but also potential for rent-seeking by government officials and environmental degradation. What policies are being adopted to effectively manage resources? Are ordinary citizens stepping up to the challenges of holding the government accountable to ensure equitable distribution of revenues and environmental stewardship? We examine the natural gas industry, corporate and government documents, and citizens' perspectives to assess concerns related to clientelism and pollution. By exploring the dynamics among government, business and citizens, we seek lessons about responsible and effective resource management.

**Gary Kersbergen '16**

***Reconociendo el Esfuerzo: The Unnoticed Contributions of Migrant Farm Labor in Maine***

**Claudia Aburto Guzmán, Spanish, advisor**

When you go to a supermarket and select a piece of fruit, your actions, unbeknownst to you, mirror the actions of a migrant farmworker. As you hold a piece of fruit in your hands, assessing its quality, you might not consider that a few weeks ago, an indigenous man from Oaxaca, miles from home and exhausted after his fourteenth straight hour of work, may have held that same piece of fruit. The world of migrant farm labor is often concealed from the public view, making the migrant body an invisible body. This presentation explores the themes of structural violence and ethnic succession in a comprehensive study of migrant farm labor, and the contributions of migrant farmworkers in the state of Maine. I will use a series of interviews of migrant farmworkers at Worcester Wreath Company that I collected for my Spanish thesis this past fall and while traveling to various migrant farmworker camps throughout Maine as a farmworker safety trainer, in order to illustrate the unnoticed contributions of migrant farm labor in Maine.

**Anissa Kersche – See Marquise Clarke '19**

***The People's Revolution: Democratization in Northern Africa***

**Leslie Hill, Politics, advisor**

**Sohee Ki '16**

***Diversity-Oriented Synthesis of Fused Bicyclic Beta-lactams***

**Yi Jin Gorske, Chemistry, advisor**

Heterocyclic compounds are involved in a diverse set of reactions that are crucial to both biochemical processes and modern organic synthesis. Beta-lactam, a four-membered cyclic amide, has been an important structural motif in biological therapeutics such as penicillin. In addition to their biological importance, beta-lactams also function as a versatile synthetic intermediate in organic synthesis. This thesis focuses on using diversity-oriented synthesis strategies to efficiently generate a diverse library of fused bicyclic beta-lactams. Structural diversity in ring sizes and

functional groups was explored using 2-azetidinones as starting material.

**Khidong Kim '16**

***RNase III Cleavage of Borrelia Species: Investigation on Evolutionary Conservation of Cleavage Site and Innovations in Double-Stranded RNA Visualization System***

**Paula Schlax, Chemistry, advisor**

*Borrelia* species are responsible for Lyme disease. *Borrelia* species is known to have a highly conserved double-stranded RNA (dsRNA) that is cleaved by ribonuclease III (RNase III), with cleavage site conserved in the rpsO-pnp operon. Through a sequence and secondary structure analysis, a conserved cleavage site is found in a hairpin loop, following UAUAAAAGGA nucleotides. This conservation is not only found within each *Borrelia* species but also throughout the entire *Borrelia* genus. This U-A rich proximal box confers to the reactivity of RNase III cleavage of dsRNA. Two innovative visual systems representing double-stranded RNA are also invented and investigated.

**Joshua Kolbert '16**

***Prevalence of Antibiotic Resistant Staphylococcus in Dogs (Canis lupus familiaris)***

**Lee Abrahamsen, Biology, advisor**

The overuse of antimicrobials can select for antimicrobial resistant strains of common bacteria such as *Staphylococci*, which can infect both pets and humans. Subsequent infections with these bacteria can be hard or impossible to treat. The objective of this study was to assess the prevalence of antibiotic resistant strains of *Staphylococcus* present as normal flora in dogs. This research was carried out on 30 dogs sheltered at the Androsoggin Humane Society in Lewiston. Noses, mouths, and bodies of the dogs were swabbed and cultured for antibiotic resistant and antibiotic sensitive *Staphylococci*. 90% of nasal swabs, 60% of mouth swabs and 40% of body swabs yielded antibiotic resistant *Staphylococcus* of various species. This data suggests that the bacterial flora in healthy dogs may act as a reservoir of antibiotic resistant Staph or resistance genes that have the potential to spread to other animals and to humans.

**Isabel Koyama '16**

***From "Refugees" to "Productive Citizens": Creating Bhutanese Spaces of Belonging in New Hampshire***

**Steven Kemper, Anthropology, advisor**

More than 60,000 Nepali-speaking refugees from southern Bhutan (Lhotshampa) have been resettled to the United States since the early 2000s. Around 2,000 currently reside in New Hampshire, where I have conducted the ethnographic fieldwork for my senior thesis with the Bhutanese Community of New Hampshire (BCNH), a nonprofit organization based in Concord and Manchester. Featuring the firsthand perspectives of Bhutanese speakers from BCNH, this panel will discuss how Bhutanese refugees are actively creating productive, inclusive social networks of belonging (both physical and virtual), and how they are cultivating an ethos of hope on a day-to-day basis.

**Mary Krathwohl '16** – see Nina Doonan '16  
*Environmental Justice in the Americas*  
**Melinda Plastas, African American Studies, Environmental Studies, Women and Gender Studies, advisor**

**Detmer Kremer '16**  
*Drops of One Ocean: Encountering and Understanding Globalization in the Baha'i Faith Communities of Samoa, Latvia, Lithuania, and the Netherlands*

**Joshua Rubin, Anthropology, advisor**  
This research examines the processes of globalization in different Baha'i communities in Samoa, Latvia, Lithuania, and the Netherlands. Drawing evidence from interviews and observations of community events and prayer services, and theoretical support from Foucault's concept of authorship and Tsing, Rifkin, and Appiah's theories of globalization, this research argues that the use of spirituality in Baha'i rhetoric centers human experience in globalization, resulting in tangible examples that defy assumed homogenization and incorporate the ways in which friction between local and global streams of culture produce and reproduce heterogeneous cultural communities.

**Elise Krims '16**  
*Women's Image: Dissatisfaction and Eating Disorders in Argentina*

**Baltasar Fra-Molinero, Spanish, advisor**  
This thesis examines the representation of anorexia as a prevalent eating disorder in Argentina. Although anorexia is discussed in the medical world, the root of eating disorders is not, in fact, medical. Eating disorders are a result of the social and cultural influences that we see in developed countries. I will examine literature to deconstruct the medicalization of eating disorders like anorexia. Through the use of a critical feminist approach this study argues that dissatisfaction with perceived and assigned positions of gender, class, race, and sexuality is at the root of what is socially constructed as an eating disorder, consistent with the values and ideas prevalent in Argentinean society. This thesis argues that dissatisfaction is at the origin of anorexia, whether that dissatisfaction stems from one's self-perception, perception of society, or any other number of factors. Cielo Latini's autobiographical fiction *Abzurdah* looks at eating disorders as not mental illness but as a reflection and critique of the values and ideals that construct the image of the woman in modern Argentine society.

**Elizabeth Laverghetta '16** – see Hannah Gottlieb '16  
*Museological Experience and Independent Projects in Art Museums*

**Anthony Shostak, Museum of Art, advisor**

**Graham Leathers '16** – see Tara Das '16  
*The Francophone Faces of Lewiston: An Exploration of the Spindle City's French-Speaking Past, Present, and Future*

**Mary Rice-DeFosse, French and Francophone Studies, advisor**

**Abigail Leberman '16**  
*Investigating Intra-Laminar Heterogeneity of the Main Olfactory Bulb*

**Jason Castro, Psychology, advisor**

The peripheral sensory inputs to the main olfactory bulb are topographically organized, defining a system of molecularly heterogeneous modules. A longstanding question is whether the intrinsic bulbar circuits composing these columns are similarly specialized. Is the bulb a system of functionally distinct columns, or is it one invariant circuit, iterated many times in parallel? To investigate this, we quantified the areal patterning of the 30 potassium channel genes across the mitral cell layer at three depths. Our analyses suggest non-uniform expression, with evidence of spatial periodicity. Principal components analysis revealed that spatial patterning of potassium channel expression is highly periodic. A power spectral density analysis of a periodic expression profile indicated a low-frequency power law, and that of uniform and "bursty" profiles indicated noisy frequency. Together, these analyses indicate high diversity in expression patterns of potassium channel genes in the bulb, preliminary evidence that the bulbar circuits are specialized.

