



2010

## Abstracts of Presentations

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# ***Colby Undergraduate Research Symposium 2010***

***April 28 - April 30, Colby College, Waterville,  
Maine***

## ***Abstracts - Research Symposium***

### **ACHIEVING CARBON NEUTRALITY AT COLBY COLLEGE THROUGH CARBON OFFSETS**

**John Abbett ('10), Environmental Studies**

In the absence of federal regulation on climate changing gases, voluntary commitments such as the American College and University Presidents Climate Change Commitment (ACUPCC) have encouraged and spurred action from educational institutions to take voluntary steps to reduce and mitigate greenhouse gas emissions. The ideal is to become carbon neutral, having net greenhouse gas emissions of zero. This research investigates the feasibility of colleges, including Colby College, becoming carbon neutral through the use of carbon offsets and is a guide through the voluntary carbon market.

### **ACCURACY OF PRESCHOOLERS' MEMORY: THE EFFECT OF INCENTIVES AND RESPONSE TYPE ON SHORT TERM MEMORY**

**Emma Anastos-Wallen ('11) and Aimee Sheppard ('10), Psychology**

The present study explored the effects of incentives and response format on children's ability to accurately recall images from their short term memory. Sixty preschoolers were asked to recall an image when shown three other images, all of which are thematically related, and were previously shown in conjunction with the missing image. Half of the children were tested with a forced choice format, and the other half were tested with a free recall format. The findings indicated that children performed better with the forced choice format, and that incentive did not influence rates of recall or recognition.

### **HELEN**

**Lindsey Anderson ('10), English**

I will be reading from a chapter of a novella-in-progress. The novella follows the lives of two women: Elizabeth Addison and Helen Crutchfield. Elizabeth returns, after nearly eleven years, to her ancestral home. When she arrives she uncovers a dark family secret, a secret that may account for her great-great-aunt Helen's untimely death in 1918. Elizabeth begins to worry that she may succumb to the same strange curse that plagued her great-great-aunt so many years ago... The novella, meant to be a work of magical realism, describes a series of progressively less plausible lies and half-truths about Elizabeth's family history.

### **RENÉ MAGRITTE AND THE ENIGMA OF THE FEMALE NUDE**

**Lindsey Anderson ('10), Art**

In this paper I explore several depictions of female nudes in the works of René Magritte. I begin by calling into question Magritte's habitual reliance upon the female nude as a site of artistic expression. I suggest, through a psychoanalytic framework, that Magritte's nudes represent a manifestation of his unconscious desire to possess and control his mother Adeline. I also suggest that Magritte relied upon the convention of the female nude in ways that subvert its canonical significance. Ultimately, Magritte depicted the female figure in his work for a variety of compelling, and at times contradictory reasons.

### **VEGETATION RECRUITMENT OF A RESTORED HABITAT LINKAGE IN TROPICAL NORTH QUEENSLAND: A FOLLOW UP STUDY**

**Steven Armbrust ('10), Biology**

Over the past two decades, reforestation and restoration practices have aimed to restore structure and diversity to the heavily cleared forests of the Wet Tropics World Heritage Area in north Queensland. The Peterson Creek Revegetation Project began in 1998 as a stepping stone project to strengthen and extend remnant vegetation patches between the small and isolated Lake Eacham Section of the Crater Lakes National Park and The Curtain Fig State Forest/Yungaburra National Park, but the project has now become a continuous wildlife corridor and linkage between the two forests. Two studies were undertaken in 2001 and 2002 with the purpose of evaluating and monitoring the developing successional processes occurring in several of the planting areas of 1998 to 2001. This study is a follow-up survey on the early vegetation recruitment data from the Peterson Creek Wildlife Corridor in an attempt to provide perspective on the long-term viability of the rehabilitation linkage by examining structural development as well as natural plant recruitment as a measure of forest function. Results indicated a dramatic increase of 1392 recruit individuals from the 2002 data with a sizeable overall increase in recruit species diversity and abundance at both the family and species level. Overall structure exhibited increased canopy closure throughout the site, a larger percentage of mature-phased life forms, greater recruitment from outside of the planting, and an increase in later-phased successional species. While the species diversity and more mature structural characteristics suggest the development of a more mature functioning rainforest, the small proportion of recruited established individuals suggests that more time is needed for recruits to establish, mature, and displace planted stems.

### **AMERICA'S CHILDREN: THE RE-INFANTRY OF FEMALE PRISONERS**

#### **Cynia Barnwell ('11), Women, Gender, Sexuality**

Over the last three decades, much attention has been paid to the American prison system and the way it operates. The prison system has been heavily scrutinized on several fronts, in particular, its poverty, social, and race based implications as well as the prison system as an economic institution. Jails are colloquially thought of as a space for men only, and thusly women have been virtually excluded from most of the academic discussion on prisons. The number of women in prisons was drastically lower than their male counterparts so most of the theorizing of prisons was done on male-specific cases. Women's prisons were considered as lenient camps for 'misbehaved women' and they remained very closed areas so little sociological work was done to explore the differences between the two gendered spaces. While most prison paradigms are not gender specific, the role gender plays in the family is integral when considering the rising rates of female incarceration. The traditional nuclear family is obliterated when the matriarch is imprisoned. While the traditional family is destroyed another family is created behind the bars. The research presented will discuss the family structure created in prisons complete with den mother, the silent but strong father, the favorite children, the middle children and finally, the black sheep of the family. Women's prisons seem to create a mirror image of the perfect family archetype just in a different environment. Women's prisons foster a newfound type of vulnerability into the prisoners and reverts them to a helpless childlike state. Women in prisons become America's children.

### **THE DARK SIDE OF ECOTOURISM: NEGATIVE IMPACTS OF ECOTOURISM ON CENTRAL AMERICA**

#### **Cynia Barnwell ('11), William Bloomhardt ('12) and Sylvia Doyle ('12), Environmental Studies**

Often heralded as a method of simultaneously promoting conservation and alleviating poverty, ecotourism is becoming increasingly prevalent in the Global South. Ideally, ecotourism provides a sustainable form of economic development that ensures species and habitat conservation, increases cultural and environmental awareness among visitors, and gives local communities autonomy and a dependable source of income. We reviewed literature on ecotourism in Central American countries to determine the nature and scope of possible detrimental effects. Ultimately, we discovered that ecotourism creates a host of environmental, economic, and cultural complications. Mismanaged venues may be detrimental to the environment they attempt to protect because the continuous influx of visitors and waste produced can disrupt the fragile environment. Frequently, foreigners are the only investors with sufficient capital and international experience to establish and market an ecotourism destination. Foreign ownership disempowers local people, disrupts their culture, and creates economic leakages while increasing the cost of living. Based on our study of Central America, we conclude that, while potentially a powerful conservation tool, ecotourism must be handled carefully to avoid negative environmental, economic, and cultural impacts.

### **ANALYSIS OF SONG PATTERNS FOR A RED-EYED VIREO (*VIREO OLIVACEUS*)**

#### **Amy Beich ('10), Biology**

In June, 2008 a male Red-eyed Vireo was recorded singing continuously for 33 minutes in the Colby Perkins Arboretum. This recording was part of a larger study of the songs of 22 male Red-eyed Vireos and contained

over 1600 individual songs. Each song was labeled according to a previously developed vocabulary for this individual, nicknamed "Hal." At the time of this analysis, Hal's vocabulary contained 26 known individual songs. This recording revealed an additional eight songs, and no song was sung twice in a row. Chi-squared tests were used to determine if the order of songs was random. These tests indicated that order and distribution of songs throughout the recording varied significantly from random, especially for those songs sung most frequently. Additionally, several small segments of four songs were repeated multiple times in the same order. This result indicates a non-random pattern of singing in this Red-eyed Vireo, contrary to the results of previous studies.

## **GENE REGULATION IN RESPONSE TO LAROMUSTINE AS DETERMINED BY REAL-TIME QRT-PCR**

**Joseph Bellairs ('11), Chemistry**

Laromustine (VNP40101M), an anticancer prodrug, decomposes in the body into two different metabolites: a chloroethylating species and a carbamoylating species. The chloroethylating species (90CE) is responsible for cross-linking DNA and triggering cell death. The carbamoylating species, methyl isocyanate, is thought to enhance the cytotoxicity of 90CE by inhibiting natural cell repair processes. Here, the effects of Laromustine are investigated at the genetic level. The carbamoylating activity of Laromustine has previously been shown to inhibit the thioredoxin (Trx) and Trx reductase (TrxR) system. This redox system is responsible for several different signaling pathways, including antioxidant defense and cell proliferation. Trx is known to interact with the transcription factor Activating Protein-1 (AP-1), which consequently is involved in cell cycle regulation. To observe Laromustine's effect on cell proliferation, the gene expression pattern for several AP-1 dependant genes (E2F1, E2F2, WEE1 and Cyclin-D1) was determined in response to Laromustine treatment. This was accomplished by quantifying cellular RNA with the qRT-PCR technique. Preliminary results show decreased expression of these genes, supporting the notion that AP-1 activity is being inhibited. The downregulation of these genes, indicative of decreased AP-1 modulated expression, provides a glimpse at the mechanism of this potent anticancer agent.

## **ENHANCING ATTRIBUTIONAL RETRAINING WITH A MULTIPLE INTELLIGENCE APPROACH**

**Terri Bello ('10), Education and Human Development**

There is a major transition period for students after graduating from high school and entering postsecondary education. For "at risk" students (defined as first generation college students, students with learning disabilities, and students of color), can be even more challenging. The presentation will outline Attributional Retraining (AR) Theory, Multiple Intelligence Theory, and the definition of "at risk." The presentation will synthesize these theories and introduce a new method of implementing AR that also incorporates concepts from MI Theory.

## **SOMALI BANTU INTEGRATION IN THE GREATER WATERVILLE AREA**

**Edward Benjamin ('11), Aaron Halpine ('13), Joshua Kelton ('10), Daniel Reeves ('10) and Jillian Vaughan ('12), Philosophy**

Team Bantu's focus is the recent influx of refugees to central Maine in the past two decades. A certain ethnic group of Somalis, the Bantu people, have been oppressed to the point where America has characterized them as refugees deserving of immediate aid. Many Somalis are now settling in Central Maine due to the availability of cheap housing, low crime rates, and strong public educational system. However, adaptation after immigration is not easy. Some common problems include language barriers, racism, difficulties with common western appliances and services, and the struggle to generally adjust to an American lifestyle. Even Somalis who manage to navigate those difficulties still do sometimes face resistance from the government and local citizens who perceive them as a threat to their own livelihood. A portion of local citizens who are not fully informed of the impact of Somalis believe that the Somalis are a drain on tax dollars and resources, and are taking jobs away from unemployed local residents. This resentment contributes to tensions between the local population and the incoming Somali refugees. Yet, statistics show that the Somalis provide a powerful social and economic reinvigoration. The current mayor of Lewiston has realized these benefits. It seems that misconceptions are hurting local relations while a lack of information on available options is slowing the Somali adaptation. On both sides, increased awareness brings increased acceptance. Over the past few weeks we have worked in various ways to help both awareness on behalf of the local residents as well as help the Somali people adjust to life in central Maine. This is a presentation of our work and our findings.

## **THE CAPACITY OF THE HUMAN PERCEPTUAL SYSTEM TO ISOLATE INERTIA**

### **Stephanie Berger ('11), Psychology**

The purpose of this experiment is to expand on a previous experiment that investigated the capacity of the human perceptual system to both detect and isolate inertia. The results of the previous experiments were unexpected in that they indicated that the participants were using static moment to detect a physical property of an object that only depends on inertia. This discrepancy between the physical reality and human perception could potentially stem from two related issues. First, the extensive constraints placed on the participant while wielding the object could have prevented the participant from exploring the object in a way that they normally would in order to detect inertia. This limitation might have forced them to rely on static moment. In order to address this issue, the participants will be unconstrained in their exploratory wielding of the object, within the confines of the apparatus so that they can move the object as naturally as possible, while maintaining control. Second, the property that the participant's were prompted to detect, how fast they would be able to rotate the object were to hold it parallel to the ground, may involve to obscure an action for people their perceptual system to discriminate the specific forces affecting this action. In order to resolve this issue, the participant's will have an opportunity to practice the action in order give their perceptual system an opportunity to become accustomed to the relevant property of inertia. This experiment into the general capacity of the system to refine its discriminations, ultimately either supporting or detracting from the theory of a smart perceptual system that detects invariants within the energy array of the world.

### **SOVIET EDUCATION: COMMUNISM IN THE CLASSROOM**

#### **Alison Berryman ('10), History**

My thesis examines the Soviet Union's educational system during Stalin's rule. It proves that the goal of the Soviet educational system in the 1920s and 1930s was to instill strong Communist loyalty from a very early age and to expedite the process of industrialization by educating future workers in "socially useful" labor.

### **THE EFFECT OF WESTERN AND EASTERN CULTURES ON MEMORY RETRIEVAL PERSPECTIVE**

#### **Martha-Gail Biddiscombe ('10) and Laura Schaefer ('10), Psychology**

The proposed study will investigate the influence of culture and primed cultural mindset (collectivistic or individualistic) on memory perspective of third-person and first-person retrieval. We will prime participants from Eastern and Western cultures into either a collectivistic or an individualistic mindset in order to examine participants' change of visual perspective when induced into a cultural mindset that is different from their own. Eastern participants are more likely than Western participants to have third-person (as opposed to first-person) memories (Cohen & Grunz, 2002). If the collectivistic nature of Eastern cultures encourages individuals to see their memories through the eyes of their group (the third-person), while the individualistic nature of Western cultures encourages individuals to see their memories through their own eyes (the first-person). Asian participants who are primed in an individualistic mindset will show a decrease in third-person perspective and an increase in first-person perspective. Similarly, American participants who are primed in a collectivistic mindset will show a decrease in first-person perspective and an increase in third-person perspective.

### **EVALUATING RACIAL ATTITUDES: DIALOGUE, UNDERSTANDING, AND SOCIAL ACTIVISM**

#### **Loretta Biss ('10) and Terri Bello ('10), Psychology**

Previous research has shown that while overt racism is based on blatant stereotypes, modern racism is the contemporary manifestation of racist thoughts/feelings channeled into contemporarily "acceptable" forms. Research on racism is elusive: although laws and social norms prohibit racism, underlying attitudes, thoughts, and feelings are not easily eliminated, meaning they can seep into our lives sometimes without our awareness. The researchers evaluated characteristics associated with contemporary reflections of racist attitudes at Colby. The researchers analyzed self-reported attitudes about racism in terms of equality, racial jokes, social responsibility, appearance, sensitivity of students of color, and insensitivity of white students. These attitudes were assessed as a function of statistical majority/minority group membership, sex, and interest in participating in anti-racist programming. The results show a generally progressive sample overall, with females exhibiting less modern racist attitudes across all sectors. Additionally, those students interested in anti-racist programs were not different from other students on most measures. White males were least likely to assume that all people are responsible for involvement in anti-racist work. This research has implications in terms of understanding the role of privilege in impeding consciousness-raising with respect to racial identity and racism. This research also has implications for racial identity development which requires conscious attention to, and working with, racial attitudes for identity empowerment to

manifest.

## **THE UNMARKED INTERSECTIONALITY OF GENDER AND ETHNIC PREJUDICES: AN EXAMINATION OF THE DIFFICULTIES OF POST-CONFLICT CURRICULAR REFORM IN THE REPUBLIKA SRPSKA OF BOSNIA AND HERZEGOVINA**

**Sarajane Blair ('10), Education and Human Development**

It has been fifteen years since the official ending of the war in BiH. In this time BiH has been split into two entities, the Republika Srpska (hereafter: RS) and the Federation of BiH (hereafter: FBiH). Although the violence and terror are gone, so too is the multicultural society that was Tito's Yugoslavia. The end of multiculturalism in BiH meant the beginning of mono-ethnic societies and schooling. That means that students my age, from all ethnic groups in BiH, have grown up and been educated in a system based on stereotypes and biases. These are the students who do not remember Tito's Yugoslavia, brotherhood, unity and fraternity. These are the students who remember their families being killed, or exiled from their homes. These are the students who grew up listening to media and elite-driven propaganda. This study focuses on an analysis of curriculum and legal document to examine the way gender stereotypes in the RS curriculum perpetuate nationalistic feelings, continuing in-group prejudices towards the other ethnic peoples of BiH. Through my analysis I found that although gender-role stereotypes appear in many commonsense (read: unmarked) forms in the curriculum, those stereotypes were not addressed in the legal documents responsible for the creation of a new curriculum. The danger of these commonsense gender-stereotype occurrences lies in the intersectionality between commonsense gender identity issues and ethnic identity issues—one form of unmarked dominance leads to the continuation of other forms of dominance. Focusing on gender-role stereotypes touches on the same issues of masculinity, machismo, and war without being as abrasive towards any of the ethnic peoples.

## **THE EFFECTS OF NARCISSISM AND ATTRACTIVENESS ON PARTNER SELECTION THROUGH FACEBOOK PROFILES**

**Jessica Blais ('12), Taylor Horan ('12), Kira Novak ('12) and Devin O'Brien ('12), Psychology**

The effect of narcissism and attractiveness on several personal factors including likeability, trustworthiness, and academic success was explored in a partner selection scenario. Shown in Facebook profiles, narcissism was manipulated by the presentation of textual information while attractiveness was manipulated through profile pictures. People with low narcissism and low attractiveness received more positive ratings of likeability, trustworthiness, and academic success.

## **THE EFFECT OF THE PRESENCE OF INC A/C PLASMID ON THE RATE OF GROWTH OF *V. CHOLERA* AND *CITROBACTER* TRANSCONJUGANTS**

**Kristina Blazanovic ('12), Biology**

An Inc A/C multidrug resistance megaplasmid (>100 kbp) was isolated in 2003 from *Aeromonas salmonicida* (AS03), a virulent fish pathogen. This Inc A/C plasmid confers resistance to mercury and clinically relevant antibiotics such as ampicillin, chloramphenicol, streptomycin, sulfonamide, tetracycline, cephalothin, ceftriaxone and gentamicin. We have found that this plasmid was easily transferable to both pathogenic and commensal bacteria, including *Vibrio cholerae* (O395) and *Citrobacter* spp. (FBT 4-10). *V. cholerae* is a gram-negative aquatic bacillus that causes the severe diarrhoeal disease cholera. FBT 4-10 is a gram-negative aquatic fish commensal that was isolated by the Fekete lab in 2003. The goal of this study was to determine how the presence of this megaplasmid in O395 and FBT 4-10 transconjugants would affect their metabolic fitness under both selective and non-selective pressure. Transconjugants of O395(AS03) and FBT 4-10(AS03) were obtained through conjugation with AS03. Transconjugants were then sub-cultured on non-selective media for 30 times and assayed over time for the antibiotic resistance phenotype as well as presence of the plasmid through PCR amplification of conserved regions and repA. The metabolic fitness of the transconjugants and wild type strains were assayed through growth curves under selective antibiotic (chloramphenicol) pressure and non-selective pressure. The growth rates of transconjugants were comparable to those of wild-type strains under nonselective pressure, but depressed under selective pressure. Our research indicates that this Inc A/C plasmid shows a remarkable ability to remain within the host cell and is robustly inherited, regardless of selective pressure or metabolic cost to the cell.

## **RACE&ROCK&ROLL: AN ANALYSIS OF REPRESENTATION ON ROLLING STONE MAGAZINE COVERS**

**Erica Block ('10), American Studies**

If African Americans heavily influenced the development of rock & roll as a musical genre, why do we picture rock stars as white men with guitars? In this project I examine, with a particular focus on race, how the visual culture surrounding rock music evolved to where it is today. To do this, I performed a close visual analysis of Rolling Stone Magazine covers from 1967-1980. In this presentation I illustrate Rolling Stone's trend of featuring 'white negroes' on their covers, which allowed the magazine to use the selling power of a white person's face while retaining the attractiveness, sex appeal, and exoticism of black aesthetics and performance styles.

### **THE VIRGIN/WHORE DICHOTOMY: FEMALE SEXUALITY IN SPIKE LEE'S 'CROOKLYN'**

#### **Erica Block ('10), American Studies**

'Crooklyn,' Spike Lee's semibiographical account of growing up in 1970s Brooklyn, stands apart from his other films because it features a young girl, 8-year-old Troy, as its lead character and protagonist. In 'Crooklyn,' Lee compares urban city spaces against rural environments, a convention commonly used in Hollywood's black-cast musicals of the 1930s-1940s. In this presentation, I show how Lee goes against the musicals' depictions of urban space as a place of sin and the southern idyll as a pious and heavenly space, but nonetheless reproduces a limited representation of female sexuality.

### **INTERRACIAL DATING IN SPIKE LEE'S CONCRETE JUNGLE: AN ANALYSIS OF INTERRACIAL DATING BETWEEN BLACK MEN AND WHITE WOMEN IN SPIKE LEE'S JUNGLE FEVER**

#### **Marcus BoisAubin ('10), American Studies**

This presentation is based on my American Studies Senior Seminar Paper on the Spike Lee film Jungle Fever. The presentation will analyze the message Spike Lee has of Interracial relations between Black Men and White Women. There will be an analysis of race relations, gender relations, and class relations. Through analyzing these conflicts I will come to the conclusion that Spike Lee does not agree that an interracial relationship between a Black man and a White woman can be based on Love, due to myths held in American society.

### **WOMEN IN JAPANESE LITERATURE: HOW WOMEN ESCAPED THEIR MARGINAL ROLES IN Ooba MINAKO'S SHORT STORIES**

#### **James Bowe ('11), East-Asian Studies**

In her short stories "Candle Fish," "The Smile of a Mountain Witch" and "Fireweed," Minako Ooba (b. November 11, 1930) explores fantasy and reality as means by which women escape their given roles in society to experience fleeting moments of power and freedom. The female protagonists in each of these stories are forced to repress their true identities and suppress their free will in keeping with their marginal societal roles. In their fantasy lives these women express themselves as they see themselves, temporarily escaping the confines society has erected around them.

### **ATLAS OF MAINE: LAND USE IN THE BELGRADE LAKES REGION**

#### **Adrienne Bowles ('12), Environmental Studies**

The Belgrade Lakes watershed located in central Maine has a lot of ecological and economic importance to the region and state. The watershed consists of six main water bodies that are used regularly, especially in the warm months, for recreational purposes. Recreational use of the Belgrade lakes means that humans, through development of land for basic infrastructural and economic purposes, heavily impact the region. This map of the Belgrade lakes region aims to present variety of current uses of the land, with a main focus on societal and cultural features. In the future, this map of land use in the Belgrade Lakes region can be used as a preliminary visual reference to understand the relationship between the varieties of land use.

### **MELATONIN MT2 RECEPTOR ACTIVITY IN THE FIDDLER CRAB EYESTALK AND RAT HIPPOCAMPUS**

#### **Sharonda Bradley ('10), Psychology**

Melatonin (N-acetyl-5-methoxytryptamine) is the principle hormone product that is secreted rhythmically by the pineal gland in mammalian vertebrates. In addition to influencing various rhythmic activities, melatonin may modulate immune system responses and protect cells from oxidative and psychological stress. One theory behind melatonin's effectiveness is it binds to membrane-bound metabotropic MT2 receptors; however, these receptors have not yet been discovered in crustaceans. In addition to the lack of information on melatonin receptors in fiddler crabs, little is known about the effects of stress on the expression of these

receptors in the brain. We describe a two-pronged project in which proteins are extracted from fiddler crab neuronal tissue and the hippocampi of stressed rats and assayed for melatonin receptors through Western blotting techniques. We hypothesize that the expression of melatonin MT2 receptors may be modified in stress-induced rats and the receptor is phylogenetically conserved and exists in crustacean neural structures.