**Jillian Legere '16**  
*Synthesis of Amino-substituted 2-methylresorcinarene as a Chiral Solvating Agent*

**Thomas Wenzel, Chemistry, advisor**

Chiral molecules have structures that are mirror images of each other but not superimposable. This phenomenon can be interesting because one form of the molecule, known as an enantiomer, may react differently in the body than the other form. Because of this, chemists have discovered a method to distinguish enantiomeric compounds using chiral solvating agents. In this method, one enantiomer fits better into the chiral solvating agent than the other. The difference in the environment of the two forms can be measured using nuclear magnetic resonance (NMR) and therefore the enantiomers can be differentiated. My presentation focuses on the synthesis of 2-methylresorcinarene as a new chiral solvating agent.

**Rebecca Leloudis '16**  
*Water Pollution and Infectious Disease among Maine Anurans*

**Brett Huggett, Biology, advisor**

Chytridiomycosis is an amphibian skin infection caused by the fungus *Batrachochytrium dendrobatidis* and is responsible for massive declines in global anuran populations. Agricultural pesticides such as chlorothalonil and atrazine, as well as antifungal compounds in household cleaners have been shown to decrease fungal load in infected frogs, and are often found in municipal run-off. Southern Maine contains waterbodies polluted by these compounds as well as relatively clean and uninhabited areas. By comparing water quality and the chytridiomycosis infection intensities of anurans from polluted and unpolluted sites, this study investigates any correlation between pollution, water quality, and prevalence of *B. dendrobatidis* in anurans of southern Maine.

**Sasha Lennon '16**

***Women and Men's Self-Esteem across the Four Years at Bates***

**Kate White, Psychology, advisor**

The purpose of this study is to examine changes in student's self-esteem across four years at a small liberal arts college. I hypothesize that women's self-esteem will decrease while men's self-esteem remains stable across the four college years. In addition to testing for this relationship, I will test for possible mediating factors including social connectedness, attitudes toward self-attributes, body-image, depression, anxiety, stress, substance use, and other habits and behaviors. The data will be analyzed using correlational tests and a one-way between groups ANOVA. The results will provide insight into the college experience and perhaps lend solutions to address the self-esteem gap between women and men in emerging adulthood.

**Nate Levin '16**

***Structural, Cultural, and Political Factors that Facilitate an Unfair Exchange for Collegiate Athletes at the Division I Level***

**Francesco Duina, Sociology, advisor**

This thesis offers a comprehensive investigation of compensation for collegiate athletes by outlining the trajectory of college sports from its inception to the current day. I focus on the sociological factors of labor and exploitation through an exploration of publications on the matter, which drive conversation pertaining to appropriate compensation for college athletes. The course of collegiate athletics, and the intersection of labor and exploitation therein, suggests that in the status quo collegiate athletes are taken advantage of by colleges and universities. This necessitates fundamental change to the collegiate athletic system to ensure just compensation for student-athletes in exchange for their services. The paper asks what structural, cultural, and political factors account for the continued institutional setup that facilitates an unfair exchange for collegiate athletes at the Division I level.

**Seth Lieberman '16**

***Development of Selective Plane Illumination Microscopy to Investigate the Molecular Underpinnings of the Mitral Cell Layer in the Olfactory Bulb of Transgenic Mice***

**Jason Castro, Psychology, advisor**

The projections of olfactory nerves in the sensory periphery to the olfactory bulb – the first central brain structure devoted to processing odors – are genetically heterogeneous, and topographically organized. However, we understand little about how this map is preserved or discarded in subsequent processing stages. We hypothesize that the bulb is in fact a system of non-overlapping modules that show heterogeneous gene expression. To test this, we are developing techniques to image large volumes of tissue at cellular resolution. Specifically, we are building and developing a selective plane illumination microscope (SPIM) system that allows us to image large volumes of intact brain tissue by illuminating and detecting a single plane at a time.

**Gibbs Lilly '16**

***The Elaboration Likelihood Model: The Moderating Role of Personal Variables in the Processing of Persuasive Appeals***

**Katherine Mathis, Psychology, advisor**

Individuals are continually bombarded with persuasive messages. The Elaboration Likelihood Model (ELM) highlights the manner in which these messages are processed, detailing two types of "routes" individuals undertake. The central route is characterized by intense consideration of the information at hand; the peripheral route is characterized by reliance on shorthand heuristics. This review considers how differences across individuals affect the ELM, including Need for Cognition (NFC), personal involvement, and mood. The review will offer recommendations on how such findings can be implemented by advertising planners, propose additional directions to be explored, and examine whether the ELM is relevant in the digital world today.

**Karen Lockhart '16**

***Athletic Identity and the Impact of Career Transitions***

**Susan Langdon, Psychology, advisor**

This study seeks a deeper psychological understanding of the role that career transitions play in the individual and social identity of an athlete, including retirement from sport, career-ending injuries, and transitions through different levels of sport. Survey results from senior student-athletes at Bates College will be analyzed. Overall, I take a closer look at the significance and impact of excessive athletic identity in athletes.

**Hannah Loeb '16**

***Understanding the Effect of Metronidazole on Zebrafish Caudal Fin Regeneration***

**Nancy Kleckner, Biology, advisor**

Zebrafish (*Danio rerio*) possess the unique ability to regenerate whole limbs and certain organs following amputation or injury (Poss et al., 2003). Previous work has indicated a neural necessity for such regenerative processes to occur (Kumar et al., 2007, Simões et al., 2014). However, a peripheral neuropathic agent, metronidazole (MTZ), has been shown in our preliminary work to enhance regeneration and the expression of growth factor, Agr2+, despite its neuropathic characteristics. The purpose of this thesis will be to investigate the mechanism that leads metronidazole to cause this increase in regeneration in the caudal fin of zebrafish. The first part of this study will be aimed to reconfirm our preliminary results: that metronidazole does indeed lead to an increase in regeneration and the expression of Agr2+, via stereoscope growth measurements and confocal analysis. The second part of the study will compare the expression level of two main growth regulators: the fibroblast growth factor (FGF), and Notch along with Agr2+ when MTZ /vehicle is applied via a quantitative polymerase chain reaction. The results of these studies will help characterize the signaling and biochemical pathways that underlie successful regeneration.

**Henry Loeffler '17**—see Livie Gilbert '19  
*Humanitarian Work's Hidden Agendas: Treating HIV/AIDS in Tanzania and Swaziland*  
Leslie Hill, Politics, advisor

**Megan Lubetkin '16**  
*Hydrothermal Nontronite Formation at Seamount Number 3 (Wolf-Darwin Seamount Chain, Galapagos Marine Reserve)*

**Geneviève Robert, Geology, advisor**

An unusual deposit of Fe-rich hydrothermal nontronite was recovered by remotely operated vehicle (ROV) from Seamount No. 3 of the Wolf-Darwin seamount chain, Galapagos Marine Reserve. Analyses show that this deposit is chemically and mineralogically similar to other deep-sea hydrothermal nontronites, indicating a formation temperature of 30° to 50° Celsius. Although hydrothermal nontronite has been sampled at a number of sites by coring and dredging, this is the first in situ documentation of its sinuous, tubular structure on the seafloor. Image-analysis of ROV imagery suggests that this unusual pattern might be controlled by fluid pathways in the underlying pillow lavas.

**Mikka Kei Macdonald '16**  
*Japanese American Internment Camps: A Narrative Collection*

**Ke Ren, History, advisor**

During World War II, nearly 110,000 persons of Japanese descent were forced into internment camps in the United States. This project works to collect the narratives of the author's Japanese-American family members as a way to honor their memories and preserve their history. In the past, understanding the internment experience proved difficult, as the postwar period yielded a sense of shame that prevented many internees from telling their story. This project attempts to contribute personal narratives to the wider framework of Japanese-American history in the United States as a way to humanize the history, and to ensure that a similar event does not happen again.

**Avery Margerum '18** – see Adair Andre '18  
*Comparing Nollywood and Burkina Faso Film Industries*  
Leslie Hill, Politics, advisor

**Welles Mathison '16**  
*Cleaning Up: A Chemical Basis for the Financial and Ecological Improvement of Maine's Mill-Based Economy*  
Pamela Baker, Biology, advisor

This thesis project reviews current knowledge about the two main methods of paper production that were used by the mills along the Androscoggin River, namely the sulfite and Kraft processes. The chemical mechanisms underlying these processes are reviewed and are contextualized in the political fight surrounding the pollution of Maine rivers as a result of the booming pulp and paper industry. The varying effects of these two processes on river pollution are quantified by a new analysis of water quality data recorded between 1947 and 1977 by Walter Lawrance, a former Bates chemistry professor.