### **MODULATING EFFECTS OF AROUSAL AND THOUGHT SPEED ON COGNITIVE PERFORMANCE**

**Andrew Bragg ('11), Morganne Kraines ('11), Arielle Saporta ('12) and Annalyse Tamashiro ('12), Psychology**

The purpose of this research is to (a) explore whether thought speed affects cognitive performance, (b) and if so, whether it does so independently of arousal. Previous research has shown that thought speed is a subjective experience that can affect mood to be neutral or positive (Pronin et. al, 2008). According to Yerkes and Dodson (1908), arousal influences cognitive performance. As arousal increases, cognitive performance will also increase up to an optimal arousal level, after which cognitive performance will decrease (Yerkes & Dodson, 1908). We also know that music tempo influences arousal, and music mode influences mood, so because these effects are independent, we inferred that arousal does not impact mood (Husain et. al, 2002). In the present study, we randomly placed participants into one of six conditions, using different combinations of the factors of thought speed (fast, slow) and arousal (high, low, none). We manipulated thought speed with different instructions in a brainstorming activity. We influenced arousal level by playing music at different tempos. Participants completed an evaluation form which was used to check that thought speed and arousal were manipulated while mood was unchanged. An additional task was used to measure cognitive performance level.

### **PADDLING THE NORTHERN FOREST CANOE TRAIL**

**Samuel Brakeley ('10), English**

A reading of an excerpt from my final project for Advanced Studies in Prose about my 740-mile canoe journey through New England on lakes, rivers, streams and portage trails.

### **RODIN'S DRAWINGS: AN EROTIC OBSESSION**

**Fiona Braslau ('10), Art**

Sculpture comes hand and hand with drawing. Rodin's work is mostly identified with sculpture, yet, in an effort to master his craft to perfection, he developed a corpus of 9000 drawings which functions still remain somewhat of a mystery. Rodin spent the last thirty years of his life producing erotic drawings, first serving as studies for his sculptures, they then nourished his curiosity and appetite for the female body. Truly innovative in their concept and subject matter, Rodin's erotic drawings define a new kind of eroticism.

### **ATLAS OF MAINE: HABITATS OF INTEREST IN THE BELGRADE LAKES REGION**

**Blair Braverman ('11), Environmental Studies**

This map displays wetland, interior forest, and surface water, and topography of the Belgrade Lakes region of Maine, and calls attention to areas with known populations of rare plants and animals. The data that was used is from both the Maine Office of GIS website and the digital data set "Beginning with Habitat," as collected by the Maine Natural Areas Program and the Maine Department of Inland Fisheries and Wildlife.

### **DISTRIBUTION OF TOXIC SITES IN ALASKA IN RELATION TO HUMAN POPULATIONS**

**Blair Braverman ('11) and Michelle Russell ('11), Environmental Studies**

This project is a GIS analysis examining the distribution of toxic sites in Alaska, including Superfund sites, Toxics Release Inventory sites, mining waste sites, and formerly used defense sites (FUDS), in relation to populated areas. The hazardous materials contained at these sites may be released into the environment, causing harm to both local ecosystems and the people who live in and rely on these ecosystems. In many cases, these hazardous sites are located in or near indigenous communities, which means that native Alaskans may be put at a disproportionate risk for harm. Furthermore, these communities may have low levels of income and education, and residents' reliance on subsistence foods may further increase their exposure. Our research looks at the overall placement of toxic sites as a possible breach of environmental justice.



## **ENVIRONMENTAL JUSTICE ON SAINT LAWRENCE ISLAND, ALASKA**

### **Blair Braverman ('11), Environmental Studies**

Saint Lawrence Island, in Alaska, is home to approximately 1,200 Yupik people, who have lived on that land for over 2,000 years. Their health is now threatened due to releases and contamination from formerly used defense sites (FUDS) on the island, and human rights groups are working to have these sites remediated. This project examines Saint Lawrence Island as a case study of environmental injustice, and refers also to the greater problem of military sites located near native villages throughout the rest of Alaska.

## **PROSE READING**

### **Blair Braverman ('11), English**

I will be reading an excerpt from my final portfolio for EN478, Advanced Studies in Prose.

## **RHYTHMICITY AND SENSITIVITY OF THE MAMMALIAN CIRCADIAN CLOCK**

### **David Brazel ('12), Computer Science**

A major class of systems studied in computational biology is the circadian clock. Circadian clocks are molecular clocks found in the cells of animals, plants, fungi, and bacteria which allow organisms to coordinate behavior on a 24-hour cycle. The mammalian circadian clock is located in the suprachiasmatic nucleus and consists of many individual molecular clocks linked together in a synchronized neural network. Studies have shown that isolated circadian neurons tend to be poor clocks and are frequently either arrhythmic or damped. In addition, computer simulations of networked circadian neurons have shown that successful synchronization tends to occur when the network contains many damped cells. This result may be explained by the theoretical prediction that damped cells will be more sensitive and more easily shifted. We are currently using simulated populations of mammalian circadian neurons to examine the relationship between damping and sensitivity.

## **THE MAINTENANCE AND CYCLING OF PLASMID-MEDIATED MULTI-DRUG RESISTANCE IN A SIMULATED AQUACULTURE ENVIRONMENT**

### **David Brazel ('12), Steven Armbrust ('10) and Daniel Echt ('11), Biology**

Horizontal gene transfer (HGT) is one of the major factors involved in the spread of multi-drug resistance in medical, agricultural, and aquacultural contexts. The Inc A/C class of plasmids consists of promiscuous mobile genetic elements that have been found in many pathogenic and commensal bacteria, including *Yersinia pestis*, *Salmonella enterica*, and *Aeromonas salmonicida*, a virulent fish pathogen responsible for significant economic damage in many aquaculture facilities. Commensals are resident non-pathogenic bacteria that may serve as reservoirs of antibiotic resistance by maintaining and transferring plasmid-mediated resistance to pathogenic bacteria. We sought to examine this process by cycling an Inc A/C plasmid between *Aeromonas salmonicida* and *Citrobacter* sp., a fish commensal. We successfully transferred both the Inc A/C plasmid and the associated resistance phenotype from AS03, a highly resistant strain of *A. salmonicida*, to K3, a non-resistant *A. salmonicida* isolate, via a *Citrobacter* sp. intermediate. We are currently working to demonstrate long-term plasmid stability in both recipients and the consequences of K3's acquired resistance for successful antibiotic treatment within a simulated aquaculture environment.

## **THE 'LUNATIC FRINGE': BARRY GOLDWATER AND THE CONSERVATIVE REVOLUTION OF THE 1960S.**

### **Nicholas Bromley ('10), Government**

How did conservatives, who had become effectively ostracized by their party following the Great Depression and the societal reforms of the New Deal, regain leverage within the GOP during the 1960s? My hypothesis is two-fold. First, I contend that a small group of conservative activists led by F. Clifton White, in spite of a dearth of resources and manpower, managed to infiltrate Republican infrastructure and "hijack" the delegate-selection process. The distinctly conservative and recalcitrant disposition of the Goldwater delegates demonstrates that these activists succeeded. Second, I argue that in addition to temporarily overpowering the national convention in 1964, conservatives thereafter retained control of the party insofar as subsequent GOP candidates were obliged to garner the support of conservative pockets of the country in order to win the presidential nomination. The resulting rightward shift of the Republican Party following the 1960s is a direct corollary of the conservative takeover outlined in this study.

## **ATLAS OF MAINE: SCHOOL ENROLLMENT AND SCHOOL DISTRICTS IN THE BELGRADE LAKES REGION**

**Megan Browning ('10), Environmental Studies**

Map created at Colby College for the Environmental Studies Program using data from the Maine Office of GIS, ESRI93 and the U.S. Census Bureau. Census Bureau data are at a census block level and were used to calculate the number of people enrolled in school, from nursery school through high school. This is represented on the map in varying shades of brown. Darkest browns represent census block groups with the most people enrolled in school. Three sets of boundaries are included: Maine School Administrative Districts (MSAD), Community School Districts (CSD), and Individual School Administrative Units. Although the Belgrade watershed is highlighted in the map, note that boundaries extend beyond this border. The map is projected using NAD83, Universal Transverse Mercator Zone 19.

## **THE EFFECTS OF VISUAL AID AND REALISTIC VERSUS UNREALISTIC IMAGINING CONTEXTS ON PRESCHOOLERS' MEMORY RECALL**

**Julia Bruss and Nicole Raheja ('10), Psychology**

Research has shown that many factors contribute to children's ability to remember what they have imagined. The present study focuses on the effects of visual aid and realistic or unrealistic context on children's recognition of what they have imagined. Children were asked to imagine different scenarios, some realistic and some unrealistic. Some children were provided with a corresponding visual aid, and some were not. Children were then read a list of scenarios, including those they had imagined as well as novel items, and were asked whether or not they had imagined each scenario. Accuracy of response was recorded, as well as confidence in their answer choice. The findings suggest that children are better able to remember what they imagine when the scenario is realistic, and that boys are more confident in their answer choices when the context is realistic.

## **'DIFFICULTY WITH DUALITY': BATMAN AND MASCULINITY**

**Leigh Bullion ('10), Women, Gender, Sexuality**

Batman has been an iconic figure since he first appeared in the 1930s. Since then, Batman has appeared in six feature-length films, three tv shows, and countless other media texts. In this paper, I explore the representation of Batman's masculinity in four films: Batman (1989), Batman Returns (1992)--both directed by Tim Burton--and Batman Begins (2005) and The Dark Knight (2008). I focus on the relationship between Bruce Wayne and Batman, both in context of these films and in the general superhero genre. I also look at the relationships between Batman and the villains, Batman and main female characters, and the villains and the female characters. Using Michael Kimmel's in-depth study of American masculinity, we begin to see that Batman often needs to be juxtaposed with the villains and the women in order to be considered a 'real' man.

## **SHAKESPEARE AND HOMOEROTICISM**

**Leigh Bullion ('10), English**

William Shakespeare's plays cover an array of topics focused on sexuality, from gender reversal to adultery to bestiality. But perhaps the most consistent and emphasized topic is homoeroticism. This focus on homoeroticism proceeds from the prohibition of women on the English stage and the subsequent female roles young boys would play. A Midsummer Night's Dream, As You Like It, and Twelfth Night each present different representations of homoeroticism yet complement each other. A Midsummer Night's Dream focuses on the erotic potential of unrestrained desire and the tense relationship between female amity and dominating patriarchal and heterosexual interests. As You Like It also involves female amity disrupted by heterosexual love, but Rosalind's cross-dressing and a homoerotic man-boy relationship also complicate conventional heterosexual desires. Twelfth Night centers on cross-dressing as well, but includes subplots of male amity and presents what we might call a prototype for a homosexual identity. In this paper, I look at these texts in conjunction with film adaptations of these plays. The similar issues of the plays, with their concerns of social structure, cross-dressing, and female amity, made me interested in the different effects of the various homoerotic issues in the texts. Above all, the plays' investment in heteronormative resolutions—with as many as four heterosexual marriages at the end of one play—compelled me to question the purpose of establishing homoerotic desires so firmly. By analyzing contemporary film to read against the original text, I hope to see gaps in the text that open up new possibilities for questioning the heteronormative endings of the plays.

## **AMERICAN CATHOLIC IN THE AGE OF OBAMA: IDENTITY, POLITICS, DIALOGUE**

**Amanda Burgess ('10), Religious Studies**

During his 2008 presidential campaign President Barack Obama captured the hearts, minds, and votes of a sizable number of Catholics much to the dismay of a vocal group of American Catholic Bishops. His campaign and election spurred dialogue within the American Catholic family about how to bring Catholic Social Teachings to bear on the major social issues of the day. This essay examines two events which produced the most varied Catholic discourse since President Obama's election in 2008: his highly controversial commencement speech at the University of Notre Dame in the summer of 2009, and the long, tumultuous road to health care reform during the first year and a half of his presidency. An examination of these events suggests that the actions of the United States Conference of Catholic Bishops have become increasingly politicized and motivated by the issue of abortion. The group stands far right of the general Catholic population on many issues of life, including abortion and contraception. This examination allows one to put the Catholic conversation about Obama and his policies within the context of the ongoing 120 years of dialogue known as Catholic Social Teaching.

## **THE STORY OF THE POMEGRANATE IN JEWISH AND CHRISTIAN LITERATURE, THOUGHT, AND PRACTICE**

**Amanda Burgess ('10), Religious Studies**

The pomegranate has taken on symbolic significance in many religions including Judaism, Christianity, and Islam. The fruit serves as a decorative motif, literary metaphor, and cooking ingredient in these religions. It is mentioned in the Song of Songs, the Babylonian Talmud, the Jerusalem Talmud, and the Hebrew Bible, and in many Renaissance paintings Christ child can also be seen offering his mother a pomegranate. Each religion ascribes a different symbolic significance to the pomegranate. Although it is clear that the pomegranate is symbolically significant for these three religions, there is little research to account for the differences in these symbolic associations. This paper will explore how the pomegranate came to be a prominent decorative motif and metaphor in early Christianity and Judaism in an attempt to account for the differences in the symbolic associations of the pomegranate in these two religions.

## **HIDING**

**Jean Burnet ('10), English**

A collection of interconnected stories following the lives of five siblings living in the San Joaquin Valley of California.

## **'THE ONE' IS THE LONELIEST NUMBER: A DECONSTRUCTION OF CONTEMPORARY LOVE AND RELATIONSHIPS THROUGH REALITY TV ROMANCE**

**Jessica Bushee ('11), Women, Gender, Sexuality**

Over the decades certain television programs have reflected the culture we live in, communicating an awareness of social issues to our society. Similar to decades past, the new millennium ushered in a new form of reflection: the cultural phenomenon known as reality television. The genre of romance reality TV has been the target of criticism for the sexist, essentially ridiculous, portrayal of female contestants. Viewed as a patriarchal primer for contemporary love and marriage, reality TV romance shows are thought to reinforce stereotypical gender roles and norms. Contrary to this belief, I argue that a critical read of romance reality TV can reveal a positive portrayal of women in relationships today. The rhetoric of love in contemporary American society is focused on fate, meeting 'the One', 'everything happens for a reason' and 'living happily ever after'. By taking a closer look at romance reality TV we can reexamine and rethink our understandings of how women might practice their own relationships in the new millennium. Through my analysis of 'The Bachelor' and 'Temptation Island', I attempt to deconstruct the contemporary rhetoric of love, suggesting that romance reality TV is an empowering 'new romantic tale' for women today.

## **THE EXPRESSION OF THE PROTEIN MARKER FOR NEW NEURONS, DOUBLECORTIN, AS A FUNCTION OF ADOLESCENT CHOLINE AVAILABILITY AND CHRONIC ADULT STRESS IN FEMALE RATS**

**Sara Cameron ('10), Jennifer Corriveau ('10) and Duy Lyford ('10), Psychology**

Choline, an essential nutrient for humans and animals, has positive long-term effects on behavior, neural functions, and brain plasticity. Further findings suggest that prenatal choline availability increases

neurogenesis in the hippocampal region of the brain. Alternatively, chronic stress has been shown to cause atrophy in the hippocampal region of the brain. The present study looks at whether periadolescent choline availability can protect from a decline in neurogenesis in the dentate gyrus of the hippocampus in female rats exposed to a chronic mild unpredictable stress (CMUS). Female rats were placed on either a choline deficient, standard-fed, or choline supplemented diet prior to and during their adolescence (postnatal day 22 – 50). Then, as adults, the rats were either subjected to CMUS treatments for a three-week period or not subjected to any stressful situations. Rats were sacrificed and brains were sectioned. Immunohistochemistry was performed to mark new neurons using the protein marker, doublecortin, and unbiased stereology was used to quantify new neurons in the dentate gyrus of the hippocampus. Analysis of new neurons in the dentate gyrus shows that periadolescent choline availability, like prenatal choline availability increased neurogenesis in the dentate gyrus; however, contrary to past research, CMUS increased neurogenesis in the female rat. Future research may be conducted to further explore sex differences at the cellular level as well as examining the effects of adult choline supplementation.

## **THE MYTH OF TSUGUMI: DEATH AND ABSURDISM IN YOSHIMOTO'S GOODBYE TSUGUMI**

**Laure-Helene Caseau ('10), East-Asian Studies**

Goodbye Tsugumi by Banana Yoshimoto tells the tale of two cousins and the summer where they become adults. Tsugumi has suffered from illness all of her life and has grown up with the possibility that each day could be her last. Tsugumi's attitude towards life is analogous to existentialist absurdist theory and more precisely to The Myth of Sisyphus by Albert Camus. Just as Camus searches for an alternative where one can come to terms with the absurd, Tsugumi struggles to find meaning in her own existence.

## **EXPLORING DIVERSITY AND FUNCTION OF EPIBIOTIC BACTERIA IN THREE SPECIES OF FROGS IN MAINE**

**Anne Chang ('11), Biology**

There is growing evidence of global amphibian population declines. Chief causes of these declines are habitat loss and emerging diseases (Wake & Vredenburg, 2008). There is significant variation, however, in the degree to which populations respond to diseases such as bacterial septicaemia, caused by *Aeromonas hydrophila*, and chytridiomycosis caused by *Batrachochytrium dendrobatidis*. Healthy populations of bullfrogs (*Lithobates catesbeiana*), green frogs (*L. clamitans*), and mink frogs (*L. septentrionalis*) are syntopic throughout much of the state of Maine, but all are vulnerable to infection by these pathogens. Two components of a frog's innate immune system, epibiotic bacteria and antimicrobial peptides produced in skin secretions, may protect these frogs from morbid infection. Indeed, epibiotic bacteria that have antimicrobial properties have been identified (e.g., Lam et al. 2010; Harris et al. 2009), and a multitude of antimicrobial peptides produced in skin secretions from many different frog species have been described and characterized. In this study, we analyzed bacteria cultured from the skin from individuals of *L. catesbeiana*, *L. clamitans*, and *L. septentrionalis* to determine isolate identity and antimicrobial and antifungal characteristics. Identification of each epibiotic strain was completed using staining and biochemical tests. Results of inhibitory tests of the epibiotic bacteria against *A. hydrophila* and *B. dendrobatidis* provide important information about the extent to which these frogs may be resistant or vulnerable to disease. It is important to continue to explore amphibian defenses against diseases in order to better manage persistent healthy populations.

## **ATLAS OF MAINE: PUBLIC SERVICES FOR THE BELGRADE LAKES AREA**

**Matthew Cheever ('12), Environmental Studies**

Matt Cheever, Colby College Waterville, Maine: Environmental Studies Program Created March 11, 2010. This map shows the location of common public services in the Belgrade Lakes Region such as airports, cell towers, EMS rescue teams, boat launches, libraries and fire stations using data collected from the Maine Office of GIS. The watershed boundary layer of the Belgrade lakes was obtained from the Colby Environmental Assessment Team, Colby College with modifications by creator. Roads and railroads are shown as well as they are publicly used avenues. Projected Coordinates used are North American Datum 1983 UTM 19N.

## **COMPARISON OF *DROSOPHILA* CIRCADIAN CLOCK MODELS THROUGH OSCILLATOR-SPECIFIC PHASE SENSITIVITY ANALYSIS**

**Allyson Cheever ('11), Sarah Harmon ('12) and Leah Perlmutter ('12), Computer Science**

Mathematical models are essential in the study of biological systems because they help us understand the systems they represent. Many models have been developed to represent the daily biological cycles, or "circadian rhythms", of the common fruit fly *Drosophila melanogaster*. These rhythms are governed by the expression of multiple genes throughout the day and can be expressed mathematically through ordinary differential equations that describe the interaction between clock-specific mRNAs and proteins. We examine and compare several mathematical models of *Drosophila* using a measure that is particularly suited for circadian clocks: oscillator-specific phase-sensitivity analysis. This method of analysis predicts how an oscillating model's phase will change under perturbations of different components or rate constants. In this way, we quantify the importance of each component and rate constant to learn more about the model. Characteristics that differ between models reveal different approaches to modeling the same system. Characteristics common to all models likely reveal the underlying structure of the circadian clock and can be used to inform further research.

## **POPULATION GROWTH IN THE BELGRADE LAKES REGION**

**Matthew Cheever ('12) and Alexander Hsiao ('11), Environmental Studies**

Matthew Cheever '12 and Alex Hsiao '11 Environmental Studies Program: Colby College, Waterville, Maine  
The goal of our project was to determine if population growth increased over the course of 50 years, and if it was bound to continue. We obtained population data for the towns in the Belgrade Lakes region (years 1950-2000 per decade) from Office of Maine GIS and proceeded to analyze them. We created maps showing the population change per town over the five decades and found the percent change in population per town per decade as well. All the towns in the Belgrade Lakes area experienced healthy growth and are estimated to continue this trend in the future.

## **SHEP & SAINT ADELAIDE**

**J. Clark ('10), English**

An excerpt from a feature length screenplay about a post graduate perfume maker, Daniel Élois, who is dropped into the family business and falls for a self destructive, masochistic and all be it charismatic, young woman in Abigail Westfield. After exacting their nostalgic beatnik plan to follow what's left of America's railways, looking for a fresh start, they find that coexisting within the confines of a young relationship and America's steel capital is more more complex and exhausting than they imagined. As their pasts and bad habits begin to unravel before them they must find a way to either grow up or get home.

## **EFFECTS OF SOCIAL INFLUENCER'S STATUS ON SUGGESTIBILITY IN PRESCHOOLERS**

**Gillian Conly, Amy Dunlap and Michael Schwartz ('10), Psychology**

The use of child eyewitness participants in courtroom procedures is controversial. Though children are capable of producing accurate testimony, there is evidence that they are susceptible to suggestible, misleading questions and that they comply with authoritative figures. This experiment examined the influence of the sex of an authority figure (male, female) and perceived power (high, low) on the misinformation effect on preschool-age children. Children (3-, 4-, and 5-year-olds) were read a modified story and presented with misinformation from the authoritative figure. Each participant was subsequently interviewed by an experimenter after a ten minute delay with cued recall and forced choice questions. Analyses revealed sex differences between males and females in the proportion of correct recall of questions with misinformation items, but there was no effect for the experimental manipulation.

## **GEWALT IN 'DIE VERLORENE EHRE DER KATHARINA BLUM' (VIOLENCE IN 'THE LOST HONOR OF KATHARINA BLUM')**

**Joshua Connell ('10), German/Russian**

Böll's quintessential work portrays a contemporary Germany rife with violence. However, this violence is not merely what one traditionally associates with the word; that is physical violence. Böll rather emphasizes the role of unconventional forms that are perpetuated by societal institutions including the press, church, and the government. These institutions conspire together to perpetuate the status quo and support one another. The experiences of Katharina Blum are used as a means for showing the interrelationship between the various forms of violence and raise the question of cause and effect, a question that is directly stated by Böll in the subtitle 'Wie Gewalt entstehen und wohin sie führen kann' (How violence develops and where it can lead). Analysis of this work can provide a valuable social commentary on interactions between individual and society, and how individuals from different social strata are able to exercise different forms of violence to

further their own interests.

## **EGON SCHIELE: DRAWING HIS SEXUAL BIOGRAPHY**

### **Megan Conroy ('10), Art**

My paper explores the development of Schiele's sexuality as well as its relevance to his art. His work suggests that he felt sexually frustrated in repressed fin-de-siècle Vienna and expressed this feeling in his depictions of himself and of young women. His explicit compositions connect violent sexuality with death, and can be understood in the context of modern philosophy, modern psychology, and his biography. Schiele's interest in children may have been more due to ease than interest, but two significant relationships, one with a model named Wally and his marriage to Edith, a respectable woman from a good family, reveal a lot about the sexuality driving his art.

## **PREVENTING SEVERE PSYCHOSIS: ANTI-SCHIZOPHRENIC PROPERTIES OF SUPPLEMENTAL CHOLINE**

### **Jennifer Corriveau ('10), Psychology**

Past research shows that the essential nutrient choline is neuroprotective against a variety of insults to the brain, more specifically the hippocampus. Examples include: seizures, neurotoxins, gestational stress, neonatal lesions and prenatal alcohol exposure. Choline may be neuroprotective against these traumas within the hippocampus by increasing plasticity. In the present study, we investigated whether choline may also be protective against neuropsychiatric conditions, namely schizophrenia. Theories regarding the etiology of schizophrenia suggest that events operating during early development may render an individual more vulnerable to stress later in life, thus precipitating the onset of the disease. To model this neurodevelopmental vulnerability, pregnant dams were subjected to chronic mild stress during late gestation. Male offspring, along with male control rats from non-stressed dams, were treated with dietary choline supplementation or standard choline levels concurrently with the gestational stress paradigm. Upon reaching adulthood, male rats were treated with MK-801, an NMDA receptor antagonist, which has been used in past research to induce positive and negative symptoms of schizophrenia e.g. psychomotor abnormalities and cognitive and emotional deficits. One week post MK-801 treatment cognitive deficits were assessed.

## **A PARAMETER-BASED INVESTIGATION OF OSCILLATORY BEHAVIOR IN A MODEL FOR THE MAMMALIAN CIRCADIAN CLOCK**

### **Andrew Cox ('11) and Hannah Coulson ('10), Computer Science**

Circadian clocks regulate the day-night biological cycle in living organisms, including plants, animals, fungi, and some bacteria. Mammalia have similar endogenous circadian gene regulatory networks located in the suprachiasmatic nuclei of the anterior hypothalamus, so the study of their clocks is generally conducted as a class. Henry Mirsky (UCSB) developed a mathematical model of *Mus musculus* single cell rhythms by describing 25 biological species with 135 parameters in a system of ordinary differential equations (ODEs), using standard Michaelis-Menten, Hill, and mass action enzyme kinetics. The model consists of two regulatory loops, which we name the primary positive feedback loop and the ancillary negative feedback loop. We perturbed the model in MATLAB (MathWorks, Inc) in separate sensitivity and bifurcation analyses. We found that the ancillary loop is relatively insensitive to parameter perturbation while the primary loop is highly sensitive to perturbations. We also confirmed that parameters related to cellular function, such as gene transcription rates, were more sensitive than those exclusive to the model, such as protein-specific rates of dimerization. These data suggest that the positive regulatory loop is primarily responsible for maintaining oscillations in vivo and that the negative regulatory loop confers non-robustness-related characteristics to the model. Further research will perform similar analysis on multi-cellular tissue models whose parameter vectors are currently being discovered.

## **DOMESTIC DRAMA, INTERNATIONAL CRISES: TSARINA ALEXANDRA, NICHOLAS II AND THE END OF THE ROMANOV DYNASTY**

### **Courtney Cronin ('10), History**

The fall of the Russian Empire can be attributed to many factors. What is often neglected, however, is the effect of Alexandra Feodorovna, Empress of Russia, on her husband, Tsar Nicholas II. Alexandra directly influenced Nicholas's political decisions and continually reminded him of his autocratic authority. She manipulated him to support the autocracy at all costs. Alexandra, first by herself and later with Rasputin,

directly manipulated Nicholas into accepting her political views. Despite advice to concede autonomy and to compromise with the upset Russian workers, Nicholas listened to his wife, and enacted contradictory changes, listening to his advisors and to his wife. Alexandra, with Rasputin by her side, wrote Nicholas letters asking him to change various ministers, and to be more firm and strong for the autocracy, and for their son, the future tsar. Nicholas obeyed, replacing all the ministers Alexandra and Rasputin suggested. It was Alexandra to urged Nicholas to be more self-assured, and reminded him of his power. Rasputin's effect on the royal family is often studied, as he claimed he could heal the young tsarevich. Rumors spread through turn-of-the-century Russia and today about affairs and a sexual relationship between Alexandra and Rasputin. However, true or false, these rumors hint at the power Rasputin yielded within the royal family, a power he used to influence Nicholas through Alexandra. Rasputin rarely wrote to Nicholas directly; his opinions were made known through Alexandra's words of support. Through her letters of support and guidance, speaking of their family, and of Nicholas's autocratic responsibility, Alexandra proved to have a major influence on her husband. Her role in the fall of the Romanov dynasty has been underestimated.

## **DETERMINANTS OF CREDIT RATINGS FOR U.S. PRIVATE COLLEGES AND UNIVERSITIES**

**Robin Daley ('10), Economics**

The recession caused many private colleges and universities to suffer credit rating downgrades. These downgrades are significant because credit ratings represent the default risk of a bond issuance. By affecting the interest rate bondholders require to be compensated for the risk of lending, bond ratings significantly impact the borrowing costs of colleges and universities. Furthermore, the higher education sector is dependent on debt issuance because schools lack the capacity to raise funds through issuing equity, making increases in the cost of debt a non-trivial burden. Moody (2008) has been the only scholar to investigate the determinants of credit ratings with respect to the higher education sector. However, his analysis focused solely on public universities. This study will extend the analysis of Moody (2008) to private higher education institutions, and will take advantage of a newly established data source to conduct a more thorough analysis. The ordered probit analysis reveals that the model predicts the actual rating for schools rated by Moody's Investors Service (MIS) 52.4 percent of the time, while the model predicts the actual rating for schools rated by Standard & Poor's Rating Agency (S&P) 41.7 percent of the time. For both MIS and S&P, the ordered probit analysis reveals there is statistical support for the hypothesis that the freshman selectivity, total students, trend total students, primary reserve ratio, viability ratio, endowment per student, and bond issuance to outstanding debt ratio variables have nonzero effects on an institution's credit rating. To our knowledge this is the first study that investigates the credit rating determinants of private higher education institutions.

## **A CASE OF ENVIRONMENTAL JUSTICE: NORTH RIVER WASTEWATER TREATMENT PLANT**

**Sarah Dallas ('10), Environmental Studies**

A study of the North River Wastewater Treatment Plant in West Harlem, New York and the environmental injustices incurred by the local residents. This will include background and history to the development of the site, actions taken by local residents, and what has been accomplished as a result.

## **CHARACTERIZATION AND DEVELOPMENT OF A CARVONE-BASED FISH ANESTHETIC: COMPARING THE EFFECT OF FISH-EEZZZ AND TRICAINE-S ON INDUCTION, RECOVERY, AND ECG PATTERN IN JUVENILE LANDLOCKED ATLANTIC SALMON, *SALMO SALAR*.**

**G. Danner, Syed Ahmad, Katherine Muto ('11), Joseph Seggio, Chelsea Stillman ('10) and Anna Zieba ('11), Biology**

The use of anesthetics for fish and other aquatic life is widespread in research settings and commercial aquaculture. Currently Tricaine-S is the only FDA approved anesthetic, however, it is toxic to humans and requires a costly 21-day catch and release limitation. Development of a non-toxic, cost-effective, and humane fish anesthetic would be beneficial for researchers and commercial fisheries. Recently we have developed an all-natural, economic and efficacious anesthetic: Fish-eezzz, composed of Carvone ((p-mentha-6,8-dien-2-one), the primary ingredient in spearmint oil, and methy-salicylate is all-natural, inexpensive, and non-toxic. In this study we attempted to determine the efficacy of Fish-eezzz on juvenile Landlocked Atlantic Salmon when compared with Tricaine-S. Fish-eezzz had comparable induction rates, recovery rates, and ECG patterns to Tricaine-S. Salmon recovered from a handleable state more rapidly when treated with fish-eezzz than with Tricaine-S. Salmon exposed to a continuous anesthetic bath of Fish-eezz throughout the ten-minute ECG recording showed clinical signs of increasing depth of anesthetization including decrease in heart rate, respiration, and electrocardiograph abnormalities, which was not observed in salmon exposed to a continuous bath of Tricaine-S. Continuous exposure to fish-eezzz resulted in apnea

and atrial-ventricular block, resulting in death, indicating that fish-eezzz can also be utilized for euthanasia. Salmon treated with fish-eezzz and then placed in freshwater for the subsequent ECG recording showed comparable respiration rate, heart rate and ECG patterns to Tricaine-S. Fish-eezzz can be an effective, safe, and economically practical anesthetic alternative to Tricaine-S when prolonged anesthetization (>8 minutes) is not required.

## **MISMATCH BETWEEN HUMAN PERCEPTION AND EYE REFLEXES DURING OFF-VERTICAL AXIS ROTATION**

**Saralin Davis ('10), Mathematics**

The vestibulo-ocular reflex (VOR) is comprised of compensatory eye reflexes in the opposite direction of self-motion perception. While the VOR is often used as a measure of motion perception, previous research has demonstrated notable differences between the two (Merfeld et al.). The current project analyzed eye movement and perception data from a previous study by Wood et al., in which subjects underwent off-vertical axis rotation (OVAR). The existence of a motion that matched the phase data for both perception and eye movements was considered in order to establish whether they were compatible. Parameter values were then tested to determine which of the current models of the vestibular system were able to match eye movements and/or perception. Our results indicate an inherent mismatch between eye movements and perception for OVAR and suggest the use of different models in the two systems.

## **VISUAL TAYLOR SERIES AND A GENERALIZED ALTERNATING SERIES TEST**

**Justin De Santis ('13), Mathematics**

We give a method of visualizing Taylor Series that leads us to conjecture a generalization of the alternating series test. We then set out to prove this generalization.

## **CENTRAL BANK INDEPENDENCE AND FISCAL DOMINANCE**

**J. Delhy Nolivos ('10), Economics**

The link between low levels of central bank independence (CBI) and high levels of inflation has long been established by previous literature. This literature implicitly infers that the inverse relationship between CBI and levels of inflation is caused because of the existence of fiscal dominance. This paper aims to better identify the link between fiscal dominance and different inflationary outcomes. Using a theoretical model and empirical evidence, we show that under low levels of CBI, there is a systematic correlation between changes in fiscal tax rates and changes in the level of inflation, and conversely, under high levels of CBI, there is no such systematic correlation between changes in the level of both macroeconomic variables. This shows that under low levels of CBI, the fiscal authority will use both the fiscal and monetary instruments symmetrically, whereas in the case of high CBI, the fiscal authority will not be able to use the monetary instrument and only the fiscal tax rate will have to be adjusted to finance government spending.

## **ASSESSING CARAVAGGIO'S HOMOSEXUALITY; AN EXAMINATION OF THE HOMOEROTIC CONTENT IN CARAVAGGIO'S WORK IN BOTH PRIVATE AND RELIGIOUS COMMISSIONS**

**Caroline Dickson ('10), Art**

Caravaggio defined the Baroque period of Italian art and set the stage for other artists to explore his Caravaggesque naturalism and dramatic chiaroscuro. His powerful naturalism, perhaps the key to his artistic fame, was also cause for the church's rejection of many of his religious commissions. While Caravaggio was most widely known for his religious works, his early paintings of young male youth engaged in ardent song might hint at the artist's personal life and sexual preferences. Though Caravaggio's young subjects were most likely selected by Caravaggio's homosexual patron, Cardinal Francesco Maria Del Monte, their soliciting stares and boyish beauty raises the question of the artist's own sexuality. The homoeroticism that characterizes these early works has led scholars to draw conclusions on the artist's sexuality. However, the examination of Caravaggio's later religious works, which were commissioned for churches and private chapels, provides a new context for considering this issue.

## **MILD TRAUMATIC BRAIN INJURY AND ADVANCEMENTS IN CONCUSSION MANAGEMENT**

**Maureen Dunn ('10), Psychology**

Mild traumatic brain injury occurs when there is enough force on the brain to alter brain physiology leading to a complex array of symptoms which are usually short-lived and self-resolving. However serious



complications can occur if an athlete returns-to-play before their concussion has fully healed. Without standardized procedures, the recognition, reporting, and treatment of concussions has been inconsistent for years. With the advent of neurocognitive testing to identify the cognitive deficits cause by mild traumatic brain injury, concussions can now be managed using an objective measurement of cognitive recovery. However, neurocognitive testing cannot be used in isolation to diagnose and manage concussions, symptoms and balance testing are also integral tools in deciding whether an athlete should return to play. The Maine Concussion Management Initiative (MCMI) provides free baseline testing to high schools in Maine. A case study of a student-athlete's concussive injury and the subsequent management provided through the system set up with MCMI demonstrates the application of the current knowledge surrounding concussions and proper management strategies.

## **HELPING MAINE COMMUNITIES UNDERSTAND THE ENERGY EFFICIENCY CONSERVATION BLOCK GRANT PROGRAM**

### **Stephen Erario ('10), Environmental Studies**

The American Recovery and Reinvestment Act (ARRA) increased funding for Maine municipal energy efficiency efforts from virtually nothing in 2009 to well over million for the years 2010 through 2012. Previously, there was relatively little energy efficiency activity in Maine municipalities, and therefore a low level of statewide coordination or support efforts. This study outlines the significance of million in funding recently approved for use by Maine towns and cities in terms of environmental and economic impacts. It illustrates examples of innovative projects that will be implemented using these funds, such as the installation of large solar panels on government buildings, and projects changes to the municipal energy efficiency landscape over time. Finally, the study recommends a number of different strategies that municipalities and statewide organizations can implement to increase the short- and long-term impacts of ARRA municipal energy efficiency funding, which is expected to continue into 2013 and beyond through various federal funding programs.

## **HISTORICAL NOVEL**

### **Julia Essenburg ('11), English**

A reading of my semester long project for EN 478. This semester I have begun a historical novel set in 12th century England, following the early life of Empress Matilda as she fought for her Kingdom after her father's death.

## **FAMILY TIES: MAINSTREAM ENVIRONMENTALISTS' UNDERSTANDING OF RADICAL ENVIRONMENTALISM IN AMERICA**

### **Zachary Ezor ('10), Government**

Environmentalism in the United States manifests itself in numerous ways. While American environmentalists have been grouped into broad camps over the years, observers have struggled to accurately classify the different components of the movement. Lately, environmentalists have been characterized based on their chosen modus operandi. Environmentalists who employ typical interest group tactics of policy advocacy and accept the notion of political compromise can generally be called 'mainstream.' Alternatively, those environmentalists who employ non-conventional strategies like direct action and take a no-compromise stance on environmental issues are typically described as 'radical.' Despite these distinctions, both radical and mainstream environmentalists are parts of the broader American environmental movement. Understanding the relationships between these wings becomes integral to any firm understanding of the movement. This study approaches the relationship between mainstream and radical environmentalists by tackling the following question: How do mainstream environmentalists perceive that radical environmentalists affect their level of success? When do they perceive radicals to be helpful in advancing their goals and strategies, and when do they think they interfere? Two case studies were undertaken: the Northwest Ancient Forest Campaign of the 1980's-1990's and the ongoing debate over development in the Maine North Woods. The cases are augmented by 17 elite interviews conducted with representatives of mainstream groups, policy makers, and grassroots environmentalists. The study concludes that mainstream environmentalists perceive that radicals hinder their success when they engage in violent action, but, surprisingly, find non-violent action to be helpful in some instances.

## **PERCEPTION OF PERSONALITY BASED ON THE USE OF FACES AND VOICES**

### **Sarah Falkof ('12), Elizabeth Davis ('12), Claire Grady ('12) and Elizabeth Raney ('12), Psychology**

The purpose of this study is to investigate how people perceive others' personality when making first impressions. Previous research has shown that people can make impressions of personality when looking at a face image alone or a hearing a voice recording. We are interested in looking at how facial and vocal features impact our perceptions when presented together. In the present study, various combinations of face images and voice recordings were displayed in a slide show. Participants rated the stimuli's extroversion and neuroticism. An analysis of the participants' ratings shows the accuracy of the ratings and the impact of face and voice features on these judgments.

## **THE IMPLICIT FUNCTION THEOREM**

### **Aichatou Fall ('10), Mathematics and Statistics**

The aim of this paper is to study the implicit function theorem, its history, theory and applications. We first prove the theorem by induction and then prove its equivalence to the inverse function theorem. We also provide a proof via the contraction mapping theorem after restating the theorem in terms of Banach spaces. The last section gives an application to ordinary differential equations with a proof of equivalence between Picard's theorem and the implicit function theorem

## **AUXILIARY CADENCES AND VOICE-LEADING STRUCTURE IN ROBERT SCHUMANN'S 'AUFSCHWUNG'**

### **Kathleen Fallon ('10), Music**

Unlike other compositions from this era, Robert Schumann's "Aufschwung" from Phantasiestücke, Op. 12, does not follow the typical Ursatz form inherent in Heinrich Schenker's theories. The piece begins with an auxiliary cadence that does not complete itself until the final measure of the piece. The composition then explores different key areas, while returning to the opening theme after each section, creating a form similar to a rondo. Although "Aufschwung" does not fit Schenker's model exactly, it still offers interesting voice-leading structures that can be more easily seen and explored using Schenkerian analysis.

## **ETHICAL ISSUES IN GENETIC COUNSELING**

### **Yanica Faustin ('10), Biology**

This Project will delve into the Scientific realm and Ethical realm of the genetic counseling field. Explaining the counseling side of the career as well as the genetics side. In addition to the display of how genetics and ethics constantly have to work together through out a career such as this one, the project also incorporates a clinical component. The clinical component of the project is essential because it discusses the issues a counselor may face when addressing a patient. The clinical component focuses on providing children books as a tool to aid with the counseling component with the profession, this is unique to pediatric genetic counseling. However similar methods and approaches can be taken in other fields. The first book will be about Meiosis. It will star cells as the characters. The book will explain the meiotic process. The point of the book is to help explain a basic genetic concept like cell division to children. It will help develop an interest in learning more about biology, and more specifically genetics. The second book will be very similar to the first, starring cells as characters, to help explain the mitotic process. The third book will be disease related (sickle cell). The book will star different types of blood cells and the blood stream itself as characters. It will help explain to a child experiencing the disease (or a parent) what exactly is going on in their body and why. It will explain and go over the difference between normal cells and cells that are sickles, and will explain how sickle cells are created. The book can be used as a teaching tool by a pediatric counselor to help explain to the child what is going on in their body. This is a good tool for counseling.

## **ATLAS OF MAINE: BELGRADE LAKES BEDROCK GEOLOGY**

### **Wyatt Fereday ('11), Environmental Studies**

This map shows the bedrock geology in the Belgrade lake region. This map is important because the rocks in this region are frequently hard to see due to vegetation cover, overlying glacial deposits, and the abundance of lakes.

## **HIKING TRAILS IN KENNEBEC COUNTY, MAINE**

### **Wyatt Fereday ('11) and Cassandra Knight ('10), Environmental Studies**

The off-road Kennebec Messalonskee Trails were mapped using hand-held GPS units. These routes were then overlaid on satellite images of the Waterville area. Included in the map are trail head parking areas and

major street names to facilitate navigation to trail heads.

## **INTERPRETATION OF AN ANCIENT COLLISIONAL PLATE TECTONIC BOUNDARY, WYOMING: PART 1**

### **Wyatt Fereday ('11), Geology**

The Cheyenne Belt, in southeastern Wyoming, is a zone of highly deformed rocks that separates roughly 1.6–1.8-billion-year-old rocks to the south from >2.5-billion-year-old rocks to the north. It is classically interpreted as resulting from the collision of micro-continents with the ancient North American Continent ~1.78-billion years ago. The collision resulted in a plastic fault zone, or shear zone. Samples of these plastically deformed fault rocks were collected and examined with a petrographic microscope to reconstruct the geometry of the collisional event. Deformed and rotated mineral grains were evaluated on separate faces. On horizontal faces deformed grains were placed into five groups indicating strike-slip fault motion: strongly left-lateral, weakly left-lateral, ambiguous, weakly right-lateral, and strongly right-lateral. To evaluate dip-slip motion on vertical faces, five similar groups were used: strongly southeast-side-up, weakly southeast-side-up, ambiguous, weakly northwest-side-up, and strongly northwest-side-up. Overwhelmingly, the clasts are ambiguous on both faces. However, a component of southeast-side-up movement is exhibited. This indicates that deformation was dominated by ductile shortening and flattening of the rocks with a small amount of southeast-side-up reverse faulting and little–no strike-slip faulting.

## **PUBLIC PORTRAYAL VERSUS INTERNAL PRACTICE: THE SEVENTH-DAY ADVENTIST FOOD MOVEMENT**

### **Amanda Forrester ('11), Religious Studies**

Seventh-day Adventism is a small sect of Christianity in the United States, yet the religion has had a profound impact upon the health practices and food staples in mainstream America. Adventist dietary practices originated from its followers' spirituality, biblical texts, and knowledge of nutrition. However, today the movement has shifted, focusing solely on the health aspect of these dietary practices. Despite the fact that the reasons for these observances have changed, dietary practices have remained a central part of Seventh-day Adventist identity and religion. This research explores why there has been a move from multiple reasons for practicing dietary restrictions to a singular reason, as well as how this notion has become an accepted practice within the Adventist community.

## **THE LEGACY OF THE AMERICAN CIVIL WAR IN THE LIVES OF WOMEN: A COMPARATIVE STUDY OF THE NORTHERN AND SOUTHERN EXPERIENCES THROUGH RECONSTRUCTION**

### **Daniel Franklin ('10), History**

The Civil War, one of the most important events in American history, is also one of the most written about subjects in American historical scholarship. Women during the Civil War and Reconstruction is not a new subject of study either. Already by 1863, historians had begun writing about the ways in which women participated in the war and how the war changed the lives of American women. But despite the fact that some significant changes in the nature and quality of this scholarship have occurred within the last few decades and many important works have been written that reflect both the growth of women's and gender studies within academia and the efforts of historians to give women their due diligence amid a much changed gender environment within society as a whole, some things have not changed all that much. Partly due to the kinds of sources available to us, for example, Northern middle-class and Southern elite women have received a disproportionate amount of attention. As a result, though class and regional differences in the experiences of women during and after the Civil War are recognized and have been included within the scope of larger works to some degree, perhaps neither of these issues has been given enough attention in their own right. My work attempts to draw explicit comparisons in how the war affected Confederate women differently than it did Union women. It also tries to show how this war, different from any other, influenced women of the various classes and races within both the Confederacy and the Union. My work asks whether change as a result of the war was limited to the wartime period or had a lasting legacy, whether it resulted in reformed identities and a new self-consciousness, and whether the Civil War helped usher in the decline of Victorian gender ideals.

## **MISSED CONNECTIONS: A CRAIGSLIST FICTION PROJECT**

### **Christine Friar ('10), English**

A series of short stories inspired by and based on the Missed Connections section of New York Craigslist.

## **WOMAN AS OBJECT IN CONSUMER CULTURE**

### **Katherine Gagnon ('11), Art**

By investigating the works of Carolee Schneeman, Cindy Sherman, Tracey Emin, and Vanessa Beecroft I explore how these artists challenge the sexual body image and the role of women marketed and sold in mass-market culture from the 1960s through the 1990s. For each artist, I focus on a specific medium or body of work that most relates to the discussion of sex as a commodity. My research reveals a backwards evolution in the way female artists portray the relationship between women and the media. This paper addresses the ways in which the work of Schneeman, Sherman, Emin, and Beecroft relate to each other and how each artist deals with the distance she puts between her work, the audience and herself.

## **BIDIRECTIONAL JUDGEMENTS OF WEIGHT AND IMPORTANCE**

### **Brendan Gallagher ('12), Nicole Pickering ('12), T. Randall ('12) and Hao Yang ('12), Psychology**

Previous studies indicate that holding heavier objects affects judgements of importance. We are testing to see if this relationship is bidirectional.