**Kei Matsunami '16** – see Tara Das '16  
*The Francophone Faces of Lewiston: An Exploration of the Spindle City's French-Speaking Past, Present, and Future*  
Mary Rice-DeFosse, French and Francophone Studies, advisor

**Ethan McGinnis '19, Brian Pansius '19, King Valdez '19, and Brandon Williams '17**  
*The Remnants of Oppression: Race-based Economic Inequality in Post-Apartheid South Africa*  
Leslie Hill, Politics, advisor

Despite ending apartheid's mandated structuring of the racial income divide, black South Africans' wages remain 90% lower than those of white South Africans, fueling racial animosity. Study of the 2014 South African platinum worker's strike and police repression reminiscent of apartheid will allow us to explore why many black South Africans consider themselves to be worse off financially today and how government has responded to persistent income inequality. Furthermore, by examining the legacy of apartheid educational disparities, scholarly analyses of the ANC's development strategy (GEAR), as well as citizen and worker perspectives we uncover complex reasons underlying South Africa's failure to achieve equality.

**Madeline McGonagle '18** – see Paige Guevarra '18  
*Dendrology Course Project: The Bates Canopy*  
Brett Huggett, Biology, advisor

**Colin McIntire '16**  
*Pollination Facilitation via Bumblebees*  
Carla Essenberg, Biology, advisor

My thesis research focused on pollination ecology, specifically how two different species of plant growing together may mutually benefit each other by facilitating each other's pollination. My experiment involved training live bumblebees on artificial flowers of two different colors and then observing them forage individually on flower patches to determine their preferences.

**Jane McLarney '16**  
*Expression, Isolation, and Purification of the E3 Ubiquitin-Protein Ligase, DTX3L, Using NEB Express<sup>®</sup> E. coli and the Bac-to-Bac<sup>®</sup> sf9 Expression Systems*  
Glen Lawson, Chemistry, advisor

Picornavirus replication requires coordination of many processes between the virus and the host cell machinery. The encephalomyocarditis virus 3C protease is critically active in polyprotein processing during picornavirus replication. Additionally, this 3C protease is a target for ubiquitylation by host cell E3 ubiquitin-protein ligases, which tag the 3C protease for degradation by proteasomes. Further understanding of these E3 ubiquitin-protein ligases' function may expand our knowledge of picornavirus replication. In this study, the InFusion<sup>®</sup> HD Cloning system and the expression of the maltose-binding protein (MBP)-DTX3L and glutathione (GSH)-DTX3L fusion proteins were used to isolate the DTX3L E3 ubiquitin-protein ligase. NEB express<sup>®</sup> E. coli and the Bac-to-Bac<sup>®</sup>

expression system were used. Restriction enzyme digests of the vector constructs visualized on a 0.8% agarose gel and DNA sequencing show that InFusion® HD Cloning produced the pMAL-c5X-DTX3L fusion vector. SDS-PAGE and protein immunoblotting did not conclusively show either MBP-DTX3L or GSH-DTX3L production in *E. coli*. Further experimentation with the Bac-to-Bac expression system is needed to determine the efficacy of this approach.

**Katherine McNally '17**

***Story Telling and Social Justice in Coastal Communities***

**Loring Danforth, Anthropology, advisor**

Climate change is changing life for rural coastal communities. In the summer of 2015, I interviewed residents and fishermen on the island of Grand Manan in New Brunswick, Canada, about how their lives have changed in response to warming waters and overfishing in the Bay of Fundy ecosystem. To culminate my project, I self-published a book of those interviews for the Grand Manan community. I will discuss memory sharing as a form of activism and the ethical difficulties associated with sharing other people's stories. I will also consider the challenges of faithfully representing places and people that are often romanticized.

**Lydia Merizon '16 – see Raja Junaid Jahangir '16**

***Fast Fourier Transform: Algorithmic Analysis***

**Katharine Ott, Mathematics, advisor**

**Laurel Meyer '16 – see Constance Brimelow '16**

***Knowledge and the Public Good: Community-Engaged Research across the Disciplines***

**Darby Ray, Harvard Center for Community Partnerships, advisor**

**Filip Michalsky '16**

***Detecting Nonlinear Optical Signals Generated by Single Gold Nanoparticles***

**Matthew Côté, Chemistry, advisor**

Nonlinear optical interactions of light with plasmonic metals have gained importance given the possible technological applications in biosensing, microscopy, photovoltaics, and high-speed optoelectronic logic circuits. Plasmonics is the study of plasmons, collective oscillations of free electrons in metals. Plasmons are accompanied by strong local electric fields which augment the nonlinear optical behavior of metals. I studied the nonlinear generation of second and third optical harmonics from gold nanoparticles. To measure the weak signals from individual gold nanostructures I implemented a time-gated photon counting detection system.

**Mary Mignone '16 – see Hannah Albertine '16**

***Literary Reading by Creative Thesis Writers***

**Robert Farnsworth, English, advisor**

**Megumi Milla Achahue '16 – see Constance Brimelow '16**

***Knowledge and the Public Good: Community-Engaged Research across the Disciplines***

**Darby Ray, Harvard Center for Community Partnerships, advisor**

**Elizabeth Miller '16**

***The Effect of Drawing on the Development of Emergent Literacy Skills in Early Childhood Education***

**Georgia Nigro, Psychology, advisor**

Preschool children who experience difficulties in emergent literacy development are at an increased risk for elementary school failure. It is important to address these problems as they occur in early childhood and seek out strategies to provide disadvantaged students with a quality education. A community-based ethnographic study was carried out to investigate how drawing and literacy are related in order to see if drawing could help preschool students develop the necessary pre-literacy skills to become academically successful. Where appropriate, a more intensive drawing intervention with children lagging behind was tried.

**Rakiya Mohamed '18 – see Joseph Alp '18**

***The World, the Self, and the Poet***

**Lavina Dhingra, English, advisor**

**Evan Molinari '16**

***Black and Labeled Red by White and Brooklyn Blue: Paul Robeson, Jackie Robinson, and their Competing Perspectives within the Struggle for Black Equality during the Second Red Scare***

**Hilmar Jensen, History, advisor**

In 1949, multitalented activist Paul Robeson argued African Americans would not fight for the U.S. military against the more racially egalitarian USSR. This garnered public outrage within anti-Communist, racist America. Amidst his best season, trailblazing baseball star Jackie Robinson testified before Congress's Un-American Activities Committee against Robeson, and denied any connection between Communism and the civil rights struggle. Why did Robinson testify when both demanded racial equality? What might this reveal about the civil rights struggle and the definition of "un-American"? Different vocations, experiences, and principles determined their contrasting opinions, but solidarity emerged despite the racial and political oppression of cold-war America.

**Cira Mollings Puentes '16**

***Phosphated Cyclodextrins as Water-soluble Chiral NMR Solvating Agents***

**Thomas Wenzel, Chemistry, advisor**

Prior work has shown that anionic sulfated [1] and carboxymethylated [1-4] cyclodextrins are more effective water-soluble chiral NMR solvating agents for cationic substrates than the corresponding neutral native cyclodextrins. Presumably an ion pairing interaction between the anionic group of the cyclodextrin and cationic substrate is important in enhancing the degree of enantiomeric differentiation in the NMR spectrum. In this study we examine the utility of phosphated a-, b- and g-cyclodextrin as chiral NMR solvating agents for cationic substrates. Two sets of phosphate derivatives, one with degrees of substitution in the 2-6 range, the other with degrees of substitution in the 6-10 range, are examined.

**Erin Montanez '16**

*Readings from "Quehaceres domésticos": Meditations on Seeing and Writing Bilingually*

**Francisca López, Spanish, advisor**

This presentation will highlight the continuities and discontinuities of writing and reading bilingually, between English and Spanish, as explored throughout an independent study in creative writing during the fall semester. The reading will feature a selection of narrative poems, the performance of which will employ qualities of spoken word in order to convey the bilingualism of the poems more fully. The use of narrative poetry represents the author's attempts to resolve the discomfort of writing, thinking, and seeing in two different languages and the fruitfulness of such instability.