## **IMPACTS OF LAND USE CHANGES ON WATER QUALITY IN SALMON LAKE AND MCGRATH POND**

### **Emma Gildesgame ('10), Amy Holmen ('10) and Katherine Orrick ('10), Environmental Studies**

Historic and present land-use patterns in the Salmon Lake/McGrath Pond watershed were analyzed by Colby College in the fall of 2009 to determine their potential impact on lake water quality. There has been an increase in residential land (78.8 ha) as well as in youth summer camps (13.3 ha) since 1965/66. Non-shoreline residential area increased 143% and now covers 135 ha. Shoreline residential area also increased (54.9 ha) but by only 29.5%. High impact development (commercial and municipal land uses) increased from 2.2 ha to 14.2 ha. Logged land has also increased from 3.3% to 8.2%. Forested land decreased from 71.5% to 65% (71 ha) due to logging and residential development. Agricultural land decreased 60% (28.1 ha) over this time. The largest external contributors to phosphorus loading into Salmon Lake and McGrath Pond as a percent of the total external load were shoreline residential septic systems (14.9%), atmospheric input (13.1%), cropland (11.1%), and shoreline development (10.1%). Over half the camp roads in the watershed are in fair (35%) or poor (23%) condition based on our survey, and likely contributors of phosphorus into the lake. Approximately one quarter (26%) of the shoreline buffers were rated as poor. Twenty-four private boat launches also provide potential avenues for phosphorus loading into these lakes. Proactive measures by the lake association, Department of Environmental Protection, Belgrade Regional Conservation Alliance and other groups should be continued to help maintain or improve lake water quality.

## **KOSHER ETHICS: AMERICAN JEWISH RESPONSES TO THE AGRIPROCESSORS SCANDAL**

### **Emma Gildesgame ('10), Religious Studies**

In 2008, a US Immigration raid on AgriProcessors, Inc, the largest kosher meat processing plant in the US, sent shockwaves through the American Jewish community. The raid included the arrests of almost 400 illegal immigrants and top ranking AgriProcessors officials amidst allegations of terrible working conditions, child labor law violations, and widespread unethical business practices. In the two years that followed, various groups of American Jews have reacted in different ways. A group of Conservative Jews, backed by the United Synagogue of Conservative Judaism, called for the inclusion of ethical guidelines into kosher certification. A Modern Orthodox social justice organization called Uri L'Tzedek created a separate seal that attested to ethical working conditions at kosher restaurants. Reactions by these groups and by the Modern Orthodox and Ultra-Orthodox communities to AgriProcessors and Ethical Kashrut orient them along a spectrum of commitment to Jewish and American legal and cultural obligations. Each group is influenced in some way by both Jewish and American legal and cultural systems, but the way they prioritize these four variables and the authorities upon which they rely reflect their identities as Jews and Americans. This is evident in the rhetoric each group uses in their mission statements, websites, newspaper articles, and opinion pieces. This presentation will focus on how each group portrays itself as socially active and aware, modern, compassionate, ethical role models reacting seriously to and concerned by AgriProcessors allegations.

## **THE BIDIRECTIONALITY OF THE ASSOCIATION BETWEEN WEIGHT AND IMPORTANCE**

### **Jenifer Goldman ('12), Megan Compaine ('12), Kristen Erickson ('12) and Katherine Gorman ('12), Psychology**

In a study by Jostman, Lakens and Schubert (2009), researchers found that people answering questions using a heavy clipboard tended to perceive things as being more important than did people using a light clipboard. However, the opposite effect has not yet been explored, so the present study aimed to replicate the original results and to find a reciprocal effect. Doing so would decrease the possibility that participants in the original study who held a heavy clipboard misattributed their feelings of effort when judging importance, or that they took such perceptions as a cue to process the information more thoroughly. In one condition, participants held either a heavy or light clipboard, and then rated the importance of a given scenario. In the other condition, participants read an important or unimportant scenario, and then estimated the weight of the clipboard that they were holding. Results indicated that participants primed with an important scenario rated the clipboard as being as heavy as those who were actually holding a heavy clipboard, but clipboard weight did not appear to affect participants' ratings of importance. The results of the original study were therefore not replicated, but the opposite effect was found. Such findings suggest that the relationship between weight and importance is bidirectional when the dependent variable is perceived weight, but not when it is perceived importance.

### **NARCISSISM IN DECLARED MAJORS AND INTENDED CAREER GOALS**

**Elisabeth Grasser ('11), Hilana Bernheimer ('10) and Jessica Newman ('11), Psychology**

The purpose of this study is to measure whether narcissistic tendencies are correlated with major and career path. Previous studies show that some of the characteristics of narcissism include self-enhancement, high goals, and importance of prestige and dominance. Thus, we hypothesize that there will be a higher population of narcissists in the majors that are socially considered more esteemed, such as business, economy, and majors related to medicine. Further, narcissists will base career path partly by perceived rankings of occupation status. In order to test this, students at Colby College will be asked to complete a questionnaire containing experimenter-created questions relating to choice, interest, and perceived prestige of majors and occupations as well as the widely used and highly reliable Narcissistic Personality Inventory. Analysis of the questionnaires will help us to answer the stated hypothesis. Results showed that there was a significant effect of narcissism on major ( $F(8, 60) = 2.755, p = .013$ ). Additionally, there was a significant effect of Authority, Exhibitionism, Exploitativeness, Superiority, Vanity, and Entitlement subcategories of narcissism on major (for all  $p < .05$ ). Tukey-b post-hoc tests revealed that narcissism scores were significantly higher in the Government major than the Economics major. No other significant effects were found. There was a significant effect of Exploitativeness on career goals ( $F(8, 60) = 2.314, p < .05$ ).

### **FAST: THE STORIES OF A TEAM**

**Katrina Gravel ('10), English**

This project is a collection of short stories that focuses on the members of a college cross-country team. Each story follows one of the young women at various points in the season and examines the difficulties and challenges each faces.

### **DOES SIZE MATTER?: THE EFFECTS OF FONT AND PAPER SIZE ON PERCEIVED IMPORTANCE**

**Lisa Ha ('12), Reesa Kashuk ('12), Kim Klatzkin ('12) and Michelle Mathai ('12), Psychology**

Past work has shown that importance can be embodied through different representations. The current study was conducted to evaluate whether size embodied importance. One hundred and twenty college-aged participants were each given one questionnaire on one of three different paper sizes, typed in either small or large font. Importance was measured by the polarity of responses, which indicates how strongly they felt about the issue at hand. Results showed that there is an interaction between paper and font size in the positive question condition, specifically presented on letter size paper in a large font.

### **SINN FEIN'S SYMBOLIC FRAMEWORK: SOCIAL MOVEMENT THEORY AND THE IRISH WAR OF INDEPENDENCE**

**Emma Hall ('10), Government**

Much historical attention has been paid to the Irish separatist party Sinn Fein and its electoral victory in 1918, which led to the Irish War of Independence. However, this literature has been grounded in the Irish historical tradition, and there has yet to emerge a comprehensive analysis of Sinn Fein's dramatic rise to power from a political science perspective. This thesis applies three social movement theories in an attempt to answer the fundamental question: Why did the Irish electorate abandon the Irish Parliamentary Party's moderate legislative strategy in favor of Sinn Fein's radical separatist platform? The study evaluates the

applicability of three hypotheses based on three social movement theories: rational choice theory, political opportunity structure, and political culture. The thesis argues that Sinn Fein's electoral success resulted from its revival of traditional nationalist symbols and its construction of a strategic symbolic narrative which interpreted nationalist politics in the context of moral legitimacy and cultural unity. This framework allowed Sinn Fein to maximize support from the public and to undermine the legitimacy of its rival, the IPP. Sinn Fein's success serves as a demonstration of the extent to which symbolism and culture can motivate and define political behavior.

### **CONJUGATIVE TRANSFER OF MULTIDRUG RESISTANCE MEDIATING MEGAPLASMID FROM *AEROMONAS SALMONICIDA* SUBSP. *SALMONICIDA* TO *VIBRIO CHOLERA*E**

**Andrew Hardigan ('10) and Elaura Patton ('11), Biology**

The spread of antibiotic resistance is currently one of the most difficult and complex problems facing the fields of medicine, agriculture and aquaculture. There is considerable concern regarding the transfer of antibiotic resistance genes to pathogenic species from the antibiotic resistance reservoir of environmental or commensal bacteria, a process typically occurring through horizontal gene transfer (HGT). The recently discovered class of multi-drug resistant (MDR) mediating IncA/C megaplasms confer high level resistance to a wide variety of clinically and economically relevant antimicrobial compounds, and has been found in a wide number of pathogenic and non-pathogenic bacterial species. In order to investigate the potential transfer of this MDR mediating plasmid to clinically relevant pathogenic species we performed conjugation transfer frequency assays between *Aeromonas salmonicida* subsp. *salmonicida* AS03 and *Vibrio cholerae* O1 El Tor (C6706). We report the successful transfer of IncA/C plasmid mediated MDR profile confirmed via antibiotic selection for transferred chloramphenicol resistance, conferred by the cat and floR genes on the IncA/C backbone. Additional confirmation of the plasmids transfer was provided by the standard method of IncA/C characterization, PCR-based replicon typing of the IncA/C backbone repA gene. We are currently working to characterize HGT of the IncA/C plasmid between additional donor and recipient species under various mating and selective conditions. In particular, we are assessing possible enhancement of IncA/C conjugative transfer to and from *Vibrio* spp. due to chitin, a GlcNAC polymer that is critical for *Vibrio* attachment to both environmental and gastrointestinal surfaces.

### **COMPARISON OF *DROSOPHILA* CIRCADIAN CLOCK MODELS THROUGH OSCILLATOR-SPECIFIC PHASE SENSITIVITY ANALYSIS**

**Sarah Harmon ('12), Allyson Cheever ('11) and Leah Perlmutter ('12), Computer Science**

Mathematical models are essential in the study of biological systems because they help us understand the systems they represent. Many models have been developed to represent the daily biological cycles, or "circadian rhythms", of the common fruit fly *Drosophila melanogaster*. These rhythms are governed by the expression of multiple genes throughout the day and can be expressed mathematically through ordinary differential equations that describe the interaction between clock-specific mRNAs and proteins. We examine and compare several mathematical models of *Drosophila* using a measure that is particularly suited for circadian clocks: oscillator-specific phase-sensitivity analysis. This method of analysis predicts how an oscillating model's phase will change under perturbations of different components or rate constants. In this way, we quantify the importance of each component and rate constant to learn more about the model. Characteristics that differ between models reveal different approaches to modeling the same system. Characteristics common to all models likely reveal the underlying structure of the circadian clock and can be used to inform further research.

### **CHARACTERIZATION OF THE TRANSCRIPTION FACTOR TAABF1 IN ABSCISIC ACID AND GIBBERELLIN SIGNALING**

**Lauren Harris ('10), Benjamin Keyser ('10), Sarah Martinez ('11) and Jennifer Sim ('11), Biology**

The interaction between the phytohormones abscisic acid (ABA) and Gibberellin (GA) regulate development and growth in imbibing cereal grains. GA induces seed development and germination while ABA inhibits this induction. The transcription factor TaABF1, a member of the ABA response element binding factor (ABF) family, has been shown to inhibit GA-inducible gene expression (Amy32b) and promote ABA-inducible gene expression (HVA1) in barley aleurone cells. To further characterize the role of TaABF1 in ABA/GA signaling, we utilized a transient particle bombardment system. Lower levels of ABA and TaABF1 caused a greater response in the Amy32b promoter than in the HVA1 promoter, suggesting the ABA responses are regulated differently in these two promoters. Amy32b was further suppressed by a combination of TaABF1 and ABA as compared to either individual treatment, indicating that TaABF1 and ABA have an additive effect on ABA suppression. Conversely, maximal induction of the HVA1 promoter by ABA was not enhanced by

bombardment of TaABF1, demonstrating that no additive effect is present. Specific inhibition of ABA perception by 1-butanol substantially reduced HVA1 induction via overexpression of TaABF1, suggesting that ABA-induced modification is required for maximal activity of the protein. Although TaABF1 has been shown to suppress the GA-induced Amy32b promoter, it did not suppress induction of Amy32b by the GA-induced transcription factor GAMyb, indicating that TaABF1 must act upstream of GAMyb along the signaling pathway. Furthermore, TaABF1 was also found to regulate the expression of GAMyb.

#### **THE ROLE OF TAABF1 IN ABSCISIC ACID-MEDIATED SUPPRESSION OF $\alpha$ -AMYLASE GENE EXPRESSION IN CEREAL GRAINS**

**Lauren Harris ('10), Biology**

The phytohormones gibberellin (GA) and abscisic acid (ABA) regulate important developmental events in germinating seeds. Specifically, GA induces the expression of hydrolase genes, like the  $\alpha$ -amylase gene Amy32b, which mobilizes starch reserves to be used by the embryo, and ABA suppresses this induction. Recent advancements identified ABA and GA receptors and key components in the signaling pathways, however, the mechanism of crosstalk between the hormones remains largely unknown. To further elucidate the mechanism of ABA suppression of GA-induced genes, we focused on the transcription factor TaABF1, a member of the ABA response element binding factor family. TaABF1 has been shown to physically interact with the SnRK2 kinase PKABA1 and overexpression of TaABF1 or PKABA1 can suppress Amy32b. We carried out particle bombardment experiments to investigate how TaABF1 suppresses Amy32b and how TaABF1 is activated by ABA. The role of TaABF1 in ABA-mediated suppression of Amy32b is more complicated than hypothesized. Unlike PKABA1, overexpression of TaABF1 did not cause a decrease of GAMyb expression and in fact resulted in an increase of GAMyb expression. When TaABF1 and GAMyb were simultaneously overexpressed in aleurone, the GAMyb induction of Amy32b was unaffected, indicating that the target of TaABF1 action must be upstream of GAMyb. Furthermore, TaABF1 and ABA demonstrated an additive effect on the suppression of Amy32b. Based on our findings, we propose a model in which PKABA1 activates two separate targets, one being TaABF1 which then modifies an unknown target upstream of GAMyb and the other being an unknown transcription factor that suppresses GAMyb transcription.

#### **ATLAS OF MAINE: CONSERVATION LAND IN THE BELGRADE LAKES REGION**

**Sarah Hart ('10), Environmental Studies**

The Belgrade Lakes Region contains natural habitat that is vital to protection of plant and animal species and to the water quality of the lakes. Individuals, businesses, state and local governments and non-profit groups have conserved over 7,000 acres of land through conservation easements and land trusts. This land provides recreational opportunities for the public and preserves natural resources. This map depicts the location of conservation land and classifies it by type of land protection.

#### **FACE THE MAKEUP: A WEBSITE ON TOXIC CHEMICALS IN COSMETICS**

**Sarah Hart ('10), Environmental Studies**

Personal care products can contain ingredients that are endocrine disruptors and neurotoxins including lead and formaldehyde. Ingredients in the products that we use every day can build up in our bodies and impact our health. Face the MakeUp website presents information on the toxic ingredients, our body burden of chemicals and current legislation regulating chemicals. More information at: [web.colby.edu/cleanmakeup](http://web.colby.edu/cleanmakeup)

#### **THE ABANDONED HOLTRACHEMICAL PLANT'S TOXIC EFFECTS ON ORRINGTON, MAINE AND THE PENOBSCOT NATION**

**Sarah Hart ('10), Environmental Studies**

The HoltraChem Manufacturing Company operated in Orrington, Maine on the banks of the Penobscot River from 1967 until September, 2000. HoltraChem used elemental mercury and other toxic chemicals to manufacture chlorine for paper mills. While operating, they violated environmental protection laws, polluted the Penobscot River and harmed the health of the environment and local residents. When the plant shut down in 2000, HoltraChem abandoned the site, leaving tons of toxic waste and contaminated soil. As a result toxic chemicals are building up in people and the environment, negatively impacting the way of life for the people of Maine and the Penobscot Nation. As of April 2010, the Maine Department of Environmental Protection is still working to clean up pollution at the site.

#### **ALLERGIC RESPONSE TO *ASPERGILLUS FUMIGATUS* EVALUATED IN RAG-DEFICIENT MICE WITH**

## **TRANSFERRED ΔF508-/- CYSTIC FIBROSIS SPLENOCYTES**

### **Hana Haver ('11), Biology**

Allergic Bronchopulmonary Aspergillosis (ABPA) is a type of asthma that commonly afflicts 10-15% of patients with Cystic fibrosis (CF), with nearly 2/3 having Af-specific IgE. We aimed to use a murine model that could effectively imitate the immune system of a patient with CF. By adoptively transferring CF ΔF508 -/- splenocytes to 8 gender-matched RAG deficient mice, we aimed to elicit an allergic reaction to Af similar to those found in human CF patients. IgM ELISA data were completed to determine engraftment levels of transferred splenocytes and IgE ELISA data to quantify a level of allergic response. All of the mice who received splenocytes showed higher IgM 8-weeks post injection suggesting that the transfer was successful, and there was no significant difference in the level of engraftment as indicated by difference in IgM. There was a nearly significant difference ( $p=.06$ ) in IgE, suggesting that this protocol could be useful in mimicking the CF allergic response to Af for further study of therapeutic treatments.

## **NOVELTY AND NEGLECT: ITALIAN AMERICANS, FOOD AND CATHOLICISM**

### **Jena Hershkowitz ('12), Religious Studies**

Upon arriving in America, Italian immigrants had cheaper and easier access to foods they never knew in Italy. With this, Italian-American food habits took on a character all their own. The preparation and presentation of food became paramount in the Italian-American household. While Italians in America generally ate more than their counterparts back home in Italy on a daily basis, Sunday dinner (after Mass) and religious holiday meals took on especially inflated levels of importance that were previously non-existent in the average Italian household. The closely bound food and religious traditions of Italian-American Catholics demonstrate patterns of early novelty followed by neglect, and more recently a new wave of novelty among younger generations trying to piece back together neglected aspects of their culture and religion.

## **RIGHT ON POOLE**

### **Dana Himmelstein ('10), English**

I will read a piece from my novella, 'Right on Poole.'

## **ATLAS OF MAINE: LAKE SURFACE ELEVATION AND IMPOUNDMENTS**

### **Daniel Homeier ('12), Environmental Studies**

This map illustrates the effect of impoundments on surface water elevation. The translucent coloring of each lake represents the surface water elevation (white representing 254m, brown representing 248m, etc.). The surface water elevation of each lake is different (the highest being East Pond and the lowest being Messalonskee Lake) because of 5 dams that regulate water flow among the lakes. Lake depth is depicted using bathymetry data (dark colors represent deep water). The elevation of the land surrounding the Belgrade Lakes is depicted by a hillshade layer in order to portray topography. All data for this map was collected from the Maine Office of GIS.

## **GENETICALLY MODIFIED ORGANISMS AND CONSERVATION**

### **Daniel Homeier ('12), David Jensen ('12) and Katherine Murray ('12), Environmental Studies**

GMOs are increasingly being used in agriculture to help alleviate the rising demand for food put on by the rising human population. They allow crop production to be more efficient by providing a higher yield while using less land. However, GMOs also pose significant risk to biodiversity. We primarily researched the detrimental effects of GMOS on nontarget organisms and through transgene movement. We found that GMOs may provide benefits to agriculture but must be closely monitored and regulated in order to reduce their ecological risk.

## **KENNEBEC COUNTY ROAD BICYCLE COMMUTING COMPATIBILITY**

### **Daniel Homeier ('12), Environmental Studies**

As bicycles become an increasingly popular means of transportation it is vital to determine what roads are most suitable for bicycle transportation (bicycle commuting). I used GIS to analyze the factors that other studies looking at bicycle compatibility found important, such as the 85th percentile speed of traffic (mph), to create a commuting compatibility model and map for the roads in Kennebec County. This model could be



applied to any roads for which the appropriate data is available, providing individuals interested in bicycle commuting with valuable knowledge of bicycle commuting suitability.

## **ATLAS OF MAINE: TRANSPORTATION IN THE BELGRADE LAKES REGION**

### **Alexander Hsiao ('11), Environmental Studies**

This is a map of transportation of the Belgrade Lakes region which includes road and road name, hydrological landmark, terrestrial landmark, railway, bridge, boating facility, and airport layer data found on the Maine Office of GIS. There is emphasis on road importance by the size of the roads.

## **THE EFFECTS OF PRIMING ON EMBODIED COGNITION**

### **James Hubbard ('12), John Gardner ('12), Nicholas Iodice ('12) and Yuki Yoshida ('12), Psychology**

Jostmann et al. (2009) found that the concept of importance is grounded in physical representations of weight. Based off of this article, the current research attempts to link this concept of embodied cognition with priming. Colby College students, (N = 127) ages 18-23, rated the values of six foreign currencies after playing a game designed to prime the concepts of light and heavy as being important or irrelevant. The average rating of the six currencies was used as the dependent measure for statistical analysis. A two-way ANOVA with clipboard (light, heavy) and game type (heavy, light, irrelevant, no game) as between subject factors was conducted and revealed no statistically significant findings. Furthermore, Jostmann et al.'s (2009) findings were not replicated. These findings suggest that importance is not grounded in physical experiences of weight and that priming for the importance of weight does not affect currency value ratings.

## **TRENNUNG, ABSONDERUNG UND INDIVIDUALITÄT IN GRILLPARZERS 'DER ARME SPIELMANN' (SEPARATION, ISOLATION, AND INDIVIDUALITY IN GRILLPARZER'S 'THE POOR FIDDLER')**

### **Susannah Hufstader ('12), German/Russian**

In his novella 'Der arme Spielmann' (The Poor Fiddler), Franz Grillparzer tells the story of an old man estranged from society as a failure and an outcast. Written during the years leading up to the failed revolution of 1848, 'Der arme Spielmann' is a reflection of 19th-century Austria with its conservative and wealth-centered culture. In a time when Metternich and his censors lead the Habsburg Empire, literature was split between revolutionary and reactionary works. Though 'Der arme Spielmann' does not fall neatly into any political category, it does paint a critical and deeply complex picture of society. The short text by Grillparzer presents Jakob, the old street musician, separated from the other people in his life in a variety of ways. Although his separation and isolation seem to be a reflection of his personal shortcomings, a closer examination of borders and limitations sheds light on the nature of the old fiddler's individuality and his relationship with the society in which he lives.

## **THE EFFECTS OF REGULATORY FOCUS ON WEIGHT ESTIMATES**

### **Brittany Hughes ('12), Meryl Poulin ('11), Stephanie Scarpato ('11) and Derek Wise ('12), Psychology**

This study attempts to expand on the idea of embodied cognition, a phenomenon in which mental representations are manifested in physical actions. Further, this study attempts to demonstrate the duality of the "weight as importance metaphor." Eighty Colby College undergraduates were assigned to one of four conditions, in which they were primed for either prevention or promotion focus and presented with either a heavy cue (box of rocks) or light cue (box of peanuts). As predicted, there was a main effect for perceptual cue in both observed and physical estimates. However, we found only a marginal effect for regulatory focus on weight estimates. These results suggest that prevention focus may increase weight estimates.

## **UAV AERIAL GIS DATA ACQUISITION**

### **Foster Huntington ('10) and Daniel Opalacz ('10), Science, Technology, and Society**

Over the past year we built an Unmanned Aerial Vehicle (UAV) out of foam, a laptop battery, remote control airplane parts, a cheap digital camera, and an 'off the shelf' GPS based autopilot. We've used the UAV platform to collect high resolution aerial images around Maine and in particular to monitor coastal erosion at Popham Beach, Maine.

## **GARBAGE MAN**

### **Zacharia Hussain ('10), English**

Garbage Man is a story about a young man who is cajoled into disposing of bodies as he struggles to start a career as a writer.

### **GENDER AND RACE DISCRIMINATION IN SPORTS**

#### **Alison Iannotti ('11), Women, Gender, Sexuality**

In my paper, I will be exploring the ways in which gender and race inequality are upheld by the institution of sport. This notion is supported by two main concepts: the idea that sociology of sport maintains the social hierarchy in America, as well as the role that the media plays in instilling dominant social and cultural values in members of society. The impact that mass media has on society is a key factor in explaining the practice of hegemonic trends and specifically targets African Americans and female athletes by trivializing their role in sport. I explain the different ways in which African Americans and women have been discriminated against in sport since they first appeared in the athletic arena. My primary focus is on the discrimination that underprivileged athletes experience in intercollegiate and professional sports. Although society has seen many changes in sport that take aim at ideological change, there are still many ways in which American society has not changed their ideals and beliefs about the roles that minorities and women play in sport. I also focus on the way that discrimination in sport inhibits underprivileged athletes' goal of achieving the American Dream. Inequality is, in fact, reinforced in sport by hegemonic groups and ideologies that dominate the social structure in America; thus, implications of a chance for equality and accomplishing one's own American Dream can be misleading to underprivileged members of society. My paper also examines how inequality in sport translates into the professional world, and how African Americans and women often struggle to attain authoritative roles and positions of power.

### **THE INFLUENCE OF SKILLED KNOWLEDGE AND NEED FOR COGNITION ON FALSE MEMORY**

#### **Amanda Ivey ('10) and Sara Field ('11), Psychology**

False memories have been widely studied using the DRM paradigm. Investigations have looked at what individual differences make some people more susceptible to having false memories than others. The current study used the individual differences of need for cognition (the tendency to engage in deep processing of information) and skilled knowledge to test for false memories of famous names. Three domain's were used: US Presidents, American Authors, and actors/actresses. Participants studied each list of names and were then asked to recall as many as they could. In later recognition tests, participants were given old and new names and asked if they had seen them before. They were also asked to rate their familiarity for each name. The results provided evidence that there was only significant effects for the authors domain. Also, the correlational analyses between familiarity and hits and false alarms revealed that the more familiar meant the most hits for studied items and less false hits for unstudied items.

### **HEALTH, HUMAN RIGHTS AND COMMODITY: HIV/AIDS HEALTHCARE PROVISION IN MAINE**

#### **Audrey Jacobsen ('10), Anthropology**

In this honors thesis, I argue that the perceived risk of HIV/AIDS in the Colby community shifts when fear, denial, and complacency interplay to create spaces for silences. Different types of knowledge and perception about HIV/AIDS generate fear, denial and complacency. In turn, fear, denial and complacency can produce silences at historical moments to render HIV/AIDS unthinkable on campus.

### **EXTERNAL SENSORY ORGAN EXPRESSION OF D-PAX2 IS ACTIVATED THROUGH TWO TEMPORALLY DISTINCT ENHANCERS**

#### **Seth Johnson ('10), Biology**

Sensory organ development is a complex process known to be regulated by transcription factor networks. One such factor is D Pax2, which is required for proper bristle cell differentiation in *Drosophila melanogaster*. The expression pattern of D-Pax2 reveals that it is regulated spatially and temporally, yet how such precise regulation is achieved is unknown. To determine the DNA elements that control D Pax2 expression, we created reporter constructs bearing pieces of the presumptive bristle specific enhancer of D-Pax2 coupled to GFP. Constructs bearing a large 6 KB and smaller 3 KB upstream enhancer region recapitulated both early and late D-Pax2 expression, whereas a 2 KB enhancer was able to drive GFP only in an early D-Pax2 pattern. In contrast, the 1 KB region located directly upstream from the 2 KB enhancer drove GFP only in a late D-Pax2 pattern. Four E-box sites present in the 2KB enhancer suggested that early expression might be regulated by the proneural genes of the achaete-scute complex. Reporter constructs with the E-box sites

mutated showed greatly diminished early GFP expression. In contrast, late expression of D-Pax2 appears to be independently controlled but does require D-Pax2 itself, suggesting that maintenance of D-Pax2 expression in the differentiating bristle cells is controlled by an autoregulatory positive feedback loop.

### **THE DENIAL OF CONVENTION IN THE SOPHISTICATED PORTRAYAL OF A YOUNG GIRL: JOHN SINGLETON COPLEY'S LITTLE GIRL WITH GRAPES, 1765-70**

**Sandra Johnson** ('12), American Studies

In eighteenth and nineteenth-century America, portraits were used by elites as a symbol of their wealth. During the mid to late 1700s, John Singleton Copley was the most sought after portrait painter in America because of his ability to please his patrons. He was particularly skilled at creating a character for his sitters that he believed they would like to embody. Little Girl with Grapes, painted in 1765-70, is a unique portrait belonging to the Colby Art Museum. There is little known about the young girl portrayed in the portrait and the painting raises many questions not only about the sitter, but about Copley as well. The artist painted very few portraits of children throughout his career and rarely did he succeed at painting youngsters in the same graceful manner as his adult sitters or Little Girl with Grapes. In my paper, I will explore how and why Copley portrayed the subject of Little Girl with Grapes in the beautiful style of his adult portraits. By analyzing the symbolism and emblems in the Colby portrait, we may be able to better understand the hidden meanings present in Copley's Little Girl with Grapes.

### **SCHENKERIAN ANALYSIS OF CLARA SCHUMANN'S 'ER IST GEKOMMEN IN STURM UND REGEN'**

**Kelsey Jones** ('10), Music

I will present a Schenkerian Analysis of Clara Schumann's 'Er ist gekommen in Sturm und Regen' graphing and explaining three levels of analysis.

### **'THE REAL MEAT AND POTATOES': FOOD AND MORALITY IN WOODY ALLEN'S SERIOUS FILMS**

**Spencer Kasko** ('12), Religious Studies

Woody Allen uses food extensively in his films. Especially in his serious works, Allen focus on Jewish food as a plot device is striking. As a representative example, Crimes and Misdemeanors (1989) contains a vital Passover Seder scene where the moral ambiguities of the universe are discussed. This scene not only links with Woody Allen's overall message, but in fact redefines the meaning of the ending of the film, where a murderer, Judah, seemingly escapes with a clear conscience. The Seder scene employed by Allen is a key moment when Judah is confronted by his past and must decide what kind of a world he wants to live in.

### **AN INVESTIGATION OF CONTEXTUAL AND PERSONAL FACTORS FOR KINDERGARTEN LITERACY DEVELOPMENT**

**Anna Kelemen** ('10), **Hilana Bernheimer** ('10), **Jessica Bond** ('10) and **Meredith Tumilty** ('10), Psychology

Students arrive at school on the first day of kindergarten with vastly different skills. This study evaluated those factors within families that enhance kindergarten-reading readiness of children. We were particularly interested in identifying factors that would be more accessible to families and school administrators than the broad and often unchangeable category of socio-economic status. Consistent with current research, we found that maternal education had a broad impact on the school readiness of children. Maternal education was found to be closely linked to the amount of time children spent with media. Because media has been shown to have adverse affects on the development of children, this offers a simple way for all families to enhance the school success of their children. Turning off media might be an important way for families of all backgrounds to level the academic playing field. Despite the difference in school readiness as children started kindergarten, the effects of maternal education lessened over the school year indicating that the programs implemented by the school were successful.

### **THE WHEAT BZIP FACTOR, TAABF1, MEDIATES ABA-INDUCED GENE EXPRESSION IN BOMBARDED BARLEY ALEURONE LAYERS.**

**Benjamin Keyser** ('10), Biology

The plant hormone Absciscic acid (ABA) plays a central role in maturation and germination in seeds, as well as mediating adaptive responses to abiotic environmental stresses. ABA induces the expression of many genes, including late-embryogenesis-abundant genes such as HVA1. To elucidate the ABA signaling pathway

leading to HVA1 expression, we focus on the bZIP factor TaABF1. Analysis of the interplay between ABA and TaABF1 in the aleurone cells of imbibing cereal grains indicated that the two are not additive in their induction of the HVA1 promoter. A synthetic ABA analog, PBI-51, did not specifically inhibit the effect of exogenous ABA on HVA1 expression while 1-butanol (which inhibits phospholipase D, an early step in ABA perception) did. Furthermore, inhibition of endogenous ABA perception using 1-butanol reduced HVA1 induction by the overexpression of TaABF1. This result suggests that TaABF1 may undergo an ABA-induced posttranslational modification. However, the lack of synergism between ABA and TaABF1 overexpression in HVA1 induction does not support this conclusion. Therefore, our findings indicate that the branch of ABA signaling leading to HVA1 is more complex than previously believed. We propose a model of ABA signaling involving TaABF1 and other putative components that results in the stimulation of ABA-induced genes.

## **UNITING NEO-RIEMANNIAN THEORY AND SCHENKERIAN ANALYSIS IN LISZT'S 'SONETTO 104 DEL PETRARCA'**

### **Qainat Khan ('11), Music**

Late Romantic works, like those of Franz Liszt, present analytical problems for conventional music theory because of the high degree of chromaticism and the unconventional use of chords. While the Sonetto 104 in its totality is a tonal piece, there are instances that defy conventional, tonal explanations. Using the facially divergent methods of music analysis, Neo-Riemannian theory and Schenkerian analysis, I seek to shed some insights on the compositional techniques Liszt utilized. I will use Neo-Riemannian methods at the micro-level to explain chord transformations in these tonally inexplicable passages and I will use Schenkerian methods at the macro level to explain the overarching form and tonal spaces of the piece. Neo-Riemannian theory, which has been in development since the 1980s, concerns itself with the relationship between chords and the way in which chords transform with the least possible movement. Tonality is not the primary concern of this method of analysis. Schenkerian analysis developed from the theories of Heinrich Schenker and is a highly influential theory of tonal music. It is concerned with the long-range goals of a piece as they arise from voice leading and harmonic considerations. It is extremely concerned with tonality. When combined, the two modes of analysis reveal a more complex and whole understanding of these arguably post-tonal pieces.

## **A DISAPPEARING BOUNDARY?: THE CHANGING DISTINCTION BETWEEN COMBATANTS AND CIVILIANS FROM THE FIRST WORLD WAR TO THE PRESENT DAY.**

### **Aimee Kidder ('10), History**

The issue of terrorism has stimulated intellectual debate regarding the rights and protections that should be afforded to civilians. However, the practice of targeting noncombatants in warfare extends far beyond terrorism and has roots deep in the historical past. This study looks at violence against civilians over a series of case studies from the First and Second World Wars as well as the French-Algerian War of the 1950s and 1960s. By looking at the changing legal distinctions between combatants and noncombatants, the study first establishes a trend in international law toward increasing protection of civilians. Yet, these legal advances are not reflected in the actuality of modern warfare. Each case study shows continued, and at times more profound, violations of civilian immunity. Violence against civilians is not restricted by international law; rather, international law permits, and even sanctions, justifications that place civilians at risk of becoming tools, weapons, and targets in the war strategies of opposing forces.

## **MORE AT HOME IN FACIST ITALY**

### **Hannah Kim ('10), American Studies**

Spike Lee's response to Clint Eastwood's lack of African American soldiers in his acclaimed movie Letters from Iwo Jima was to tell the story of the all-black 92nd regiment in Miracle at St. Anna. Through the story of four soldiers who are stranded in a small town in Italy, Lee tells a different story regarding American race relations. As the soldiers' reception in Italy was vastly different from the treatment they received at home and from their white superiors, Lee's film is commenting on the lack of racism in countries outside of the United States, and how some soldiers felt more at home, and more free, in a small town in a fascist country they were not fighting for.

## **ATLAS OF MAINE: BELGRADE LAKES TRAILS AND RECREATION**

### **Cassandra Knight ('10), Environmental Studies**

This map was constructed to show all the recreational opportunities available in the Belgrade Lakes Area. It

includes hiking trails, and the locations of boat launches, picnic areas, and swimming / beach areas. It displays contour lines and labels summits and local features for hikers. All local roads are shown to facilitate access and direction for finding each recreational activity.

## **EMISSIONS TRADING**

### **Robert Knipp ('10), Economics**

The existence of import caps governing the use of project credits in the European Union Emission Trading Scheme causes the secondary-market Certified Emission Reduction (sCER) to trade at a discount to the European Union Allowance (EUA). While the EUA-sCER price spread characterizes fungibility constraints in the unilateral link between European carbon trading and the Kyoto Protocol, the spread's dynamic evolution suggests that exogenous shocks filter through the EUA and sCER price formation processes differently. This paper investigates the relationship between the development of the EUA-sCER spread and changes in the price spreads between primary CER forward contracts with distinct risk profiles. The results show that increases in the primary price spreads embedding project issuance, verification, and registration risk coincide with a contraction of the EUA-sCER spread. Drawing on lessons from asset pricing, these findings are clarified by turning to the term structure of risk premia in the forward market as well as to growing timelags and default risks at each stage of the Clean Development Mechanism project activity cycle.

## **ATTACHMENT MECHANISMS OF *VIBRIO CHOLERA*E AND RELATED SPECIES**

### **Julianne Kowalski ('11) and John Brainard ('10), Biology**

The colonization factor GICNaC-binding protein A (GbpA) has been shown to mediate binding to the N-acetyl-Glucosamine monomer present in both the host and aquatic environments of *Vibrio cholerae*, the causative agent of Cholera. Our research indicates that related species collected from crustaceans along the Maine coast express a homologous GbpA protein and that it also promotes binding in both environmental and host surfaces in these isolates. In order to identify environmental isolates, we ran 16S rRNA gene sequencing PCR and used NCBI's BLAST algorithm to assign identity to our sequences with high confidence. Isolates that were related to *V. cholerae* were tested for the expression of GbpA by Western Blot procedure. We then tested the binding phenotype with binding assays to chitin beads and CaCo2 cells to mimic environmental and intestinal conditions, respectively. Several of our isolates displayed comparable results to the *V. cholerae* 0395 control, suggesting that GbpA is prevalent and serves a similar function in these aquatic species.

## **A STUDY OF FLOW TRENDS IN LOWER PERKINS BROOK, COLBY COLLEGE CAMPUS, WATERVILLE, MAINE**

### **Elizabeth Kugel ('10), Geology**

Collection and interpretation of data at Perkins Brook in Waterville, Maine, show that the characteristics of the brook change rapidly over a wide range. This study focused on a portion of Perkins Brook in the Perkins Arboretum on the Colby College campus. In January of 2004, 22 cobbles and boulders were emplaced in the brook, and in the fall of 2009, ten of these clasts were relocated. Five of the clasts had remained where first emplaced, and five others had been displaced downstream by subsequent stream flow. Flow velocities and water depth were measured at multiple modern stages, and discharges calculated. Based on these data and using a simplified Shields equation applied to the largest displaced boulder, the maximum flood event of the past five years was calculated to have a discharge of approximately  $5 \text{ m}^3/\text{s}$ .

## **EFFECTS OF IMPORTANCE ON WEIGHT JUDGMENTS**

### **Stephanie-Ann LaRose ('12) and Ryan Trafton ('12), Psychology**

The physical concept of weight is metaphorically tied to the abstract concept of importance throughout many cultures. Past studies have shown a relationship between manipulation of weight and resulting judgments of importance. We hypothesized that the relationship between weight and importance is bidirectional. We attempted to replicate the past findings by giving participants heavy or light clipboards and asking them to make importance judgments. We then manipulated importance primes and asked participants to make weight judgments. Our findings suggested that there is a bidirectional relationship between abstract and physical judgments of importance and weight, respectively.

## **BRIDGING THE CULTURAL GAP WHEN DOING BUSINESS IN VIETNAM**

### **Hong-Phuc Le ('11), International Studies**

In the last two decades, in the offshoring and outsourcing trend of globalization, Vietnam has received more and more attention from foreign investors for its fast growth, cheap yet educated and hardworking labor and above all, its political stability. Similar to yet distinguish from other Asian countries, the Vietnamese culture, however, has proven to be a barrier for newcomers. This research will explore these cultural challenges and attempt to take investors beyond the basic methods of arriving at contract and dispute resolution to forming collaboration based on trust and understanding.

## **COLBY BAZAAR: CLASSIFIEDS FOR COLBY COLLEGE**

### **Brian Leighton ('10) and John Clauson ('10), Computer Science**

Colby Bazaar is a web-based classified ad system open solely to members of the Colby community. The Colby Bazaar project is intended to facilitate on-campus commerce and lighten the load on our various daily Digests. The marketplace is suitable for buying and selling as well as borrowing goods. For example, this could consolidate and simplify the used textbook, furniture and appliance sale procedures. We hope that this could some day increase Colby students' sustainability. The project is written in Java using servlets and JavaServer pages with a MySQL back-end. The whole system is running on an Apache Tomcat web server.

## **JOHN FREDERICK KENSETT'S SEACOAST VIEW: IN HARMONY WITH EMERSON'S NATURE**

### **Gordon Lessersohn ('12), American Studies**

'For, seen in the light of thought, the world always is phenomenal; and virtue subordinates it to the mind. Idealism sees the world in God. It beholds the whole circle of persons and things, of actions and events, of country and religion, not as painfully accumulated, atom after atom, act after act, in an aged creeping Past, but as one vast picture, which God paints on the instant eternity, for the contemplation of the soul.'--Ralph Waldo Emerson from *Nature* (1836). In his essay *Nature*, Ralph Waldo Emerson uses the word "light" and the phrase "one vast picture" to describe the perfection that "God paints" in nature. Emerson's friend, the landscape artist, John Frederick Kensett undoubtedly knew these words and for him, they may have had special meaning. As a Luminist painter, Kensett believed that light revealed truth and beauty. His landscapes, even when small, presented vast, almost infinite horizons. Emerson's notion that God is a painter should have been particularly inspiring to Kensett. In fact, Emerson might even be read in the quote above as saying that painting is the best way to express the ideal of mankind's oneness with nature. Although *Sea Coast View* (1854) is a transitional work stylistically, it succeeds in putting Emerson's celebration of nature on canvas. While Kensett's *Sea Coast View* measures only 7.5x12-inches, the oil painting presents a vast subject matter. Through the interplay of sky, land and water, Kensett covers all of nature's elements in a single painting. This composition creates a sense of peace and stability, an "instant eternity" in Emerson's words. With infinite horizons and waters extending beyond the canvas, Kensett's ideal seacoast scene fulfills Emerson's highest wishes for art as viewer and artist become one with nature at a specific moment in time.

## **SELF EFFICACY, THE BIG FIVE, AND PERFORMANCE**

### **Christiana Lumbert ('10), Benjamin Gross ('10) and Stephanie Scarpato ('11), Psychology**

The present study investigated the relationship between self-efficacy, the Big Five personality traits, and effort on both academic and physical tasks. Participants completed the General Self Efficacy (GSE) scale, scales adapted to measure academic and physical self-efficacy, the Ten Item Personality Inventory (TIPI) in general, as well as for an academic and a physical activity context. Participants then performed both the academic and physical tasks. Preliminary results suggest that, as expected, athletic self-efficacy is positively correlated with athletic effort, Extraversion, and Conscientiousness. Also consistent with expectations, academic time and effort are both positively related to academic conscientiousness. Unexpectedly, there were also significant correlations between academic effort and athletic personality traits, while the opposite effect was not present.

## **EXPLORING THE IMPACT OF CHRONIC MILD AND UNPREDICTABLE STRESS ON BEHAVIOR AND NEURON MORPHOLOGY IN NEOPHOBIC AND NEOPHILIC RATS**

### **Duy Lyford ('10) and Jennifer Corriveau ('10), Psychology**

Differences in adrenal activation to acute stress have been associated with the behavioral traits of neophobia and neophilic in rats, as indexed by their hesitation or willingness to explore a novel environment, respectively. These behavioral tendencies emerge early in life and are stable over a lifespan. Past research shows that neophobic, compared to neophilic, rats have a greater glucocorticoid response to novelty and

stress, a negative consequence, which can include but may not be limited to a stunted lifespan (Cavigelli & McClintock, 2003). In the present study we sought to extend this work by exploring whether the response of rats to chronic stress would be similarly dissociable as a function of their degree of behavioral inhibition. To do this, rats were assessed in an open field overlaid with a 4x4 grid for 5 minutes and classified as neophobic or neophilic if they fell below or above, respectively, the median for the group in number of entries into grid squares. Half of the rats from each of the classifications were then subjected to 3 weeks of chronic, mild, and unpredictable stress. Behavioral outcome measures included saccharin preference and forced swim. After behavioral tests, all rats were sacrificed and brains collected. Half of each brain was used for Golgi-Cox staining to visualize neuronal structure and morphological features, such as soma size and dendritic branching, are being analyzed in cortical areas. The findings of this research will be an important extension of past work by revealing whether the dissimilar patterns of physiological stress reactivity to acute stress emerge as a consequence of chronic stress.

#### **COMPARATIVE GENOMICS OF MER OPERONS AND I CLASS INTEGRONS IN MULTI DRUG AND METAL RESISTANCE LOW-COPY INCA/C, INCA/C2, INCL/M AND INCU PLASMIDS.**

**Olena Marchenko ('10), Biology**

Plasmids of A/C incompatibility group have been documented in a range of Gram-negative pathogen and commensal bacteria and are active agents of the spread of antibacterial and heavy-metal resistance genes. The emergence of acquired mercury resistance cassette and 1 class integrons in broad-host-range plasmids is of clinical concern since they confer resistance to all  $\beta$ -lactams except aztreonam (Tato et al. 2010) even when exposed to high mercury levels. The antibiotic resistance cassette transfer is not confined within the A/C incompatibility group which resulted in the appearance of IncL/M and IncU broad host range plasmids carrying identical cassette arrays in different contexts (Carratoli et al. 2009). The phylogenetic analysis of the antibiotic cassettes of IncA/C plasmid isolates was performed and the results suggest that the sequences have originated from *K. pneumoniae* chromosome sequence. The goal of the study was to analyze the ancestry of the conserved regions of broad-host range plasmids of different incompatibility groups, including ICE (Integrative and Conjugative Elements), especially SXT-like (sulfamethoxazole and trimethoprim) and transposon Tn21. Comparative analysis of the identified groups of conserved regions was performed and confirms that the bla-2 plasmids from *E.coli* and *S.enterica* groups are genetically distinct (Call et al., 2010), and discovers high similarity of the transfer regions and Tn21 mercury resistance cluster suggesting recent plasmid movement event among the indicated host pathogens. Surprisingly, the diversity in ICE sequences in the broad host range plasmids leads to segregation of distinct groups among broad host range plasmids and formation of complex mosaic-like transfer patterns.

#### **VARIABLE PHAGOCYTOSIS OF GRAM-POSITIVE AND GRAM-NEGATIVE BACTERIA BY ZEBRAFISH (*DANIO RERIO*) LEUKOCYTES**

**Corey Martin ('10), Biology**

One of the primary immune defense mechanisms exhibited by animals is the phagocytosis of pathogens. In fish and higher vertebrates, this process of pathogen engulfment is conducted by phagocytic leukocytes, the neutrophils, monocytes, and macrophages. Phagocytes recognize a number of pathogen associated molecular patterns (PAMPs) on the surface of pathogens. Gram-negative bacteria such as *E. coli* are characterized by cell walls containing lipopolysaccharide (LPS) but little peptidoglycan, while Gram-positive bacteria such as *S. aureus* possess cell walls containing high levels of peptidoglycan and lipoteichoic acids. Since each of these structures is a known PAMP, the differences in cell wall structure may lead to differential recognition and elimination by leukocytes. In previous work, we have noticed that higher percentages of zebrafish kidney leukocytes appear to actively participate in phagocytosis of killed, labeled *E. coli* than of similarly prepared *S. aureus*, especially at 2 pm and 6 pm. This led us to explore whether zebrafish leukocytes preferentially phagocytose Gram-negative organisms over those that are Gram-positive. Leukocyte function, as defined by bacterial phagocytosis, showed variation throughout the day. Leukocyte bacterial phagocytosis was dependent on the Gram-staining properties of the bacteria themselves. Gram-negative bacteria were phagocytosed at a higher rate than Gram-positive bacteria during the day, however the nighttime phagocytosis rates favored the Gram-positive bacteria. In addition, this variation appears to be dependent on the type of leukocyte participating in the phagocytosis process. Neutrophils showed invariable preference for Gram-negative bacteria, while macrophage preference varied.