**Alanna Morque '18 – see Jacqueline Cooper '17**

*Family Matters: The Pros and Cons of Child Marriage in Northern Nigeria*

**Leslie Hill, Politics, advisor**

**Alexandra Morrow '16 – see Constance Brimelow '16**

*Knowledge and the Public Good: Community-Engaged Research across the Disciplines*

**Darby Ray, Harvard Center for Community Partnerships, advisor**

**Michela Moscufo '16 – see Hannah Gottlieb '16**

*Museological Experience and Independent Projects in Art Museums*

**Anthony Shostak, Museum of Art, advisor**

**Emilie Muller '16 – see Melissa Carp '16**

*Perspectives on Jewish Religion and Culture*

**Thomas Tracy, Philosophy and Religious Studies, advisor**

**Students in Music 237, Computers, Music, and the Arts**

*Environmental Electronica*

**William Matthews, Music, advisor**

QR codes – the ubiquitous black and white square optical labels – link individuals to data through smartphone apps which read them. Students in Music 237, Computers, Music, and the Arts, have composed works of electronic music and have created QR images that point to their musical pieces on Soundcloud. When Summit-goers access a QR code with their smartphone, they will hear a student's piece of music. When a number of people do this together and turn their volume up, a beautiful environmental soundscape is the result.

**Sam Myers '16 – see Cheyenne Cannarozzo '16**

*Everything You Always Wanted to Know about Chaucer But Were Afraid to Ask: Gender, Politics, and Sexuality in The Canterbury Tales*

**Sylvia Federico, English**

**James Naso '16**

*Quantifying Malarial Parasitemia in Whole Blood Using a Novel qPCR Strategy*

**Karen Palin, Biology, advisor**

With almost half of the world's population still at risk of contracting malaria, accurate and sensitive diagnostic

techniques are critical for global malaria control and elimination efforts. This study explores a novel molecular-based diagnostic assay that has been proven more sensitive and specific for *Plasmodia falciparum* detection compared to malaria diagnoses by microscopy and rapid diagnostic tests. A standard curve was generated using positive controls and qPCR was performed to quantify parasite loads in whole blood from patients enrolled in a cohort study in Uganda.

**Alexandra Nason '18 – see Jacqueline Cooper '17**

*Family Matters: The Pros and Cons of Child Marriage in Northern Nigeria*

**Leslie Hill, Politics, advisor**

**Rachel Neckes '16**

*Justifying Moral Evaluations: The Capabilities Approach to Female Genital Surgeries*

**Susan Stark, Philosophy, advisor**

An anthropological analysis of the varying cultural conditions for well-being suggests that there is no universal good for humans. Despite the cross-cultural differences in well-being, my thesis argues that, under some circumstances, we are justified in evaluating the moral practices of other cultures. I examine emotionism, as it is developed and defended by Jesse Prinz, which claims that we cannot judge the moral practices of other cultures because moral claims are grounded in brute emotion. Using evidence from contemporary psychology and neuroscience, I demonstrate the deep connection between cognition and emotion and argue that moral utterances are not statements of feeling, but statements of belief. Recovering objective truth, I reconstruct Martha Nussbaum's capabilities approach to provide a framework for sensitive and just moral judgment, focusing on gender equality and human dignity. Using this platform, I analyze the moral matter of female genital surgeries, both in regions of North and West Africa and within the United States.

**Khoi Tuan Nguyen '16**

*Characterizing Optical Aberrations in Fluorescence Correlation Spectroscopy*

**Travis Gould, Physics, advisor**

Understanding the effects of aberrations is essential for any optical system. Fluorescence Correlation Spectroscopy (FCS) is a confocal-based fluorescence technique commonly used to measure time-dependent information in a diffraction-limited observation volume. However, the effects of aberrations on correlation curves has not been studied in depth. Here we present a study of the effects on correlation curves when a deformable mirror is used to modulate aberrations in an FCS setup. An orthogonal basis set of mirror modes is derived from the mirror geometry, which allows modulation of both the excitation and detection beam phase profiles. The phase profile created by each mirror mode is used to calculate a theoretical observation volume, which is subsequently used to determine the expected correlation curve. Additionally, we compare these theoretical calculations with experimentally measured correlation curves. Finally, these mirror modes are categorized based on their respective effects on the FCS correlation curves.

**Abbey Nolan '19 – see Livie Gilbert '19**  
*Humanitarian Work's Hidden Agendas: Treating HIV/AIDS in Tanzania and Swaziland*  
Leslie Hill, Politics, advisor

**Peter Novello '16**  
*A Wet Chemical Approach to Control the Geometry of Plasmonic Gold Nanoparticles*  
Matthew Côté, Chemistry, advisor  
Gold nanoparticles can be engineered to control their plasmonic effects and optical properties. The quantized oscillation of electron density, called plasmons, excite an electromagnetic field around a nanoparticle. The plasmonic behavior of these particles enhances their nonlinear optical response allowing multiple photons to combine and form a higher energy photon. The strength and location of the electromagnetic field depends on the geometry of the nanoparticle so developing chemical syntheses that provide control over nanoparticle shape and size is a crucial step toward developing plasmonic structures with desired properties. This work focuses on developing facile syntheses of a variety of gold nanoparticle geometries, including nanospheres, microplates, and high aspect ratio gold nanorods, opening up new possibilities for the study of plasmonic enhancement.

**Kyle Olehnik '16**  
*From Mosul to Raqqa: The Rapid Rise of the Islamic State*  
Senem Aslan, Politics, advisor  
When the Islamic State (IS) overran cities such as Mosul and Ramadi in Iraq during the late summer months of 2014, it was a shock to the whole world. Eventually, the question emerged: How could a terrorist organization take over territories and cities in two countries so rapidly? Predatory State Theory, where war helps build states, primarily accounts for the lightning quick creation of the Islamic State.

**Ezra Oliff-Lieberman '18 and Ahmed Sheikh '17**  
*Creating Communal Re-Entry Programs for Lewiston's Formerly Incarcerated Immigrant Youth*  
Cynthia Baker, Religious Studies, advisor  
Through community-engaged work with the Maine Immigrant Refugee Services (MIRS), we have researched re-entry programs for formerly incarcerated immigrant youth across the country. From this research, we are developing similar programs designed to serve the local Somali community in Lewiston. By creating a network of resources, programing, and support systems, we seek to decrease the rate of recidivism for immigrant youth, who are often disproportionately affected by the criminal justice system.

**Melissa Paione '16**  
*The Implications of Processing our First Names without Awareness in Continuous Flash Suppression (CFS)*  
Todd Kahan, Psychology, advisor  
People have a well-practiced capacity to respond to their own name; one's own name may be recognized automatically. Previous research suggests that a person's name is processed subconsciously and that it may attract attention. The current study uses a newly developed task

(continuous flash suppression; CFS) to examine whether these claims are true. Sixty participants with normal or corrected-to-normal vision will be recruited on a voluntary basis from introductory psychology courses at Bates College. Participants completed a computer-based task where they were shown either their own name or another person's name unconsciously. The time for the name to reach consciousness was measured. Results are discussed in relation to claims that have been made about the attention capturing properties of one's own name.

**Jia-Ahn Pan '16 – see Hannah Jeffrey '16**  
*An Application of Fourier Series to the Most Significant Digit Problem*  
Katharine Ott, Mathematics, advisor

**Brian Pansius '19 – see Ethan McGinnis '19**  
*The Remnants of Oppression: Race-based Economic Inequality in Post-Apartheid South Africa*  
Leslie Hill, Politics, advisor

**James Pardo '18 – see Adair Andre '18**  
*Comparing Nollywood and Burkina Faso Film Industries*  
Leslie Hill, Politics, advisor

**Daniel Paseltiner '16**  
*Progress toward Bose-Einstein Condensation on an Atom Chip as a Functional Testbed for Experiments aboard the Orbital NASA Cold Atom Laboratory*  
Nathan Lundblad, Physics, advisor  
We present the development of an atom chip-based Bose-Einstein Condensate (BEC) experiment at Bates College, to serve as a functional testbed for future research aboard the International Space Station. A theoretical and experimental description of the process, driven by laser cooling and magnetic trapping techniques, used to realize a BEC on an atom chip is provided. A 2D+ Magneto-Optical Trap (MOT) is used as a slowed source of 87Rb to load a 3D MOT. The performance of both MOTs is quantified, and a path toward condensation on the chip-based magnetic trap through use of radiofrequency evaporative cooling is outlined.

**Elizabeth Patterson '16**  
*Stocks and Sources of Carbon Buried in the Salt Marshes and Seagrass Beds of Patos Lagoon Estuary, Southern Brazil*  
Beverly Johnson, Geology, advisor

This project investigates carbon source and stocks in salt marshes and seagrass beds in the Patos Lagoon estuary located in Southern Brazil. Sediments from nine total cores (50cm) along three transects spanning from marsh to seagrass beds to unvegetated sediments were analyzed for %C, C/N ratios, and the isotope ratios of <sup>13</sup>C/<sup>12</sup>C, and <sup>15</sup>N/<sup>14</sup>N. Organic carbon (1-10%) was found in all sediment cores suggesting that both the salt marshes and seagrass beds in this region are sequestering carbon. Early results indicate that carbon source in marshes is influenced by surrounding vegetation whereas carbon in seagrass beds and unvegetated areas could come from a mix of sources.