#### **WHAT ROLE DOES CAPTIVE BREEDING PLAY IN MAINTAINING OR REESTABLISHING WILDLIFE POPULATIONS?**

**Sara Mason ('12), Alexander Hsiao ('11) and Katherine Todd ('10), Environmental Studies**

Captive breeding can be an effective way to conserve a threatened or endangered species, but only if done correctly and under the right circumstances. We first determined what qualities make a species especially good for entering a breeding program and the elements necessary for a program to be a success. We then present three case studies which detail the different captive breeding programs of the giant panda, the black footed ferret and the California condor. Specifically we identify why captive breeding was needed in each case, how each breeding program was implemented, and whether it was considered a success. Finally we illustrate the limitations of this conservation method and why it should be a last resort. Although it can be incredibly successful, there are many things that can go wrong and in many circumstances there are other more effective methods to conserve species. It is not possible to save every species this way; there are simply not enough resources to do so, therefore we must carefully choose which species need this type of conservation most and apply it only where absolutely necessary.

## **INTERPRETATION OF AN ANCIENT COLLISIONAL PLATE TECTONIC BOUNDARY, WYOMING: PART 2**

**Samuel Mathes ('10), Geology**

The Cheyenne belt is a series of faults formed by the accretion of microcontinents onto the ancient North American continent about 1.76-billion years ago. Previous studies concluded that this area formed in a collisional environment associated with dip-slip faults. This study addresses the hypothesis regarding the nature of the collision event. The hypothesis states that the collision was orthogonal rather than oblique. The analyses used to determine this are based on the degree of shortening and shearing the rocks have experienced. This study analyzes quartzite samples from the northern-most fault zone of the Cheyenne Belt. Samples were prepared as 30um thick sections from which quartz crystal orientations were measured. The orientations were determined with the use of a universal stage microscope. These data indicate the sense of motion along faults at this location as well as the relative amounts of shearing and fault-zone normal shortening. These data support the existing hypothesis that this shear zone formed during near orthogonal collision between a series of small islands and the North American continent.

## **USING MEDICAL IMAGING SOFTWARE TO ASSESS DEFORMATION IN QUARTZITE**

**Andrew McCarthy ('10), Geology**

Mineral grains in deformed rocks often yield clues about the geometry of past-movement the Earth's crust. This study involves highly deformed rocks, collected from a mid-crustal plastic fault zone exposed in northwest Utah. The degree of deformation is so high that linear fabrics (lineations) of mineral grains formed due to elongation, and planar fabrics (foliations) formed due to flattening. The goals of this study are: (1) to build and test a methodology for use of Image SXM software and the Lazy Grain Boundaries macro for tracing mineral grains (2) to compare shape and alignment of mineral grains on different faces of the samples. Hypothetically, only lineation-parallel, foliation-perpendicular faces will exhibit asymmetric grain shape fabrics, indicating monoclinic deformation. Samples were screened for compositional homogeneity. Digital images were recorded from 30um-thick slices from three mutually perpendicular faces of each of three samples. Grain boundaries on these images were traced by hand and traced by the macro. All traces were analyzed with Image SXM to determine axial ratios, angle off horizontal, and area of mineral grains. The macro proved unable to trace grain boundaries with any efficacy at 40x magnification due to the high degree of deformation and large number of mineral grains. Analysis of hand-traced samples shows that grain-shape fabrics are asymmetrical for all faces. This serves to reject the original hypothesis that only lineation-parallel, foliation-perpendicular faces exhibit asymmetric grain-shape fabrics, calling into question the fundamental assumption of monoclinic deformation at the sample site.

## **NUTRIENT LOADS AND THE PRESENCE OF AN INVASIVE SPECIES THREATEN SALMON LAKE AND MCGRATH POND, KENNEBEC COUNTY, MAINE**

**Ian McCullough ('10), Jessica Balukas ('10), Michael Bienkowski ('10) and Jordan Schoonover ('10), Environmental Studies**

Phosphorus loading and the presence of the invasive aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*) threaten the health of Salmon Lake and McGrath Pond. Salmon Lake is susceptible to algal blooms. Secchi depth has decreased slightly in recent years. Mean epicore total phosphorus recorded during summer and fall of 2009 was 13 ppb but concentrations approaching 300 ppb were recorded at the deepest part of the lake in late summer due to anoxic conditions near the bottom sediments. Dissolved oxygen was less than 1 ppm in water deeper than 8 m at this time. Eurasian watermilfoil was discovered in Salmon Lake in August 2008 growing in the shallow outlet cove to Great Pond. The Salmon Lake population represents only the second known infestation of Eurasian watermilfoil in Maine. Attempts to eliminate this invasive from



Salmon Lake are ongoing. Bathymetric data obtained for Salmon Lake indicate the potential spread of Eurasian watermilfoil could include approximately 56% of Salmon Lake and all of McGrath Pond. Continued efforts are needed to mitigate future nutrient loading and eliminate Eurasian watermilfoil to preserve the water quality of Salmon Lake and McGrath Pond.

## **THE IMPACTS OF LAND USE AND DEVELOPMENT PATTERNS ON WATER QUALITY OF THE BELGRADE LAKES**

**Ian McCullough ('10), Environmental Studies**

The Belgrade Lakes are a system of seven interconnected lakes in central Maine spanning all or parts of 13 townships. Past research has focused on individual lake watersheds and there has been no comprehensive analysis of water quality, land use and development history for the whole Belgrade Lakes Region. Due to the interconnectivity of the system, nutrients such as phosphorus can be transported throughout and affect the water quality of the entire chain. A Geographic Information System (GIS) was used to classify and quantify land use, identify spatial patterns of development and predict areas in the watershed most likely to be developed in the future. Analyses of current watershed development and projections for residential development in 2020, 2035 and 2050 were made using town records and demographic statistics to model the current phosphorus budget and the additional phosphorus load from future development. Agriculture, residential land and roads currently contribute a disproportionate 60% of the total external phosphorus load despite covering approximately 11% of the watershed area. Residential development is expected to increase by 1327 units by 2050, which would further increase the overall load. Moderate increases in phosphorus concentrations of approximately 1 ppb are expected in Great Pond and Long Pond, while relatively small increases are expected in East Pond and North Pond due to stagnating local populations. The largest projected increases are in Salmon Lake/McGrath Pond and Messalonskee Lake at approximately 2.3 ppb. All projected phosphorus concentrations are within the range necessary for algal blooms in Maine (12 - 15 ppb), except in Long Pond. This study hopes to help inform efforts to minimize loading from both existing and future development.

## **STOPGAP: SHORT STORIES**

**Eric McDowell ('10), English**

Reading excerpt from a collection of short stories based on two sets of characters around Charleston, South Carolina.

## **CONGRUENCY AND SURVIVAL: THE MNEMONIC ADVANTAGE AFTER PRIMING SURVIVAL PROCESSING DEPENDS ON WHAT WAS STUDIED**

**Devon McIntyre ('10), Psychology**

Previous research has suggested that the more deeply information is processed, the more likely it is to be retained in memory. Studies have also shown that rating words for their relevance to survival (survival processing) results in higher recall than when using any other type of processing. The present study was designed in order to investigate three unexplored questions: (1) can survival processing be induced without explicit direction (2) is there something special about survival stimuli and (3) is recall better when there is congruity between type of processing and words? To see if survival processing is implicit, participants were given a survival related prime instead of being asked to rate a word in terms of survival. To see if survival stimuli are special, a lexical decision task was created using survival related words. To see if congruity affects recall, words related to the prime were used. Results show that recall is helped only by the condition using the survival prime and the survival related words, which raises more questions about and requires future research into the complexities of survival processing.

## **KÄŒLÄ« AND FOOD RITUAL IN HINDU TANTRA**

**Sierra Medling ('12), Religious Studies**

To some, Hindu Tantra is a misogynistic, hedonistic, and exploitative religious practice. It is my belief however that Hindu Tantra has a deep respect for women - a respect that is best supported by Tantric food rituals and practices, as well as the worship of the Hindu Goddess, KÄŒLÄ«.

## **EFFECTS OF OBESITY AND COGNITIVE LOAD ON PERSONALITY AND ATTRACTIVENESS**

**Thomas Meehan ('12), Meghan Kelly ('12), Melissa Krause ('12) and Robyn St. Laurent ('12), Psychology**

There has been a great deal of research in the area of personality judgments based on facial images. It has been discovered that people will make personality judgments based on nothing more than a facial image. There has also been considerable research regarding the stigmatizing effects of obesity, and the prevalence of "anti-fat" prejudice in our culture. In order to more deeply research the effects of obesity, the present study involves using facial images as a way of measuring the effect of weight on personality and attractiveness judgments. This study investigated the difference between personality and attractiveness ratings given to both normal and overweight facial images, as well as the effect of cognitive load on these ratings. Cognitive load was used as an attempt to elicit more automatic responses from the participants and avoid the effects of social desirability. Consistent with previous research, it was found that normal weight facial images were rated significantly higher than overweight facial images on attractiveness and on 3 out of the 5 socially desirable personality traits. However, we failed to find an effect for cognitive load, suggesting that automatic responses were given in both the loaded and non-loaded conditions. This study has implications for the prevalence of weight discrimination in our society.

## **THE EFFECTS OF CHANGING STIMULUS FORMAT AND TIME PRESSURE ON FALSE RECOGNITION**

### **E. Merrell ('10), Psychology**

This study assessed the extent of false memory by exploring whether the strength of the conceptual activation is significant enough to be represented across stimulus formats. The spreading activation and monitoring theory defines activation as what occurs when one stimulus activates another related stimulus and monitoring as the process that allows people to determine the source of remembered information. Spreading activation and failure in monitoring processes cause false memories. This study examined the effects of changing stimulus format (from words to images) and speeding responses (thereby decreasing monitoring) on false recognition. Participants studied semantically and associatively related word lists. At test participants responded in a speeded or unspeeded condition. Participants determined a test stimulus (word or image) had been studied as a word. The results indicated that false memory for images can occur, indicating that the conceptual nodes of spreading activation extend to image representations of a concept.

## **TRENDS IN ALCOHOL CONSUMPTION AT COLBY**

### **Alexandra Merriweather ('12) and Hadrien Vasdeboncoeur ('12), Mathematics**

This poster presentation will show statistical analysis of 200 surveys from the Colby student population regarding drinking habits. The analysis reveals how year, housing, athletic participation, gpa, gender, and drinking preferences are related to drinking habits in terms of frequency and quantity. A multi-linear model was constructed to analyze the significance of these variables. We will be using a poster with text, tables, and charts to present the highlights of our research. The original research was conducted for the MA 231 final project during the fall.

## **UNDERSTANDING THE MENTAL HEALTHCARE SYSTEM FOR REFUGEES IN LEWISTON**

### **Kathleen Minton ('10), Anthropology**

In Lewiston, Maine, a large population of Somali refugees requires health care assistance, particularly with respect to mental health issues. The systems in place in Lewiston, however, are disorganized and inefficient, rendering an already challenging task even more difficult both for the patients and the health care community. Over the past academic year, Professor Catherine Besteman and student Kathleen Minton have been working to understand the existing mental health system in Lewiston by interviewing community members, service providers, and refugee activists. Ultimately, they are working towards compiling a comprehensive "resource guide" of available mental health services, and developing a "resource map" outlining the responsibilities of and relationships among the various government agencies and non-governmental organizations (NGOs) operating in Lewiston charged with assisting refugees. In this way, Professor Besteman and Kathleen Minton are working not only to develop and share improved understandings of the systems' structures and capacities, but also to contribute valuable information about possible reforms that will make the necessary mental health care assistance more accessible and beneficial.

## **THE CLUSTER ENVIRONMENT OF HIGH MASS PROTOSTARS**

### **John Moriarty ('10), Physics and Astronomy**

I present images and results from Spitzer IRAC and MIPS observations of 21 candidate high mass protostellar objects (HMPOs) and their surrounding environments. These candidate HMPOs are objects in the lists assembled by Sridharan et al. (2002) and Molinari et al. (1996) that were not covered by the GLIMPSE,

GLIMPSEII and MIPS GAL surveys. This sample has the advantage of longer exposure times than the GLIMPSE and MIPS GAL surveys. The images were reduced and photometry was performed using IRACproc (Schuster et al., 2006). Color-color and color-magnitude criteria adopted from Gutermuth et al. (2009), were used to identify candidate class 0/I and class II young stellar objects (YSOs) around each of the HMPO candidates. I performed a cluster analysis around each candidate HMPO using minimal spanning tree (MST) diagrams, nearest neighbor density maps, 1.2 mm continuum dense dust tracing maps and IRAC/MIPS images. This analysis showed a diverse set of environments. Some common features between some of the fields were one or more high density YSO groups, complex extended emission structures with YSO positional correlation and in some cases YSO positional anticorrelation and multiple extended emission bubbles. I also attempted to fit models to source spectral energy distributions (SEDs) using a library of precomputed radiative transfer models (Robitaille et al. 2007), but found that just using 2MASS and IRAC photometric data points was not enough to constrain model parameters enough to get reasonable estimates of physical quantities.

## **JEWISH WIVES IN SMALL TOWN AMERICA: EXAMINING THE EXPERIENCES OF WATERVILLE'S JEWISH WOMEN IN THE POST WAR YEARS 1945-1960**

**Rebecca Muller ('10), Religious Studies**

Jewish small town communities worked in various ways to both separate and integrate themselves within the mainstream gentile culture. As Lee Shai Weissbach commented, "Jews established their own social milieu and constructed their own communal infrastructure." The development of separate Jewish organizations, in addition to the persistent chain migration of Jews from Eastern Europe to America, helped the Jewish populations in small towns flourish and develop their own identity. In Waterville, many challenges faced the Jewish community, for example, serial proximity and occupational similarities created a culture of competition among the Jewish and non-Jewish residents of the town. Following World War Two, a new group of Jewish women entered the preexisting Waterville community as war brides, and struggled to become acclimated to the casual and rural nature of country living. This study seeks to examine the ways in which Jewish women were involved in the Waterville Jewish community through civic engagement, synagogue membership, raising families, and occupying spaces in the workforce. By understanding the ways in which Jewish women were integral to the Waterville community, I hope to also illuminate the challenges they faced as a result of small town living.

## **BREAD MOLD CAN TELL TIME: A COMPUTATIONAL ANALYSIS OF MOLD CIRCADIAN CLOCKS**

**Christopher Murdock ('10), Daniel Nolan ('10) and David Quigley ('12), Computer Science**

Circadian clocks provide organisms with the ability to coordinate daily rhythms in their behavior. These biological oscillators are regulated by interactions among certain cellular components. To understand such complicated networks, it is necessary to use methods from the field of computational biology. A convenient approach is to represent the clock as a mathematical model comprised of ordinary differential equations. Multiple models have been developed for the circadian clock of *Neurospora crassa*, a red bread mold. Here, we consider three of these models. Employing a velocity response curve technique, we perform a sensitivity analysis of the three models. The analysis should provide insight into not only the biological accuracy of each model, but also underlying design principles of the *Neurospora crassa* circadian clock.

## **SAND**

**Caitlin Murphy ('10), English**

A work of creative non-fiction about a good friend who has struggled with addiction, and the changes this addiction has caused in our relationship over the years.

## **CHARACTERIZATION OF THE *AEROMONAS SALMONICIDA* INC A/C CONJUGATIVE PLASMID: COMMENSALS FROM THE GI TRACT OF SALMONIDS SERVING AS A RESERVOIR FOR ANTIBIOTIC RESISTANCE**

**Chelsea Nahill ('10), Elizabeth Disney ('10) and Adam SanMiguel ('10), Biology**

In the wake of the discovery that many bacteria have developed resistance to various antibiotics, many researchers have posed the question if commensals can serve as reservoirs for antibiotic resistance. To test this hypothesis, we used a strain of *Aeromonas salmonicida* subspecies *salmonicida* (AS03), isolated in 2003 and known to infect salmonids with the disease, furunculosis. Initial experiments showed that this strain was resistant to both mercury and multiple antibiotics. These resistance genes were carried on an Inc A/C

plasmid, which can be transferred to other pathogenic strains of bacteria through horizontal gene transfer by the mechanism of conjugation. These mobile elements have been transferred to a wide range of bacterial genera. Using commensals of the GI tract of salmonids, genera of the various recipients included *Escherichia coli* DH5a, *Citrobacter* FBT4-10, *Hafnia*, *Serratia*, *Aeromonas*, and *Shewanella* spp., thus transferring resistance to these bacterial strains. Therefore, the Inc A/C plasmid was able to confer antibiotic resistance to a whole suite of various genera thus supporting the hypothesis that commensals can indeed serve as reservoirs for antibiotic drug resistance. The major concern these results illuminate is that a fish pathogen such as AS03 could transfer its conjugative plasmid to other pathogenic strains of humans, thus inducing a multiple drug resistant bacterial strain, which would be difficult to treat chemotherapeutically.

## **FILM UND TEXT ALS DARSTELLUNGEN WIDERSTREITENDER VERANTWORTUNGSGEFÜHLE (FILM AND TEXT AS REPRESENTATIONS OF CONFLICTING FEELINGS OF RESPONSIBILITY)**

### **Ross Nehrt ('10), German/Russian**

Immediately after the Second World War, Germans struggled to come to terms with feelings of individual and collective responsibility for war crimes committed under the National Socialists. While the East and West German states had not yet come into existence, the occupying powers were already working to instill their respective ideologies in German minds. This paper will examine film and text in post-World War II Germany and show that Wolfgang Staudte's *Die Mörder sind unter uns* (The Murderers are Among Us) and Wolfgang Borchert's *Draußen vor der Tür* (The Man Outside) can be viewed as reflections of future official and unofficial East and West German philosophies regarding responsibility. Staudte's film emphasizes the official East German policy of placing blame on the capitalist-fascist system and individual high-party members while at the same time exonerating most ordinary Germans. Borchert's drama, on the other hand, highlights and denounces the inability or unwillingness of both bystanders and perpetrators in West Germany to confront their own personal responsibility for Germany's past, as well as the victimization of normal Germans.

## **ATLAS OF MAINE: HOUSING UNITS DISTRIBUTION BETWEEN VEGETATED AND DEVELOPED AREAS**

### **Anders Nordblom ('10), Environmental Studies**

This map illustrates the distribution of housing units in the Belgrade Lakes Region, Maine in relation to developed and vegetated areas. Housing units from 2000 Census Data are represented by a dot density of 1:3 and are constrained to developed areas. Roads, hill shade, and water bodies are added for reference.

## **PROJECTED WHITEWATER CLASSIFICATIONS ON MAINE'S RIVERS**

### **Anders Nordblom ('10), Environmental Studies**

Whitewater kayaking and canoeing has long been a recreational sport in Maine. This past time is formed off of the multitude of rivers located in Maine. However, the ability to gain knowledge regarding a certain river is limited, specifically the classification. Whitewater classifications are passed off of four factors; river volume, elevation change, geologic formations, and width/constrictions. These attributes create a scale from I-VI denoting the difficulty of a section of river. With greater knowledge of the classifications of Maine's rivers it will allow boaters to be safer, as well as explore rivers which have little to no previous literature.

## **THE DIFFERENTIAL ROLES OF D-PAX2 VARIANTS IN REGULATING *DROSOPHILA* EYE AND BRISTLE DEVELOPMENT**

### **Colin O'Shea ('10), Biology**

The ability to appropriately interact with the environment is crucial to an organism's survival. The establishment of functional sensory systems, such as the bristles and eyes in *Drosophila*, is a critical event during the development of the organism. The transcription factor D Pax2 is involved in the differentiation of the shaft and glial cells in the developing bristle (Kavaler et al., *Dev*, 126:2261-2272, 1999) and of the cone and primary pigment cells in the developing eye (Fu and Noll, *Genes Dev*, 11:389-405, 1997). How D-Pax2 contributes to distinct differentiative pathways in different cell types is not known. Recent work by Anna Czechowski and Katherine Harmon (personal communication) identified a mutation in the D-Pax2 gene that introduced a stop codon at the end of exon 9, effectively truncating the protein. This mutation affects bristle, but not eye, development. We thus suspected regions after exon 9 are required for D-Pax2 function only in the bristles and may also be associated with alternative splicing of the D Pax2 transcript. We plan to assess the role of the carboxy terminal region of the protein by establishing transgenic lines bearing rescue

constructs of D-Pax2 with either the complete coding sequence or with deletions of specific exons. To date, we have generated the first rescue construct bearing the complete coding region of the gene driven by a 3 KB upstream regulatory region of D-Pax2 and are currently generating transgenic fly lines with this construct.

## **A MARKET FOR MAGRITTE : INVESTING IN THE SURREAL**

### **Rinchen Olthang ('10), Economics**

This paper investigates the market for Surrealist artist René Magritte using his art works auctioned over the period 1985-2009. Employing the Hedonic Price Model, a hedonic function is estimated where the price of an art work is regressed on its hedonic characteristics including time-variant variables such as the year an art work was created and year it was sold. The empirical findings from the regression are used to identify the key factors that contribute significantly in determining the price. The medium and dimensions of an art work as well the auction house and saleroom location appear as influencing factors. The results are also used to construct a Hedonic Price Index that offers an overview of the global market trend for René Magritte. The study also examines how the rate of return on Magritte's works compare to returns on financial assets over the period 1985-2009. With a 12 % compound annualized rate of growth, Magritte's works appear to be relatively more profitable.

## **EROSIONAL STUDY OF THE MORSE TIDAL INLET AT POPHAM BEACH, MAINE**

### **Daniel Opalacz ('10), Geology**

Over the past several years the Morse Tidal inlet at Popham Beach, Maine has facilitated the erosion of sand dunes and pitch pine trees from the Popham Beach Back Barrier environment. Large extra tropical Northeaster storms intensify this erosion and often dramatically alter the sand bars of Popham Beach. This study observed changes in the path of the Morse River, and the resulting Popham State Park Beach erosion over storms during the 2010 winter. The research team used a Differential Geographical Positioning System (DGPS) to acquire high-resolution ground measurements and an experimental Unmanned Aerial Vehicle (UAV) to acquire high-resolution imagery of the changing beach environment. The team built the UAV out of foam remote control airplane parts, an "off-the-shelf" GPS based autopilot, and a low cost point and shoot digital camera. Over the observation period, between February and March 12th, 2010, the Morse River inlet cut a new more direct channel across the Popham Beach Barrier spit as a result of repeated high-energy Northeaster storms in the January and February 2010 months. Before changing paths to a less damaging route, between June 17th, 2009 and March 12th, 2010, the Morse River inlet eroded 2.4 acres of pitch pine Maritime forest and pushed the tree line 40 meters landwards in places. In addition, the DGPS results show that the westerly migration of the Fox Island tie bar may constrain the movement of the Morse River inlet and alter the position of its erosional cut banks.

## **DETERMINING THE SYNTHESIS AND FUNCTIONALITY OF N-ISOBUTYL-3,6-DIHYDROXYCARBAZOLE DERIVED CALIXARENES**

### **Kwadwo Opoku-Nsiah ('11), Chemistry**

The field of calixarenes is an ongoing study in the Katz group. With the success of forming an oxacalixarene with a nucleophilic carbazole, N-isobutyl-3,6-dihydroxycarbazole, opportunities have presented itself in the study of carbazole containing calixarenes. Furthermore, a calixarene containing the isobutyl-dihydroxycarbazole, structurally, has the potential of being a molecular tweezer. Precedent work in the Katz group has shown the formation of molecular tweezers with dichloronaphthyridine as an electrophile via SNAr reactions. Attempts at macrocyclizing isobutyl-dihydroxycarbazole with this naphthyridine have been successful based on 1H NMR analysis but further and more definitive characterization is necessary. Continued efforts include: purification, crystallization, fluorescence analysis and guest-host chemistry analysis of this calixarene.

## **CONFLICT AND THE WILL TO WIN**

### **Isaac Oppen ('10), Economics**

All theories explaining why states engage in rational war currently rest on assumptions of uncertainty or concerns about the future. This paper investigates how the desire to win a conflict for reasons apart from the resources gained provides another rationalist explanation for war. It is proven that if the will to win is large enough, two states can enter into a rational war, even if they have complete information and are fighting over a divisible resource. It is also proven that with uncertainty, an increase in one players will to

win increases the probability that the two sides enter into war. This theory is tested empirically using a proxy to measure the will to win. This proxy was constructed using the fixed-effect portion of a gravity model of immigration. It is shown that an increase in the will to win increases the probability that a conflict escalates using bootstrapped standard errors.

#### **FOMC COMMITTEE MEMBERS ON MONETARY POLICY**

##### **Isaac Oppen ('10), Economics**

The United States Federal Open Market Committee (FOMC) determines monetary policy. It is determined by five members representing regions in the United States as well as seven members representing the entire United States. Often regions in the United States experience economic conditions unique to the specific region. The Fed then has a choice: should it tailor monetary policy to the specific region or to the United States as a whole. Using interest rates from 1960, we find evidence that during Ben Bernanke's reign as Fed Chairman, policy was tailored to benefit the regions represented on the FOMC more than regions without representation in the particular year.

#### **CELL DEATH MECHANISMS ASSOCIATED WITH THE CARBAMOYLATING ACTIVITY OF THE ANTICANCER PRODRUG LAROMUSTINE**

##### **Adam Paine ('10), Lindsay Dale ('12), Bridget Reichelderfer ('10) and Jared Tepper ('10), Chemistry**

The preclinical anticancer prodrug Laromustine (VNP40101M; Cloretazine) yields 2-chloroethylating and methyl carbamoylating activities upon activation in cells. While the induction of DNA damage from its chloroethylating activity is widely considered to be the primary cause of its therapeutic cytotoxicity, Laromustine's carbamoylating activity has proven critical to the drug's mechanistic profile. Methyl isocyanate, the carbamoylating species derived from Laromustine in situ, can enhance the effectiveness of DNA damaging agents, including the cogenerated chloroethylating agent. This consequence is thought to be a result of a diminishment of cellular DNA damage response. However, carbamoylating agents themselves cause acute cell death in cultured mammalian neoplastic cells, principally via apoptosis. Several overlapping cell death pathways can be induced upon exposure to Laromustine's carbamoylating activity. Using Laromustine and its analogs, the chloroethylating-only 90CE and the carbamoylating-only 101MDCE, we identified molecular markers of apoptosis via Western blot analysis and flow cytometry. Poly(ADP-ribose) polymerase (PARP) is often proteolyzed by caspase-3 in the course of an apoptotic death. We report here that Laromustine, with its carbamoylating activity, induced PARP cleavage similarly to the cytotoxic agent etoposide in HL-60 human leukemia cells. In addition, flow cytometry analyses using FITC-annexin V / propidium iodide staining revealed that the carbamoylating activity of Laromustine is responsible for substantial apoptosis in HL-60 cells at clinically relevant doses within three hours of drug treatment. However, the DNA damaging, 2-chloroethylating activity did not induce appreciable apoptosis in similar experiments.

#### **ATLAS OF MAINE: TOTAL NUMBER OF HOUSING UNITS AND RENTED UNITS IN THE BELGRADE LAKES REGION**

##### **Rachael Panning ('10), Environmental Studies**

This map was conducted using ArcGIS and shows the total number of housing units and the number of rented units in the Belgrade Lakes Region of Maine. The total housing units are represented by census block using a red to orange color scale, while the rented units are represented using dots, with one dot equaling two rented units. Total number of housing units and rented housing units data is available from the 2000 Census Bureau data. Data for the roads, water bodies, and town lines were obtained from the Maine Office of GIS. The Projected Coordinate System is North American Datum 1983 UTM.

#### **COMMUTER TRAVEL TIMES FROM BELGRADE LAKES REGION TO WATERVILLE AND AUGUSTA**

##### **Rachael Panning ('10) and Sarah Hart ('10), Environmental Studies**

Communities in the Belgrade Lakes Region are "bedroom communities" where residents live in rural areas and commute to work in metropolitan areas including Waterville and Augusta. How much time does a resident of the Belgrade Lakes Region spend commuting? What are the most efficient routes from populated rural locations to city centers? ArcGIS network analyst was used to calculate travel times and routes from residential road intersections in the Belgrade Lakes Region to Waterville, Augusta-Capitol and Augusta-University of Maine. The mean travel times from residential points to Waterville, Augusta-Capitol and

Augusta-U Maine were 26, 29 and 26 minutes, respectively. There was no significant difference in mean travel times from residential locations to Augusta-Capital, Augusta-U Maine and Waterville.

## **TOURISM, COLONIALISM, AND "THIRD GENDER" IN PACIFIC ISLAND CULTURES**

### **Emily Pavelle ('10), Anthropology**

This project examines the contemporary impact of colonialism in the islands of the Pacific through the lens of alternative genders. Through an examination of the fa'afafine of Samoa and American Samoa, as well as some analysis of the fakaleiti or fakafefine of Tonga, and the mahu of Tahiti and Hawaii, I explore the societal and cultural changes that flowed from the introduction of "Western" concepts of personhood and Christian morality into the Pacific. I argue that although "third gender" identities still exist in the Pacific, these are not identical to their traditional conceptions, a consequence of their unavoidable interactions with imported concepts of gender and morality of "Western" origin. The Pacific Islands are still being colonized, but now, tourists and the islands' economic dependency on the tourism industry are the primary forces involved. To understand the effects of tourism, I examine how the traditional concept of "third gender" has adapted over time in response to "Western" notions of gender, homosexuality and Christianity. Building on these understandings, I then examine the ways that "third gender" identities are continuing to change as a result of tourism. I argue that "gay tourism" and the advertisement of islands in the Pacific as "gay-friendly" have led to an increase in direct contact between gender-liminal persons and homosexuals, thereby further affecting the ways that the "third gender" locals view themselves. I argue that historical colonialism and contemporary tourism have both acted as imperial agents in altering the "traditional" concept of "third gender."

## **JEWISH AMERICAN RENAISSANCE: THE ROLE OF THE JEWISH BLOGOSPHERE IN IDENTITY NEGOTIATION**

### **Katherine Perez ('10), Independent Studies**

The presentation examines the role that weblogs (Blogs) play in constructing notions of identity and community in contemporary American Jewish life. My research is primarily concerned with the perception of intermarriage among Jewish bloggers between the ages of 18 to 35, better known as Generation Y or 'Millennials.' I analyze the pros, cons and possible solutions proposed by Gen-Y bloggers and how they are using the blogosphere to address what it means to be Jewish in contemporary America.

## **WHITE PRESENCE THROUGH ABSENCE IN SPIKE LEE'S 'SCHOOL DAZE'**

### **Katherine Perez ('10), Independent Studies**

As a filmmaker Spike Lee is primarily concerned with issues of race and the African American Experience. The majority of his films revolve around urban life, specifically in New York City. But in 'School Daze' Lee ventures off and discusses African American identity in Historically Black Colleges. Here Lee discusses a different kind of Blackness, one that is based on how close or far away to Whiteness one is. In my paper I will discuss the ways in which Lee constructs Whiteness in Black space and uses this to comment on the way Blackness is perceived within the African American community.

## **IMAGINING LOVE IN CONTEMPORARY CHINA**

### **Hanna Pickwell ('10), Anthropology**

In the US, we tend to think of romantic relationships as purely emotional experiences. An American woman who tells her friends that the most important quality she looks for in a partner is the ability to buy a house would likely be interpreted as materialistic and morally questionable. Yet nearly all of the young women I interviewed in Beijing spoke to me openly about this and other economic expectations they hold for potential partners. Unsurprisingly, many foreigners in China told me that there is no 'love' in China, and that relationships are based only on money and status. I will refute these assumptions, arguing that romantic relationships are never purely emotional affairs; rather they are inextricably embedded in socio-historical processes.

## **ON PERFECT FRIENDSHIP: AN OUTLINE AND A GUIDE TO ARISTOTLE'S PHILOSOPHY OF FRIENDSHIP**

### **Kristen Psaty ('10), Philosophy**

What is friendship? Are the best friends similar or dissimilar? Does having friends make you a better person?

Friendship was a topic of special concern in Classical Greek society and was of significant importance within two of Aristotle's major works, *Nicomachean Ethics* and *Eudemian Ethics*. Here Aristotle attempts to answer theses and many of the other important questions about camaraderie. Considered a virtue, Aristotle (384-322 B.C.) wrote more about friendship than any other virtue he presented. This paper lays out the foundation for understanding Aristotle's philosophy of friendship as well as the sketch Aristotle draws of "perfect friendship." ON PERFECT FRIENDSHIP is a modern exploration of Aristotle's philosophy of friendship and its position within Aristotle's larger moral schema. The paper also addresses several important questions concerning virtue and equality as well as contemporary concerns about the implications of friendship for both the individual and for society.

## **ATLAS OF MAINE: BELGRADE LAKES REGION LAND USE**

### **Yiyuan Qin ('12), Environmental Studies**

This map is part of the Atlas of Maine - Belgrade Edition. Land use data from Colby Environmental Assessment Team. Aquifer, elevation, town boundaries, road, railroad, watershed boundary, county boundary data from the Maine Office of GIS. Town boundaries clipped to show only the Belgrade Lake Region. Land use modified to show new categories.

## **PREY HABITAT SUITABILITY ASSESSMENT USING A GEOGRAPHICAL INFORMATION SYSTEM**

### **Yiyuan Qin ('12), Environmental Studies**

The habitat suitability assessment of prey species in Hupingshan-Houhe National Natural Reserve (NNR) was carried out using a Geographical Information System (GIS). First, I summarized information on the habitat requirements and natural history characteristics of the Wild Boar from published literatures. A Prey Habitat Suitability Index (PHSI) model was built based on the criteria that fulfill the species' requirement and reduce human-wildlife conflict. The study concluded that some part of the NNR is more suitable for the Wild Boar. However, a more refined study with better data and information, further field survey, and a complementary study on the ecological and socioeconomic impact will be required for the reintroduction of the Wild Boar.

## **PRESSURE-DRIVEN FLOW OF A CONFINED SUSPENSION**

### **Daniel Reeves ('10), Physics and Astronomy**

Many everyday materials such as milk or blood, which we think of as liquids, are actually composed of microscopic colloidal particles or droplets suspended in liquid. Many of the familiar properties of these materials -- ketchup's well-known resistance to being poured, for example -- are macroscopic consequences of a suspension's microscopic structure and dynamics. We have designed and built a high-precision microchannel experiment in which a suspension is driven between two parallel plates separated by as little as a few thousandths of a millimeter, not much wider than the colloidal particles themselves. Using confocal microscopy to observe the moving particles, we can study how this confined flow is different than that of an ordinary fluid, such as water, or of flow through a much wider channel. This project brings together a range of experimental and analytical tools from physics, chemical engineering, and fluid dynamics.

## **THE ASTHMA PUZZLE: A COMPARISON OF FACTORS CONTRIBUTING TO ASTHMA IN THE US AND CHINA**

### **Zachary Rich ('10), Science, Technology, and Society**

It has been well documented that the prevalence of asthma is increasing worldwide and sharp distinctions are observed between developing and developed countries. The World Health Organization (WHO) states that the "strongest risk factor for developing asthma are inhaled asthma triggers" such as allergens, tobacco smoke, and chemical irritants. Comparisons between the US and the Peoples Republic of China show this to be overly simplistic. The incidence of asthma in the US is roughly 3 times higher than in China, but exposures to these triggers are significantly higher in China than in the US. This apparent paradox might indicate that rates of asthma are influenced more by lifestyle differences than exposure to triggers. Mounting evidence demonstrates that differences in obesity and hygiene may lead to different rates of asthma. Epidemiologic and animal studies indicate that obesity and minimal exposure to microbial products may each contribute to the development of asthma. These observations suggest that the US may be approaching a point where increased hygiene is no longer associated with increased health but can in fact be deleterious. While the difference in the incidence of asthma does not appear to correlate to exposure of allergens or chemical irritants, elevated asthma rates do seem to correlate with increased incidence of obesity and decreased exposure to microbial and parasitic products. More research is needed on



environmental and behavioral factors that contribute to the development of this disease. In order to combat increasing rates of asthma it will be necessary to increase public awareness of lifestyle changes that can diminish the risk of this disease.

## **COLOR LINES, SHADING HUGHES OF CLASS**

### **Carl Richards ('11), African-American Studies**

I plan on discussing the way class is shaped around race in Colombia. Most of my discussion will be based on my observations while in Cartagena. Although much of the city is of African descent, the majority of the rich are the white minority. Afro-Colombians conducted all the labor based activities while whites held upper class jobs such as being doctors or lawyers. This is a reflection of the colonial legacy that has reinforced the dualistic economic structure.

## **MILTON WILLIAM HOPKINS'S MARTHA ELLEN CONNELL: THE SIGNIFICANCE OF NON-ACADEMIC PORTRAIT PAINTING IN JACKSONIAN AMERICA**

### **Samantha Richens ('11), American Studies**

In this paper I explore Milton William Hopkins' folk portrait of Martha Ellen Connell as a reflection of portrait painting of the upper middle class in 19th century America. Portrait painting was a means of expressing not only the social standing but also social and political views. Furthermore, a portraits were a reflection of the individual beliefs of the artist; Milton William Hopkins' Martha Ellen Connell help to illustrate his involvement with the temperance and anti-slavery movements. Drawing from furniture techniques and the work of some contemporary artists, Hopkins, as other folk artists, developed a style recognizable as his own. Drawing from furniture techniques and some contemporary artists. Yet his development within the greater tradition of American portraiture illustrates that individual expression is important to this style. Additionally, I will argue that the portrait of Martha Ellen Connell helps to illustrate how American folk portraiture is a deliberate product of its environment, rather than a lesser version of academic portrait.

## **RELIGIOUS RESPONSES TO GENETICALLY MODIFIED ORGANISMS**

### **Silas Rioux ('10), Religious Studies**

Often times in modern society, religious institutions have a difficult time translating and adapting their texts in order to come up with a definitive answer to a modern day theological problem. Such is the case in the battle over GMOs, and whether they are permitted by their respective religious texts. Each set of religious texts, as well as the belief structures of each religion, have their own similarities and differences. For this reason, the arguments put forth by each religion in regards to the creation and consumption of GMOs contain both similarities and differences.

## **VEILED EROTICISM IN GOTHIC IVORIES**

### **Virginia Robbins, Art**

With a fourteenth century gothic ivory writing tablet case as my guide, I will explore the ways in which artists of the Middle Ages represented love and sexuality. Because polite society deemed overtly erotic images improper, artists and writers developed a language of sexual innuendo to represent such themes in a more discreet, veiled way. A vocabulary of puns wrought from the courtly activities of the gentry thus came to serve as a visual language used to express erotic themes. Accordingly, this paper simultaneously addresses the theme of courtly love that is integral to the understanding these images. They are not simply clever representations of sex; they are also the product of the stunningly different cultural avenues that shaped the concept of idealistic love in Medieval Europe. These tablets thus demonstrate the playfully hidden eroticism of the day while also acting as a medium through which we can understand the myriad forces that shaped the concept of courtly love.

## **MOZART'S NON PIU ANDRAI - DEFYING FORM**

### **James Rockafellow ('10), Music**

I will present a Shenkerian analysis of a Mozart aria. Through this analysis I will demonstrate an explanation for the irregular form of the piece. It will ultimately result in a confirmation of Shenker's theories on form. This analysis will also explain techniques used by Mozart and how the smaller sections of the aria work with one another

## **SCHENKERIAN ANALYSIS OF BRAHMS'S WALTZ OP. 39 NO. 11**

### **Devon Rook ('10), Music**

Heinrich Schenker (1868-1935), a well-known music theorist, is best known today for his unique method of analyzing music. His approach, commonly referred to as 'Schenkerian analysis,' is often graphically represented through the use of beams, slurs, dotted lines, and other symbols. In this analysis of a short Brahms waltz (which follows Schenker's approach) it will become apparent that, underneath the various adornments and embellishments, the basic structure is actually quite simple.

## **CONDITIONS FOR CONTAINMENT**

### **Andre Rougeot ('10), Government**

In this work I analyze the necessary conditions for the successful implementation of a foreign policy strategy of containment. This is accomplished by deriving lessons from various case studies, such as Ancient Rome's containment of Macedon, the Fatimid Caliphate's and the Syrian Emirates' containment of the Crusader States, the Austrian Empire's containment of Louis XIV, England's containment of Czarist Russia, American containment of the Soviet Union. and American containment of Iraq.

## **'THE GENERAL WILL'S COLD FURY: HEGEL'S CRITIQUE OF ROUSSEAU AND THE FRENCH REVOLUTION'**

### **Jacob Roundtree ('10), Philosophy**

Most scholars interpret Hegel's critique of the French Revolution as essentially an indictment of Rousseau's political thought. Hegel's damning assault on Rousseau's political thought must not be read as a wholesale critique of Rousseau's system because many of Hegel's points can be answered by Rousseau in a manner that would leave his system intact. However, as this paper argues, Hegel was not concerned with dismantling Rousseau's entire edifice; rather, Hegel sought to expose how the general will, when actualized, would engender a universal consciousness in the minds of political subjects, at the expense of singular consciousness and particularity. Hegel explores the dynamic of the French Revolution so as to delineate how such a rigidly certain universal consciousness necessarily develops a negative and absolute sense of freedom that is hostile to all particularity. According to Hegel, the final expression of this negative and absolute sense of freedom is "Absolute Terror," with the society in question fluctuating between violent chaos and despotism. This paper presents Hegel's interpretation of the French Revolution, as the actualization of the general will, which is taken to be the heart of Rousseau's political thought.

## **A NIETZSCHEAN CASE FOR TAX EVASION**

### **Jacob Roundtree ('10), Philosophy**

Modern western governments have become the foremost legislators and enforcers of society's moral rules. They have been especially successful in indoctrinating their subjects into believing that paying taxes is a moral duty. This victory of the State's over the interest of society's members was necessary for the state's very survival, for its existence is predicated on predation. The State, however, is, in the words of Nietzsche, "the coldest of monsters", with its entire function being the ever-greater control of its subjects' lives. Its insatiable pursuit of power has resulted in the mass-regimentation of society, the stifling of cultural progress and the general erosion of the human spirit. In this essay, I argue the need for true revolutionary spirits, who are capable of arresting a nation's trend towards decadence by being immoralists in the strictest sense of the term. The essay is narrowly focused on evasion of taxes, both direct and indirect such, as one important plank in the immoralist's agenda. I rely heavily on the ethical thought of Nietzsche, who argued that a moral code is simply a set of rules established by a community to maintain itself, to make the case that the upshot of tax evasion, if earnestly and strategically pursued, is the disintegration of the western political community and that such a disintegration is the means to achieve cultural progress. This argument is presented against the backdrop of Nietzsche's critique of the state and the Austrian analysis of the relationship between taxation and the state's ability to execute its power.

## **THE EFFECTS OF MELATONIN ON THE CIRCADIAN RHYTHM OF THE ZEBRAFISH (*DANIO RERIO*) INNATE IMMUNE RESPONSE**

### **Catarina Ruksznis ('10), Biology**

The phagocytic cells of the innate immune system, the neutrophils and monocytes/macrophages, function as the first line of defense against invading pathogens. Our laboratory has shown that the percentage of

zebrafish kidney leukocytes participating in phagocytosis varies in a circadian manner. Secretion of the hormone melatonin by the pineal gland is a circadian oscillator that is believed to be responsible for the regulation of some circadian patterns in physiological activity. To determine the effects of melatonin treatment on the phagocytosis of leukocytes isolated from the zebrafish kidney, fish were exposed to 50  $\mu$ M exogenous melatonin for one hour before euthanasia. Leukocytes were incubated for one hour with pHrodo™ *E. coli* and the participation in phagocytosis analyzed by flow cytometry. Melatonin treatment at one, two or three hours prior to 6 PM raised the level of phagocytosis to that normally observed at 10 PM, while melatonin treatment prior to 10 PM had no effect. Melatonin treatment one hour prior to 10 AM suppressed the participation in phagocytosis, while melatonin treatment at 6 AM had no effect on phagocytosis. Treatment with 50  $\mu$ M luzindole, a melatonin receptor antagonist prior to melatonin addition reversed the effects at all times. The phagocytosis of *E. coli* by neutrophils varied in a circadian manner which was suppressed by melatonin and reversed by luzindole treatment. Monocyte phagocytosis did not display a circadian rhythm and was not affected by melatonin treatment. The percentage of neutrophils present in the zebrafish kidney was decreased by melatonin addition in the evening and increased by melatonin addition in the morning. Clock mRNA was rhythmically expressed in the zebrafish kidney and was decreased by melatonin treatment at all times.

## **ATLAS OF MAINE: BIOTIC LAND COVER IN THE BELGRADE LAKE REGION**

### **Michelle Russell ('11), Environmental Studies**

This map shows biotic land cover types in the Belgrade Lakes Region. The data was adapted to more clearly show vegetation patterns and types. Land cover, water body and elevation data all come from the Maine Office of GIS. The Universal Transverse Mercator Projection for zone 19 was used with the North American Datum 1983.

## **THE EFFECT OF FREE-RANGE GRAZING ON GRASSLAND BIODIVERSITY**

### **Michelle Russell ('11) and Elizabeth Schneider ('12), Environmental Studies**

Grasslands are the most degraded and converted ecosystems in the world. Traditionally converted to rangeland or agricultural plots because of their abundant grasses and fertile soils, less than one percent of native grasslands remain in areas of North America. The United States has about 770 million acres of rangelands, more than half of which are managed by private individuals. The many landholders and conversion of grassland to rangeland endanger global biodiversity, because 11.6% of the mammals and 5.3% of the birds native to prairies are endemic and threatened by habitat loss. Many organizations, state and local governments have realized the threat to the remaining undisturbed grasslands and the potential to recover degraded or converted grasslands and have taken a broad range of management initiatives. On the other hand, more people are becoming aware of their impacts on the environment as well as the health and animal rights implications of consuming meat, and the support for free-range grazing has increased. Paradoxically, the new "green" movement towards free-range livestock may threaten the newfound efforts of prairie conservation. By studying different grazing management cases we explored the effect of free-range grazing on grassland biodiversity. We found that intermediate grazing has the potential to increase biodiversity; however its success depends on many environmental and management factors.

## **A COMPREHENSIVE CHARACTERIZATION OF THE *AEROMONAS SALMONICIDA* INCA/C PLASMID CONJUGATION SYSTEM**

### **Adam SanMiguel ('10), Biology**

Antibiotics have been prescribed for over fifty years to control bacterial infections by medical professionals and in agriculture. However, the emergence of antibiotic resistance within the past few decades has become an increasingly large obstacle to adequate medical treatment. Antibiotic resistant bacteria evolve or acquire the ability to survive in particularly hostile environments, and it is this endurance that allows certain pathogens to invade and colonize host organisms. In this context, horizontal gene transfer has raised particular concern, as it represents a mode for previously antibiotic susceptible pathogens to gain robust resistance profiles from auxiliary genetic elements. The IncA/C plasmid represents one such genetic element, encoding resistance to a diverse class of antimicrobial drugs. This plasmid has been isolated from a plethora of commensal and pathogenic bacteria, and has conferred a selective advantage to these bacteria during normal treatment regimens. This study represents an extensive characterization of the pSN254-like *A. salmonicida* IncA/C plasmid conjugation system. Specifically, we report the ability of *A. salmonicida* to transfer the IncA/C plasmid to a large group of feral brook trout commensal bacteria. Moreover, we show that IncA/C plasmid transfer can occur at appreciable frequencies despite extreme temperature shock, and that this transfer can be enhanced by the presence of certain antibiotics such as chloramphenicol, florfenicol,

and streptomycin. Overall, this data represents the relative ease with which the *A. salmonicida* IncA/C plasmid can transfer, and illustrates the essential need for prudent antibiotic use in hospitals and agriculture.