**Theodore Pender '18** – see **Cheyenne Cannarozzo '16**  
*Everything You Always Wanted to Know about Chaucer But Were Afraid to Ask: Gender, Politics, and Sexuality in The Canterbury Tales*  
**Sylvia Federico, English, advisor**

**Bryant Perkins '16**  
*Characterizing the Interactions of Plant Alkaloids and Flavonoids with DNA and tRNA*  
**Glen Lawson, Chemistry, advisor**  
Alkaloids and flavonoids are structurally similar groups of naturally occurring chemical compounds. This study focuses on characterizing the formation of drug-nucleic acid complexes using three members of the alkaloid and flavonoid families: aristolochic acid, myricetin, and kaempferol. Ethidium bromide, a known intercalator of DNA and tRNA, was used as a positive control. Through UV-visible spectroscopy and scatchard plot analysis, relative binding affinities were determined for each complex. Melting temperatures were also calculated using uv-visible spectroscopy techniques. Finally, for the purpose of moving into a live system, Ames Tests were carried out in *S. typhimurium* cell cultures to determine compound mutagenicity.

**Carly Peruccio '16**  
*Les Femmes Guides de Montagne: Negotiating Gendered Spaces in Morocco*  
**Loring Danforth, Anthropology, advisor**  
*Guides de montagne* are Moroccan mountain guides who have trained and received accreditation to lead hiking groups throughout Morocco's mountain ranges and natural spaces. Fewer than one percent of these mountain guides have been women. While most scholarship discusses Moroccan women's place in private, indoor, and domestic spaces, the female *guides de montagne* challenge long-held paradigms of Moroccan cultural and gendered spaces. Based on fieldwork conducted from April to July 2015 near Morocco's Atlas Mountains, this thesis examines the experiences of five women who work as *guides de montagne*. I study their access to the guiding profession and their experiences at a mountain guide school; their interactions with tourists, male coworkers, and people who live in Morocco's mountain ranges; and the relationship between professional and familial obligations. Using theoretical approaches of cultural and feminist geography, I analyze how female *guides de montagne* negotiate their participation in a predominantly male industry as they move through and across Morocco's gendered spaces.

**James Peterson '16**  
*Application of Synthetic Peptides as Potential Inhibitors to Borrelia burgdorferi Pathogenicity*  
**Paula Schlax, Chemistry, advisor**  
*Borrelia burgdorferi*, the causative bacteria behind Lyme disease uses lipoproteins to bind host complement proteins and avoid innate immunity-catalyzed destruction. Bacterial protein redundancy facilitates this process. Five BbCRASPs (*Borrelia burgdorferi* Complement Regulator-Acquiring Surface Protein) have complement protein

interacting regions. However, BbCRASP-1 and BbCRASP-2 have been identified as the primary contributors to this complement system evasion. In the past, antibiotic treatments have proved somewhat successful, but as bacteria mutate, or exchange DNA to gain antibiotic resistance, antibiotic treatment becomes less viable. In silico peptide design can predict peptide structures that have binding affinities to complement protein attachment regions on BbCRASPs. Peptides with high binding affinities have potential to act as therapeutics which could be used instead of antibiotics. This project used the program Pepsite2 to generate potential inhibitory peptides for a proposed in vitro experiment that would use fluorescein-5-EX, succinimidyl ester as a fluorescent tag on a variety of BbCRASPs, human complement proteins, and short, synthetic peptides to quantify binding affinity and denote any potential inhibitory activity.

**Max Petrie '18** – see **Cheyenne Cannarozzo '16**  
*Everything You Always Wanted to Know about Chaucer But Were Afraid to Ask: Gender, Politics, and Sexuality in The Canterbury Tales*  
**Sylvia Federico, English, advisor**

**Jessica Plotnikov '16** – see **Allie Freed '16**  
*Can Women Paint? Can Women Write? Worldly Women as Artists*  
**Lavina Dhingra, English, advisor**

**Roderick Pratt '18** – see **Cheyenne Cannarozzo '16**  
*Everything You Always Wanted to Know about Chaucer But Were Afraid to Ask: Gender, Politics, and Sexuality in The Canterbury Tales*  
**Sylvia Federico, English, advisor**

**Samuel Predham '16**  
*Synthesis of Benzimidazolone Derivatives via Palladium Catalyzed Oxidative C-H Amination: Relating Substrate Acidity to Reactivity*  
**Patrick Jokiel, Chemistry, advisor**  
Benzimidazolones are nitrogen-containing heterocycles that possess biological properties. Traditional means of synthesizing these compounds were not founded on principles of green chemistry. Previous efforts in this research laboratory have demonstrated palladium (II) catalyzed oxidative C-H amination as a sustainable alternative to the synthesis of benzimidazolone derivatives. The objective of this research was to identify a relationship between substrate acid strength and reactivity. Reactivity was examined by substituting various electron withdrawing and electron donating groups into the R3 position of the urea substrate. Diversely substituted N-N'-diaryl urea substrates were synthesized and their performance in the oxidative C-H amination reaction was examined.

**Lindsey Prelgovisk '16** – see **Hannah Gottlieb '16**  
*Museological Experience and Independent Projects in Art Museums*  
**Anthony Shostak, Museum of Art, advisor**



**Ian Ramsay '16*****Characterizing the Activity of a Truncated Mycobacterium tuberculosis H37Rv 1-monooxygenase (AlkB) for Insight into Protein Structure, Active Site Determination, and Reaction Mechanism*****Rachel Austin, Chemistry, advisor**

Alkane 1-monooxygenase (AlkB) is a membrane spanning protein found in a diverse range of bacteria species that hydroxylates the terminal position of medium chain length alkanes. AlkB selectively breaks an alkane carbon–hydrogen bond and activates molecular oxygen, neither of which can be easily replicated in the laboratory. To better understand this enzyme and its method of catalysis, a truncated variant of *Mycobacterium tuberculosis* has been characterized to better understand the properties of substrate specificity, reaction rate, and reveal further insight into active site structure.

**Dylan Ray '16*****1-(1-Naphthyl)Ethylurea Derivatives of Amino Acids as Chiral Solvating Agents*****Thomas Wenzel, Chemistry, advisor**

We are investigating the use of 1-(1-naphthyl)ethylurea derivatives of amino acids as novel NMR chiral solvating agents. Using the methyl ester variants of amino acids L-valine and L-tert leucine bound to (S)-(+)-1-(1-naphthyl) ethyl isocyanate, these chiral solvating agents will hopefully allow the determination of enantiomeric purity of select substrates through NMR spectroscopy. Prior studies used identical amino acids with (R)-(-)-1-(1-naphthyl) ethyl isocyanate and found that spectral enantiomeric separation occurred, and we are hopeful that using the S enantiomer of the naphthyl ethyl isocyanate will yield greater NMR separation of the enantiomers.

**Rosa Reyes '16*****Characterization of RSK1 and p27kip1 in Metastatic Breast Cancers*****Stephanie Richards, Biology, advisor**

Every year thousands of women are diagnosed with breast cancer, of which more than 40,000 diagnoses lead to death. Harmful mutations from genetic and environmental sources can cause cancerous growth by altering certain cell-signaling pathways. Specifically, the p90 ribosomal S6-kinase 1 or RSK1 protein kinase has been found to be overexpressed in more than 50% of metastatic breast cancer types. This overexpression has been correlated to enhanced cellular proliferation and increased cell motility. RSK1 forms part of the RSK family of protein kinases found in humans. As a protein kinase, its main job is to activate or modify other proteins through the addition of a phosphate group. One of the proteins modified by RSK1 is the CDK2 (cyclin-dependent kinase) inhibitor p27kip1, whose role is to stop the transition from G1 to S phase of the cell cycle. In certain cancers, where RSK1 is found in high concentrations, increased phosphorylation of p27kip1 results in its mislocalization from the nucleus to the cytoplasm, which can contribute to metastasis. A detailed characterization of how RSK1 regulates p27kip1 activity in metastatic breast cancer cells could be highly relevant in gaining a better understanding of the unregulated pathways that shape this disease.

**Mitchell Rider '17*****Assessing the Effectiveness of the Turks and Caicos Government's Marine Protected Areas and Size Regulations in Relation to Snapper Populations in South Caicos*****Stephen Sawyer, Office of Off-Campus Study, advisor**

The Turks and Caicos government recently implemented a new size regulation for all snapper species caught, and introduced marine protected areas (MPAs) in an effort to increase snapper abundance. This study assesses if the generic size regulation is appropriate for all snapper species, and if the marine protected areas are increasing abundance of snapper as intended. Results suggest that a more species-specific size regulation is warranted to prevent over-harvest of snappers that have not reached reproductive maturity, and larger MPAs are required in order to function effectively, as snapper populations currently do not differ in density inside and outside MPAs.

**Bria Riggs '18*****Revolutionizing Conservation: Biocultural Diversity, Co-management, and Indigenous Peoples*****Ethan Miller, Environmental Studies, advisor**

This research explores alternative methods of conservation that consider the social and cultural values instilled in protected areas through collaboration between conservationists and indigenous peoples. Biocultural diversity describes an ecosystem in terms of the intersection among language, culture, and biology and the ways in which these elements work together to influence communities. By examining multiple case studies from around the world, a spectrum of conservation methodologies, with influential and pragmatic impacts for both conservationists and indigenous communities, is presented in order to question the current mainstream system of environmental management and conservation.

**Lydia Rosenfield '16*****The Efficacy of Social Stories for Young Children with Emotional and Behavioral Disorders*****Krista Aronson, Psychology, advisor**

Children with emotional behavioral disorders (EBD) often have impaired social skills. This research investigates whether Social Stories, an intervention originally designed for autistic children, can improve the social skills of children with EBD. Students were read Social Stories that focused on increasing hand raising and improving cooperative game playing. Qualitative observational data revealed that Social Stories do not improve hand raising or game playing but may help children understand appropriate behaviors. These results may be explained by time constraints, classroom expectations, and a lack of impulse control. Since students engaged with the stories, there is potential for future research.

**Wade Rosko '17*****Modelling Freezing and Thawing of Arctic Permafrost***  
**Raj Saha, Geology and Physics, advisor**

This study examines findings from a dynamical model of the arctic permafrost. Model parameters were extrapolated from borehole data. The model explores the dynamics of the thaw and freeze seasonal cycles under different environmental forcings, namely anthropogenic warming.

Currently there are very few modelling studies of the permafrost that explore conditions for "tipping," or abrupt thawing of the permafrost, while there is sufficient physical evidence that this has happened in the past.

**Teddy Rube '16**

*Searching for Blood in the Streets: Mapping Political Violence onto Urban Topography in Ciceronian Rome, 80-50 BCE*

**Margaret Imber, Classical and Medieval Studies, advisor**

Ancient sources depict the Roman Republic's final decades as pervaded by urban violence, but how widespread was political violence, and where did it take place? This thesis uses literary and archaeological evidence as well as digital tools such as GIS mapping and 3-D models to pinpoint the location of instances of political violence. Embedding literary narratives of violence in their physical environment reveals a clear relationship between specific elements of Rome's topography and the forms of violence that political actors used. The physical accessibility of topography associated with political processes enabled actors to effectively use violence to impact political decision making.

**Paul Runyambo '17 – see Hugh Kenny '18**

*Mozambique's Discovery of Natural Gas: Opportunity or Curse?*

**Leslie Hill, Politics, advisor**

**Thomas Sacchetti '16**

*The Hypergeometric Function in Physics and Mathematics*

**Adriana Salerno, Mathematics, advisor**

In this poster we examine the occurrence and significance of the Hypergeometric function as an analytical solution to physical motion problems. In particular we explore cases of the Gaussian and Confluent Hypergeometric functions as they relate to Electrostatics and Quantum Mechanics. We then examine the properties of the generalized Hypergeometric function and its expansion into multiple dimensions, known as the q-series.

**Alexia Sahue '19 – see Kiria Borak '19**

*All Lives Matter ... Really?*

**Leslie Hill, Politics, advisor**

**Larissa Sambel '16**

*Characterization of the Ubiquitin-Protein Ligase E6AP*  
**Glen Lawson, Chemistry, advisor**

Our lab has shown that the concentration of the encephalomyocarditis virus (EMCV) 3C protease (3Cpro) is partially regulated by the cellular ubiquitin-proteasome system. We recently discovered that the ubiquitin-protein ligase E6AP/UBE3A is part of a 3Cpro-ubiquitylating pathway. E6AP/UBE3A polyubiquitin linkage specificity was investigated to determine if the enzyme catalyzes the ubiquitylation of 3Cpro and if the conjugated polyubiquitin chains signal 3Cpro for degradation. In vitro reconstitution assays using purified E6AP/UBE3A confirm that this enzyme catalyzes 3Cpro ubiquitylation by targeting the K48 residue. Our results show that E6AP/UBE3A participates in EMCV 3Cpro concentration regulation by

ubiquitylating EMCV 3Cpro, thereby signaling the protein for degradation.

**Madelene Santizo '16**

*Navigating "Gringolandia": Student Narratives of Performing Ethnic Identity in a New England Liberal Arts College*

**Loring Danforth, Anthropology, advisor**

My thesis explores how students of Latin American/Spanish-speaking origins perform their ethnic identities in public and private spheres at Bates College, which I have coined Gringolandia. I gather themes found in their narratives to construct an understanding of the diverse ways in which ethnic identity is performed by interviewing eight to twelve students and conducting participant-observation of individuals and groups. I analyze self-ascribed identity categories that students use to name their performances in order to map the ambiguities within the spectrum of Latin American/Spanish-speaking ethnicity. In this presentation, I focus on the autoethnographic section of my research.

**Taylor Saucier '17**

*Effects of Dehumanizing Associations on Judgments of Athletes Accused of Doping*

**Michael Sargent, Psychology, advisor**

Recent studies on racial dehumanization have found that people tend to associate apes with Blacks. One apparent consequence of this association is that people primed with apes believe police use-of-force is more justified when a racially ambiguous suspect is thought to be Black rather than White. The current study will serve to broaden the scope of the consequences associated with the Black-ape stereotype. To do this, 128 Bates students will be primed with either apes or big cats, and judge the extent to which the punishment of a Black or White athlete accused of taking performance-enhancing drugs is justifiable.

**Michaela Scanzillo '16**

*Investigating the Properties of High-Power Vertical-Cavity Surface-Emitting Lasers (VCSELs) Subject to Optical Feedback*

**Hong Lin, Physics, advisor**

In this thesis, the properties of high-power vertical-cavity surface-emitting lasers (VCSELs) were investigated experimentally, both in solitary operation and under the influence of optical feedback. The investigation yielded results that not only lead to further research, but also shed light on the intrinsic qualities and experimental behaviors of this device. The results of this investigation specifically indicated that with high-power operation comes unique polarization, time-series, power spectrum, and optical spectrum features, both with and without optical feedback.

**Miles Schelling '16**

*Tensegrity Structures*

**Martin Montgomery, Mathematics, advisor**

Tensegrity structures are self-sustaining structures made of vertices connected by either struts, cables, or rods. Struts cannot be compressed, cables cannot be pulled apart, and rods cannot be compressed or pulled apart. I will examine the rigidity of these structures on the plane and when they are placed on a torus.

**Amy Schmidt '16**

***Keep the Water Flowing: Balancing Utility Revenue Stability and Changing Consumption Demand***

**Lynne Lewis, Economics, advisor**

Water utilities throughout the United States struggle to maintain sufficient revenue to cover their high fixed costs. This project evaluates a utility water pricing system proposed by Spang et al. (2014) which fully distributes system costs among all system users. Data from Lomita, CA and Longmont, CO are used to explore how this novel water pricing system could change consumer prices, influence conservation efforts, and provide necessary revenue to the utility facing uncertain demand.

**Kelsey Schober '16 – see Mary Anne Bodnar '16**

***Dance Theses, 2015-16***

**Carol Dilley, Dance, advisor**

**Elena Schroeder '16 – see Hannah Jeffrey '16**

***An Application of Fourier Series to the Most Significant Digit Problem***

**Katharine Ott, Mathematics, advisor**

**Rebecca Schwartz '16**

***The Awkward, (Un)Desirable, and Enticing Politics of Sex and Reproductive Health in HBO's Girls***

**Jonathan Cavallero, Rhetoric, advisor**

In 2012, HBO premiered Lena Dunham's *Girls*. This thirty-minute dramady focuses on the lives of four white twenty-somethings living in Brooklyn, New York, and has attracted scathing critiques and abundant praise from fans, critics, and academics. My thesis critically examines the representations of sexual experiences and reproductive health on *Girls*. Using Rebecca Munford and Melanie Waters' theory on the Post-Feminist Mystique, I examine how *Girls* appropriates tactics typically used to perpetuate misogyny in popular culture for its own political aims, thus moving beyond the "retrograde." *Girls* offers a fresh representation of feminism and femininity on television while making sharp critiques about our current cultural political climate. I suggest that despite the limitations of *Girls*, this series challenges traditional representations of sexual experiences and reproductive health while endorsing the individuality, choice, and contradictions of third-wave philosophies.

**Jessica Segal '16**

***The Presence of Flow in Kindergarteners While Engaging in Art-Making Activities***

**Rebecca Fraser-Thill, Psychology, advisor**

School budget cuts that emphasize tested subjects devalue extracurricular subjects like art (Csikszentmihalyi, 1997). However, the arts, associated with increased emotional well-being (Chilton, 2013), teach students prosocial skills (Stone et al., 1998). These benefits have been studied through the presence of the psychological state of flow. Flow has been mainly researched among athletic and musical adults. Less is known about flow in children and the visual arts. This study aimed to determine if kindergarteners enter flow while art-making and if personal drawings, compared to neutral tasks, would result in greater mood improvement. Results and implications of the study are discussed.

**Nina Sevilla '16 – see Nina Doonan '16**

***Environmental Justice in the Americas***

**Melinda Plastas, African American Studies, Environmental Studies, Women and Gender Studies, advisor**

**Christopher Shaw '16 – see Hannah Albertine '16**

***Literary Reading by Creative Thesis Writers***

**Robert Farnsworth, English, advisor**

**Ahmed Sheikh '17 – see Ezra Oliff-Lieberman '18**

***Creating Communal Re-Entry Programs for Lewiston's Formerly Incarcerated Immigrant Youth***

**Cynthia Baker, Religious Studies, advisor**

**Maxwell Silverman '16**

***Masculinity, Depression, and Access to Mental Health Supports among Boys in High School***

**Mara Tieken, Education, advisor**

Masculinity has been shown to compound with the experience of depression in ways that produce gendered outcomes in boys' access to counseling and other mental health supports. Through interviews with guidance counselors at a New England public high school, this study examined the specific structural barriers and supportive mechanisms at play in shaping boys' access to necessary supports in high school. Findings highlight – in relation to boys' depression – boys' lack of active help-seeking, conformance to ideals of hegemonic masculinity, and the importance of boys' relationships to peers and role models as well as processes that criminalize manifestations of boys' depression.

**Alison Simmons '16**

***Diversity of Bacterial Microbiota in the Midgut of Blacklegged Ticks (Ixodes scapularis) across the Northeastern United States***

**Lee Abrahamsen, Biology, advisor**

Ticks are considered to be the second most important vector for transmission of zoonotic infectious diseases throughout the world. Prior research has indicated that bacterial flora of ticks may have an effect on the transmission of pathogens through the tick vector and bacteria found in the tick midgut may differ between ticks in different geographic locations. The bacterial flora of blacklegged ticks collected from southern Maine, western Pennsylvania, and southeastern New York was compared to that of pathogen-free, lab-reared blacklegged ticks. Any differences found may be used in future studies to help discover why certain ticks are pathogenic and other ticks are not pathogenic even when they are both harboring the same infectious disease causing microbe. The importance of understanding the interactions between tick microbiota and its effects on disease transmission is crucial for public health.

**Becky Smith '16**

***Effect of the Na:K Ratio on Melt Viscosity within the SiO<sub>2</sub>-NaAlSiO<sub>4</sub>-KAlSiO<sub>4</sub> System***

**Genevieve Robert, Geology, advisor**

Melt viscosity is a primary transport property of magma through the crust and upper mantle. In order to understand the viscous behavior of alkali-rich, silica-undersaturated

magmas, I studied eight melts in the SiO<sub>2</sub>-NaAlSiO<sub>4</sub>-KAlSiO<sub>4</sub> system. Four melt compositions along the nepheline-kalsilite join and four along the jadeite-leucite join were synthesized in order to test the effects of the Na:K ratio on melt viscosity. The most K-rich compositions along each join are more viscous than Na-rich compositions at both high and low temperatures. Compositions along the Ne-Kfs join exhibit greater change in viscosity with temperature than melts along the Jd-Lct join.

**Rose Snyder '16**

***The Biochemical Origins of Homosexuality and Sexual Expression***

**Paula Schlax, Chemistry, advisor**

A longstanding question is the origins of homosexuality. Evidence has been suggested for biological factors, behavior, and a combination of both. The main arguments for homosexuality as biologically determined are genetics, hormones, and brain structures. Genetic testing has shown a common marker called Xq28 on the X chromosome that homosexual men share. Additionally, homosexual men's androgen levels were found to be intermediate from heterosexual men and women, as well as the size and number of their interstitial nuclei of the anterior hypothalamus. However, this evidence does not explain why identical twins can share the same biological factors but not the same sexuality. Epigenetics must play a role for that to be the case. Homosexuality is also thought to be a behavior that fosters same-sex bonding and has been seen throughout history in humans and nonhuman animals alike. Only when we consider the biological, environmental, and social aspects can we truly begin to discover the origins of homosexuality.

**Katherine Solman '16**

***The Role of Self-Constraint in Vulnerability to Depression***

**Helen Boucher, Psychology, advisor**

As summarized by Markus and Kitayama (1991), individuals with interdependent self-construals seek to fit into the group and maintain harmony with others, whereas individuals with an independent self-construal seek independence by expressing their unique inner attributes. Previous research shows that an interdependent self-construal is a contributing factor in the development of anxiety disorders, but little research has been done considering its effect on vulnerability to major depressive disorder. In his cognitive theory of depression, Beck (1983) hypothesizes that two personality orientations, sociotropy and autonomy, lead to increased vulnerability to depression. Research indicates that interdependence is positively related to sociotropy, in which the individual's self-schema represents self-evaluation in relation to interpersonal approval. This thesis investigates sociotropy as a problematic form of an interdependent self-construal that could result in vulnerability to major depressive disorder through the relationship between depression and sociotropy.

**Adriane Spiro '16**

***Effect of Endogenous Oxytocin on Psychosocial Adjustment as Mediated by Emotional Receptivity***

**Nancy Koven, Psychology, advisor**

Oxytocin, a neuroendocrine peptide involved in the processing of emotional and social stimuli, is starting to be prescribed as exogenous oxytocin to individuals with psychological disorders whose symptoms include social dysfunction. However, little has been done to determine the psychosocial correlates of exogenous oxytocin in the general population. Preliminary evidence suggests that administering exogenous oxytocin could have potentially negative emotional outcomes particularly in individuals who are already socially attuned. This study aimed to determine the relationship of endogenous oxytocin levels to three psychosocial constructs: social anxiety, social functioning, and temperament, via the intermediate construct of emotional receptivity.

**Nathan Stephansky '18 – see Paige Guevarra '18**

***Dendrology Course Project: The Bates Canopy***

**Brett Huggett, Biology, advisor**

**Katherine Stevenson '17 – see Elsa Case '17**

***Negotiating Cultural Difference Abroad***

**David Das, Office of Off-Campus Study, advisor**

**Lauren Stimpert '16**

***Due Process in the War on Terror***

**Stephen Engel, Politics, advisor**

For my politics thesis, I examined drone strikes and whether or not they are a violation of the Fifth Amendment right to due process. This is grounded in the broader question of due process throughout the War on Terror.

**Mats Terwiesch '18**

***Tunisia: Arab Spring Outlier***

**Senem Aslan, Politics, advisor**

Tunisia, the birthplace of the Arab Spring, has now held two free and fair elections. In contrast, all other nations of the Arab Spring have descended into chaos or increased authoritarianism. Why has Tunisia seen such successful democratic transition relative to the other nations of the Arab Spring? I argue that the Tunisian democratic transition succeeded due to the existence of credible commitments in a climate of political parity between Islamists and secularists which made democracy a project worth continuing. This paper also offers thoughts on the policymaking implications for Tunisia and the world.

**Dylan Thombs '18 – see Paige Guevarra '18**

***Dendrology Course Project: The Bates Canopy***

**Brett Huggett, Biology, advisor**

**Robben Tian '19 – see Hugh Kenney '18**

***Mozambique's Discovery of Natural Gas: Opportunity or Curse?***

**Leslie Hill, Politics, advisor**

**Nancy Tran '16**

***Role of Nrfl in the Transcriptional Response to Mono(2-ethylhexyl) Phthalate (MEHP) Exposure in Zebrafish (Danio rerio)***

**Larissa Williams, Biology, advisor**

Phthalates are ubiquitous plasticizers known to cause oxidative stress and its metabolites have the capacity to enter the human fetus via the placenta. While little is known about the effects of phthalate exposure during early development, Nrfl has been hypothesized as a potential mediator for phthalate toxicity. We found that activation of glutathione-related genes was found to be Nrfla/b dependent, except when under the presence of oxidative stress, suggesting that other regulatory mechanisms may compensate. Also, both paralogs were shown to be activators for Hsp70 in response to MEHP. These findings suggest that Nrfla/b paralogs may each have distinct but also overlapping roles in the oxidative stress response.

**Alex Tritell '16 – see Melissa Carp '16**

***Perspectives on Jewish Religion and Culture***

**Thomas Tracy, Philosophy and Religious Studies, advisor**

**Christopher Tso '16**

***Mental Health in the Lewiston-Auburn Community***

**Karen Palin, Biology, advisor**

The purpose of this project was to examine the mental health indicators among adult individuals living in Androscoggin County. A screening survey was created based on questions from the Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder 7-item Scale (GAD-7). The survey was distributed to Bates College students, faculty, and staff online through Qualtrics, and kept anonymous. 115 Bates students and 105 faculty and staff responded to the survey. A small number of community members were surveyed using hard copies. Data was used to compare mental health indicators among these different populations, as well as among demographics.

**Joe Tulip '18 – see Constance Brimelow '16**

***Knowledge and the Public Good: Community-Engaged Research across the Disciplines***

**Darby Ray, Harvard Center for Community Partnerships, advisor**

**Mallory Turner '17 – see Jacqueline Cooper '17**

***Family Matters: The Pros and Cons of Child Marriage in Northern Nigeria***

**Leslie Hill, Politics, advisor**

**King Valdez '19 – see Ethan McGinnis '19**

***The Remnants of Oppression: Race-based Economic Inequality in Post-Apartheid South Africa***

**Leslie Hill, Politics, advisor**

**Christopher Van Hare '16 – see Benjamin Brimelow '16**

***Putin's Russia: Memory, Image, and Motive***

**Dennis Browne, Russian, advisor**

**Katherine Van Patten '17 – see Elsa Case '17**

***Negotiating Cultural Difference Abroad***

**David Das, Office of Off-Campus Study, advisor**

**Erica Veazey '16**

***Analysis of the Relationship between Serotonin Level, Emotional Regulation, and Emotional Contagion Susceptibility***

**Nancy Koven, Psychology, advisor**

Serotonin (5-HT) is broadly known as the neurotransmitter responsible for maintaining mood balance. The goal of this study is to determine whether 5-HT levels predict performance-based emotion regulation ability and in turn if either of these factors predict the degree of emotion contagion susceptibility. This study will examine performance-based emotion regulation using the Managing Emotions subscale of the Mayer-Salovey-Caruso Emotional Intelligence Test and emotion contagion susceptibility using the Emotion Contagion subscale of the Questionnaire of Cognitive and Emotional Empathy as well as the Emotional Contagion Scale. Plasma serotonin levels will be assessed via enzyme-linked immunosorbent assay. Serotonin levels and results from the emotion regulation and contagion questionnaires will then be compared to determine if a correlation is present. Understanding the role of serotonin as an emotional regulator is critical, due to its apparent link and potential as a treatment to a variety of mental illnesses including depression, bipolar disorder, and anxiety.

**Cristina Vega '16**

***Ego-Depletion Theory, Autonomy Support, and Its Effect on Alcohol Consumption***

**Helen Boucher, Psychology, advisor**

In this study, alcohol consumption is examined using the ego-depletion theory and the moderating role of autonomy support to determine if autonomy support will lead to greater self-control strength and thus the ability to resist drinking alcohol. Forty to sixty Bates College students, 21 years and older, will be used as participants for this study. Temptation to drink will be measured by the Temptation and Restraint Inventory Measure, and participants will be randomized into an autonomy supportive condition or a no autonomy support condition. They will all complete a depleting task, and then will engage in a taste test. We will measure alcohol consumption by conducting a t-test measuring alcohol consumption based on the condition of the participants. We will also run a regression analysis to see the relationship between trait temptation to drink and alcohol consumption. We expect to find that individuals who receive autonomy support will consume less alcohol than those who do not.

**Marit Wettstein '16**

***Prevalence and Transmission of Mycoplasma bovis in Dairy Cattle at Brigeen Farms in Turner, ME***

**Lee Abrahamsen, Biology, advisor**

*Mycoplasma bovis* is a leading cause of infection and disease in dairy cattle worldwide. The main objectives of this project are to 1) understand the prevalence and transmission of this bacteria among dairy cattle at Brigeen Farms in Turner, ME, 2) match cow:calf combinations to identify potential cases of vertical transmission, and 3)

evaluate the presence of *M. bovis* on communal calf feeders and other environmental surfaces. Expected findings include the transmission of *M. bovis* principally from mother to offspring during gestation. This study will provide particularly useful information to Brigen for both treatment and prevention of *M. bovis* diseases.

**Katharine Wick '16**

***Determining Mechanisms of Delta-Opioid Receptor Neuromodulation in the Accessory Olfactory Bulb***

**Jason Castro, Psychology, advisor**

Delta-opioid receptors (DORs) are highly expressed within mitral (MC) and granule (GC) cell layers of the accessory olfactory bulb, an early central brain structure critical for chemosensation. Despite their abundance, little is known about DORs' role in olfactory neuromodulation. I used paired pulse extracellular stimuli to excite the GC layer, while recording intracellularly from MCs in the presence and absence of DADLE (a delta-opioid receptor agonist). Glutamatergic and GABAergic blockers isolated inhibition and excitation in separate experiments. Preliminary results suggest DORs diminish presynaptic GC glutamate release by acting on high-voltage activated calcium channels, leading to enhanced stimuli discrimination of MC throughput.

**Brandon Williams '17 – see Ethan McGinnis '19**

***The Remnants of Oppression: Race-based Economic Inequality in Post-Apartheid South Africa***

**Leslie Hill, Politics, advisor**

**Charlie Wilmerding '18**

***Turkish Politics and the Kurdish Conflict: Trends of Electoral Needs and Violence***

**Senem Aslan, Politics, advisor**

Since the creation of the modern Turkish state in 1923, the majority of the nation's Kurdish population has vehemently differentiated themselves from the rest of the country. This cultural, political, and linguistic divide has prompted instances of extreme violence between Kurdish forces and the Turkish military over the past several decades. In my essay, I explored the political implications that have dictated the varying severity of violence throughout the duration of the conflict. As a sizable portion of the Turkish

voting population, the Kurds fulfill an important role in shaping the Turkish political landscape. Turkish politicians have historically used varying levels of violence to mold their electoral needs. The decisions to implement violence against Kurdish forces have been based on the varying electoral dependence that Turkish politicians have had on the Kurdish voting demographic.

**Mi Hui Wong '16 – see Hannah Jeffrey '16**

***An Application of Fourier Series to the Most Significant Digit Problem***

**Katharine Ott, Mathematics, advisor**

**Mara Woollard '16**

***Courage, Violence, and the Unseen Wounds: Post-Traumatic Stress Disorder in the Civil War***

**Joseph Hall, History, advisor**

Post-Traumatic Stress Disorder (PTSD) is often observed in military personnel, but what is not often discussed is its presence 115 years before it was defined. After comparing modern PTSD guidelines and medical documents from the period, the presence of PTSD resulting from the Civil War is extremely likely. New technology rendered obsolete previous military tactics, increasing death rates; while nineteenth-century definitions of courage along with ignorance of mental illness helped perpetuate the disorder. Due to the amount of trauma experienced, the Civil War was a catalyst for changing some of the very things that influenced the development of PTSD.

**Hannah Zeltner '16**

***Tintin in Context***

**Kirk Read, French and Francophone Studies, advisor**

Tintin, the famous fictional hero created by Belgian cartoonist, Georges Remi, is a phenomenon that has enthused generations of loyal admirers for nearly a century. Strangely, apart from his proper use of the French language and his vaguely European surroundings, aspects of Tintin's identity (nationality, sexuality, age, etc.) remain undefined. He never surpasses adolescence, yet navigates the adult world without difficulty. What is the secret to his allure? In this presentation, I will take on the task of reconciling Tintin/Remi's lack of sociocultural referents given Tintin's enormous popularity.