### **EXPLORING THE EFFICACY OF PRENATAL CHOLINE SUPPLEMENTATION AS AN ANTIDEPRESSANT IN ADULT FEMALE RATS.**

**Arielle Saporta ('12), Psychology**

To explore the potential of choline supplementation to act as an antidepressant in adulthood, female rats were subjected to supplementation and stress during gestation. Once they matured to adulthood, they underwent the forced swim test to measure the effects of despair. During this stage, they were manipulated with either an injection of the antidepressant imipramine (30 mg/kg) or a saline injection. Times spent immobile during the test were totaled and analyzed to understand the effects of all three variables on female rats in adulthood.

### **POPULATION GENETICS OF THE INVASIVE PLANT *IMPATIENS GLANDULIFERA* IN MAINE**

**Jordan Schoonover ('10), Biology**

The invasive plant *Impatiens glandulifera*, native to the Himalayan foothills, is widespread in Europe, though its range in Maine is currently restricted. One theory of invasiveness suggests that introduced species from disparate source populations may hybridize in their new environment to create genetically robust populations that have greater success as invaders. The purpose of this study was to examine genetic relatedness among the populations of *I. glandulifera* in Maine. This would enable us to determine whether these populations show evidence of originating from distinct source populations, whether they have the potential to hybridize and thus become increasingly invasive, or whether hybridization has already occurred. Leaf tissue samples were collected from populations in Alford, Augusta, Farmington, and Lubec, Maine. DNA was extracted, PCR was performed with fluorescently labeled primers, and the genetic analyzer was used to determine the length of the microsatellite repeats. Statistical analyses were performed using GenAlEx. We found that the greatest amount of genetic diversity occurs between individuals, rather than among populations. This suggests that populations in Maine have already interbred, most likely with the aid of humans. It is predicted that the vigorous expansion of this species may soon follow.

### **MECHANISMS OF CYTOTOXICITY OF DIEPOXYBUTANE, EPICHLOROHYDRIN, AND (1-CHLOROETHENYL) OXIRANE**

**Vanesa Silvestri ('12), Bethany Bartley ('10), David Hirsch ('10) and Christopher Ng, Chemistry**

The bifunctional alkylating agents are an important class of drugs for the treatment of cancer, psoriasis, and some anemias. These compounds are widely believed to exert their cytotoxic effects through reactions with biological nucleophiles, with DNA interstrand cross-links considered to be the most lethal lesions. Indeed, for many families of bifunctional alkylators, DNA interstrand cross-linking correlates with cytotoxicity. Moreover, apoptotic potential may play a role in antitumor chemotherapeutic utility. We have established previously that diepoxybutane (DEB) and the structurally related compounds epichlorohydrin (ECH) and 1-(chloroethenyl)oxirane (CEO) form DNA interstrand cross-links in vitro. With the goal of elucidating the molecular and cellular mechanisms by which this family of epoxides exerts its cytotoxic effects, we are determining the relationships between interstrand cross-linking, LD50 values, and apoptotic potentials for DEB, ECH, and CEO in chicken 6C2 and human HL-60 cells. Preliminary results in 6C2 cells suggest that cytotoxicity follows the order DEB > CEO > ECH. Furthermore, flow cytometry with Annexin V-FITC/PI dual staining has revealed that the apoptotic potentials follow the order DEB >> ECH > CEO. Reverse-transcriptase real-time PCR analysis of HL-60 cells treated with DEB under conditions known to induce apoptosis suggests up-regulation of several key genes involved in the mitochondrial apoptotic pathway, including BAK1, BAX, DIABLO, and APAF1. Further work is underway to characterize the pathways by which ECH and CEO exert their apoptotic effects.

### **CAN THE RE-INTRODUCTION OF SPECIES BE A SUCCESSFUL CONSERVATION STRATEGY?**

**Autumn Smith ('12) and Brianna Lind ('12), Environmental Studies**

Through negative species-human interactions, many species have become locally extinct from native ranges. A large number of these extirpated species are mammals and particularly carnivores who are killed for resources or for actual or perceived protection of human settlements and livestock. These species are also excellent studies because of the high number of re-introduction attempts and studies conducted on

mammalian carnivores who are often used as flagship species for many conservation organizations. This poster examines the re-introduction of the Grey Wolf into the Greater Yellowstone Area and the first unsuccessful re-introduction of Asiatic Lions in the Chakia forest in eastern Pradesh, India as well as a possible second re-introduction of Asiatic Lions in the Kuno Wildlife Sanctuary, in Madhya Pradesh, India. These two case studies cover a wide range of biotic and abiotic differences and so show a wide range of obstacles and problems that each project faced as well as many that were shared by both. Re-introductions were found to be a successful strategy if strong management plans are set for the long-term and the project has the support of locals who through their actions can determine whether a re-introduction is successful or not.

## **CRUMBLING THE CORNERSTONE: HABITAT FRAGMENTATION AND KEYSTONE SPECIES**

**Peter Smithy ('12) and Katharine O'Reilly ('12), Environmental Studies**

Numerous, pervasive and challenging problems face species and ecosystems in the wild, the least of which is habitat fragmentation. Climate change may shift distribution gradients and entire ecosystems, yet the link between the effects of habitat fragmentation and a keystone species prove to be even more disruptive to traditional ecosystem interactions. Through case studies of the sea otter, the common wolf, and army ants, we pinpoint where the fragmentation is negatively affecting a given population. When habitat fragmentation becomes exponentially worse as habitat is subdivided further, it is compounded by the direct effect it has on the keystone species. As a result the ecosystem becomes highly disturbed across the entire gradient of trophic levels. Increased development on the coast of Chile, the primary habitat for the sea otter, has been seen to negatively affect the ability of certain sections of coastline to serve their role in the entire metapopulation. Like the otter, ants and wolves are deterred by bisects through their habitat, and ultimately additional fragmentation leads to reduced range and propagation of the keystone species.

## **THE GOD OF YOU AND ME**

**Brittany Soderholm ('10), English**

This is a collection of four short stories written for Advanced Studies in Prose (English 478, the 'capstone' of the Creative Writing minor) that I will be reading a fifteen-minute selection from as part of our class's reading.

## **DIET AND DEIFICATION IN ANCIENT HINDUISM**

**Karthik Sonty ('10), Religious Studies**

In India, the social landscape is dominated by the perennial varna system of Hinduism, an intricate nexus of prescriptions and proscriptions. The calculated relationships, which establish internal power and dominance, were installed through strictly enforced codes of purity and impurity articulated in different dharmashastras (texts dealing with each varna's duties). This legislation cleaves the public along various ontological lines into different varnas, each with its own set of dharmic precepts denoting what duties are accorded to certain people. Interestingly, the majority of this legal writing involves daily practices, aiming at the actualization of its desired social hierarchy. By focusing texts on ubiquitous features of life, these civil codes were engrained both through rhetoric and through praxis. There is, perhaps, no more shared characteristic of life than eating. Because to survive, everyone must eat, food becomes a common feature of all people's thought. As such, the Brahmin framers of dharmashastras chose to be conscientious in how they presented the food, so as to impart meaning in ingredients and modes of transaction. In this paper, I explore the Brahmin use of various prescriptions, in relation to food transaction, as a means of constructing a social order based off of Hindu metaphysics and ontology.

## **EMERSON'S AMERICAN HINDUISM**

**Karthik Sonty ('10), Religious Studies**

In this paper, my aim is to demonstrate that there is a notable difference between Indian Hindu thought and American Transcendentalist interpretation, by putting in dialogue the two foremost voices in the 19th century from either group: Swami Vivekananda and Ralph Waldo Emerson. In order to demonstrate this divergence, I will present their individual feelings on Vedanta Hinduism's four most important concepts: atman/Brahman, advaita, karma, and jnana. Finally, I will attempt to surmise a basis for the division in their thought, by relying on other transcendentalist works to assert that Emerson held a uniquely 'American Hinduism'.

## **SPIKE LEE'S 'INSIDE MAN': A NEW AUTEURIAL DIRECTION**

### **Brett Souza ('11), American Studies**

'Inside Man' marks a point of departure from the topics of discourse that have come to come to be understood as representative of Spike Lee films and instead focuses on more general, genre based discourses that have come to define 'heist' films. I will attempt to show that 'Inside Man' can be read as a turning point in Lee's auteurial career, from the independently written, edited, and directed films that defined Lee's early career to his more recent big budget, studio-backed films.

## **EFFECT OF AUDITORY STIMULATION ON STEP FREQUENCY IN DISTANCE RUNNERS**

### **Robyn St. Laurent ('12), Psychology**

Synchronization is a widely studied phenomenon in psychological studies. In particular, much attention has been paid to the use of synchronization as a way to improve walking in stroke and other gait-impaired patients. There is much documentation of humans showing intentional and unintentional entrainment to various stimuli in a wide range of activities from finger tapping to side-by-side treadmill walking. Little work has been done investigating entrainment in human running. The current study examines the effects of auditory feedback on preferred stride frequency in distance runners. Individuals have a preferred frequency when jogging based on minimizing energy cost and maximizing efficiency. Weyand et al. (2000) found increases in running speed are not correlated with increased stride frequencies but rather with greater ground forces. This suggests that increases or decreases in preferred frequency may not have an energetic benefit. The experimental condition examines the degree to which a runner can be drawn away from their preferred frequency by sensory feedback. We expect the most entrainment when the frequency of auditory stimuli is closest to the preferred stride frequency.

## **THE HOOK-UP: THE THEOLOGY AND REALITY OF SEXUAL BEHAVIOR AT COLBY COLLEGE**

### **Maya Steward ('10), Women, Gender, Sexuality**

My presentation will focus on the hook-up culture at Colby College. It will compare how people interact on our campus in relation to nation-wide hook-up trends. Moreover, it will take a look at what we believe the hook-up culture to be and what students believe their peers are doing as opposed to what students are actually doing; the public versus the private discourse surrounding hooking-up. I will explain how our campus acts as a safe space that promotes hooking-up and through this advent how our culture has shifted from the era of dating to the era of the hook-up. Finally, I will touch on what it means too hook-up and why students are so invested in it, whether it is beneficial or detrimental to their well being or growth as young adults.

## **THE EFFECTS OF INCENTIVE AND MOTIVATION ON RECALL IN PRESCHOOL AGE CHILDREN**

### **Catherine Stewart ('11), Hali Castleman ('11) and Nicholas Lehman-White ('10), Psychology**

The motivation behind an incentive can have effects on memory in children. This study explores the effects of incentive and motivations on 3-to 5-year old children's memories. Children watched a short video clip followed by free and cued recall tasks. Analyses showed better recall for older than younger children and better recall for girls than boys. A 2 x 2 ANOVA for motivation and incentive as between-subjects factors revealed an interaction in free recall accuracy. Additional data collection is in progress to explore interaction effects.

## **POTENTIAL REGULATORY EFFECTS OF D-PAX2 ON EYE AND BRISTLE DEVELOPMENT**

### **Frances Still ('10), Biology**

Many genes (and associated transcription factors) are required in development to ensure the correct differentiation of cells into the functional organs of the mature organism. Eye and bristle development in *Drosophila melanogaster* is regulated, in part, by the transcription factor D Pax2. However, the target genes that D-Pax2 regulates have remain relatively undefined. A search of the *Drosophila* genome for the mammalian Pax2 binding identified 64 occurrences of this site, a subset of these sites are near genes with previously identified functions in sensory system development, such as dally, quick-to-court, and sequoia. We are investigating the possibility that D-Pax2 does indeed regulate these genes by two methods. First, we are cloning potential regulatory regions of these genes bearing the Pax2 binding site into a GFP reporter vector and using these constructs to generate transgenic fly lines. We expect that reporter constructs from true target genes will generate GFP in D-Pax2+ cells in vivo. Secondly, we are overexpressing D-Pax2 in

embryos bearing an inducible D-Pax2 transgene. Both wild-type and transgenic embryos are heat shocked briefly and mRNA was isolated. We are examining levels of RNA of the putative target genes by qRT-PCR. We expect that true target genes will show an increased level of RNA in the transgenic embryos compared to the wild-type embryos.

## **THE EFFECTS OF AGING ON THE SURVIVAL PROCESSING ADVANTAGE IN MEMORY**

### **Chelsea Stillman ('10), Psychology**

Past research had demonstrated that people remember words processed for survival better than they remember words processed in other, equally meaningful manners. However, research into the effects of aging on the survival memory advantage is missing, as is information about the effects individual differences may have on this phenomenon. In this experiment we examined the classic survival processing paradigm in both older and younger adults. Participants rated words according to their relevance to a grassland survival scenario and a moving scenario. Then, after a short distracter task, they were asked to recall as many words as they could remember. We hypothesized that as people age the advantage of processing words according to reproductive survival may diminish. The results of Experiment 1 supported this hypothesis. Younger adults showed a robust survival advantage while older adults showed no such bias in the words they recalled. Current studies are attempting to find the driving force behind the 'survival advantage' by decomposing survival into three specific goals: reproduction, avoiding predators, or finding food and water and comparing recall from these rating conditions to that in the moving condition.

## **ZEBRAFISH LEUKOCYTE RESPIRATORY BURST RESPONSES TO LIVE BACTERIA**

### **Matthew Strickland ('10) and Corey Martin ('10), Biology**

Circadian rhythms are daily oscillations in the biochemical and physiological equilibrium that governs homeostasis within an organism. It has been reported in a number of animal models that some components of the immune system function under circadian control. Previous work in our laboratory has shown that phagocytic activity by zebrafish kidney leukocytes varies throughout the twenty-four hour daily cycle. However, in assays using phorbol myristic acid (PMA), the standard artificial stimulant of respiratory burst, we did not detect variability in the fold-increase in production of reactive oxygen species (ROS) by these cells. This led us to consider using bacteria as a more physiological stimulus for respiratory burst assays, to determine whether ROS responses to natural stimuli would vary in a circadian pattern. This study involved the development and optimization of a respiratory burst assay using *E. coli*. We first discovered that preparations of killed *E. coli*, similar to those used in our phagocytosis work, did not prompt any detectable ROS production in zebrafish leukocytes, even after extended periods of exposure time. Upon shifting to use of live bacteria, we found that optimal condition of the bacterial culture used was imperative to induce significant ROS production in zebrafish leukocytes. A culturing protocol with sequential steps was developed where *E. coli* frozen in glycerol at  $-80^{\circ}\text{C}$  could be grown into viable, phagocytosis-inducing bacterial cells in liquid medium. Additionally, we found that *E. coli* strain K12 induced a greater response than the standard laboratory model strain DH5a. Respiratory burst activity is now being measured at different times of day to determine whether responses to live bacteria fluctuate in rhythmic patterns.

## **OSCILLATING CHEMICAL REACTIONS AND WAVES**

### **Gopal Subedi ('10), Physics and Astronomy**

Imagine mixing a few chemicals in a beaker and finding that the solution, which is red initially, suddenly turns blue and then back to red and continues to oscillate in this way for half an hour, before finally choosing red. When a mixture like this is poured into a shallow dish, propagating waves of blue appear out of nowhere and arrange themselves into shifting patterns of stripes and spirals. The study of these surprising behaviors creates an exciting interface between physics, chemistry, and mathematics. In this project we have explored how fluid motion, such as stirring, affects the formation and dynamics of chemical patterns in general and, in particular, how the addition of polymers to the fluid medium opens up new possibilities for future experiments.

## **PERCEIVED MOTION AND MODELING OF EYE MOVEMENTS DURING HUMAN CENTRIFUGATION**

### **Kelly Sullivan ('10), Mathematics**

Previous research has demonstrated that predictive models which use eye movement data as a foundation to predict an individual's perception of motion during gondola centrifugation are deficient. These models do not account for perceived differences in pitch reported during acceleration and deceleration. Data has been

gathered from a study performed by McGrath et al. in which subjects experienced gondola centrifugation. Horizontal and vertical eye movements during both acceleration and deceleration were recorded. Parameters of a self-motion model were then altered to optimally fit the model to this data. Additionally, a three dimensional animation was created using POV-Ray to visually describe both the subject's movements and perceptions during the centrifugation. Collectively, this research illustrates the difference between perception of motion and eye movements that are used to predict how an individual will feel during the centrifugation.

## **MIGRATION, FOOD AND CULTURAL PRODUCTION ACROSS CHANGING AFRO-ECUADORIAN GEOGRAPHIES**

### **Amelia Swinton ('10), Latin American Studies**

The human geography of Ecuador is changing. Urban Afro-Ecuadorians now outnumber those living in the two rural regions that have been the ancestral homelands of the population. This physical transformation assaults Ecuador's historically racialized geography, which conflated cities, modernity and white-mestizo identity. Though Afro-Ecuadorians living in the rural north had previously been physically and figuratively located outside of the national project, Ecuador's new constitution has sought to reverse this institutionalized exclusion. National belonging has been reframed through the concept of interculturality, which recognizes diversity and equality at the same time. I conducted two periods of fieldwork in the north-central Chota Valley, specifically in the Afro-Ecuadorian communities of La Concepción and Salinas. During this time, I observed cultural production through the lenses of agriculture, food preparation, gastronomic tourism, and ethnoeducation. In this thesis, I examine how these practices are contested by migration and interculturality. I suggest that interculturality narrowly defines diversity by ethnicity, which in Ecuador, is tethered to specific geographic sites. The people left behind in the Chota Valley must therefore uphold traditions that qualify the authenticity of the entire Afro-Ecuadorian diaspora despite dwindling population and resources in the valley itself. Drawing upon my ethnographic fieldwork, I argue that women have been disproportionately saddled with the burden of preserving and generating Afro-Ecuadorian culture. This gender-specific exploitation may have broader implications towards revealing the limitations and selectivity of the intercultural imagination.

## **THE 25TH HOUR: ACCOUNTABILITY IN A POST 9/11 SOCIETY**

### **Michael Talarico ('11), American Studies**

Spike Lee's 25th Hour uses the backdrop of a post-9/11 New York to expose the inner prejudices of a man unable to cope with devastation. The characters and story line in this film offer a starkly realistic representation of the American psychological state following the worst foreign act of violence on our nation. Lee demonstrates how our societal fears and inability to cope with disaster are all too often masked with misguided blame and hate. In addressing the reality of the shocked psychological state of our American society, I would argue that Lee proposes the problem lies within our characteristic national inability to properly assess responsibility or place blame in the wake of devastation.

## **THE BUDWORM AND THE MILL: THE SPRUCE BUDWORM EPIDEMIC AND THE EVOLVING FOREST PRODUCTS INDUSTRY IN MAINE FROM 1975-1985**

### **Steven Tatko ('10), History**

For three hundred years the forest products industry has sustained the economy of Maine. Private industrial ownership maintained timber yields and preserved public access for much of the twentieth century. A Spruce Budworm outbreak in the 1970s and 1980s undermined the stability of the industry and the socioeconomic system of the state. The budworm, a conifer-eating insect provoked heavy-handed forest management practices which have had lasting effects on forest health. The pulp and paper economy experienced rapid changes which decreased the price of wood and heightened tension between corporate owners and loggers due to the industrial response to a natural event. In the midst of the epidemic the environmental movement found support among a population that became increasingly concerned with the health of the forests and rivers. Pressure from new sources of foreign competition and industry wide movements to modernize drove paper companies to take drastic measures to ensure the continued profitability of their industrial systems. The industrial response to the budworm changed the sectors of forestry, labor and technology, economics, and environmental politics within the forest products industry in Maine. At the end of the first decade of the new millennium Maine stands at a crossroad that will have lasting effects on the future of the forest. The massive transition in ownership from industrial to private investment firms threatens to forever change Maine's ecological and economic stability. Only by understanding the events of the budworm era it is possible to comprehend the gravity of the situation facing the north woods today.



## **THE RELATIONSHIP BETWEEN ADULT ATTACHMENT STYLE AND THE FUTURE PLANS OF COLLEGE SENIORS**

**C. Thomas ('10) and Alexander Fenstermacher ('10), Psychology**

The aim of our study is to examine the role of parent-adolescent attachment style on the plans and career decisions that seniors make as they approach their college graduation. We plan to measure a few, more concrete items involved in making plans for the future as college seniors including location, type of opportunity and its proximity to one's parent(s). We will use an Adult Attachment and Future Plans measure to distinguish correlations between the students' future plans next year as well as a few years down the road. The four attachment styles will closely resemble Bartholomew's four-category framework that identifies Secure, Dismissive, Preoccupied and Fearful individuals. Our hypotheses are focused primarily on choices made by Secure and Preoccupied individuals. For our first hypothesis, we believe that Secure individuals will correlate positively to seeking an opportunity away from home and will correlate negatively with prioritizing close proximity to their parent(s). For our second hypothesis, we believe Preoccupied individuals will be correlated positively with seeking an opportunity close to home and with prioritizing close proximity to their parent(s).

## **ONE-POT SYNTHESIS OF AZACALIXARENES AND MIXED HETEROBRIDGED CALIXARENES BY NUCLEOPHILIC AROMATIC SUBSTITUTION REACTIONS**

**Brittany Tschaen ('11), Chemistry**

We describe a single step synthesis of azacalix[4]arenes using nucleophilic aromatic substitution(SNAr) reactions. Azacalixarenes were purified by chromatography and characterized using NMR techniques. This constitutes the first single-step synthesis of azacalixarenes that lack an internal plane of symmetry, due to the anti-disposed appended functional groups. Mixed nitrogen and oxygen heteracalix[4]arenes have also been synthesized using a one-pot synthesis and subsequently purified. Our methods have greatly expanded the scope of heteracalixarene macrocycles now accessed by SNAr.

## **ATLAS OF MAINE:WETLAND AREAS OF BELGRADE LAKE REGION**

**Taylor Tully ('10), Environmental Studies**

This map displays the location of wetland areas in the Belgrade Lakes Region. Wetlands are areas of land whose soil is saturated with water either permanently or seasonally. These habitats are some of the most productive and biologically diverse ecosystems in the world. However, wetland areas have diminished in recent history due to large-scale draining efforts for real estate developments and other human uses. Local communities should focus on the conservation of these important habitats.

## **SUITABILITY OF LAND FOR AGRICULTURE IN TANZANIA**

**Taylor Tully ('10) and Megan Browning ('10), Environmental Studies**

Agriculture is vital to the economy of Tanzania, accounting for a large portion of its GDP, providing many jobs, and representing a large share of exports from the country. Additionally, tourist visits to national parks and game reserves contribute to the economy. These two land uses, however, conflict with each other. This project sought to identify the factors that contribute to making land suitable for agriculture and subsequently locate such land throughout Tanzania. We expected to identify additional land that would be suitable for agriculture but not yet recognized as such in order to demonstrate optimal land use in regard to agriculture. In our initial model we found that elevation, rainfall, distance from lakes and distance from rivers were all significant factors affecting the suitability of land for farming. Ultimately, however, we found that these factors alone were not enough to accurately predict suitable agricultural land and we created a new model with some additional factors.

## **THE GRAMEEN BANK: METHODOLOGY AND PERSPECTIVE**

**Caroline Turnbull ('10), International Studies**

Over the past two decades there has been much attention concerning micro-finance in developing nations. The Grameen Bank, based in Dhaka, Bangladesh, has become the leading prototype for micro-finance institutions around the globe. After spending a month interning at the Grameen Bank, I was able to engage with my academic interests in the field and came to recognize the vibrancy of local and global markets. Controversies and contradictions in the model have intrigued me. My interest in these areas has framed my studies of globalization and development in new ways.

## **DOES TIME FLY WHEN YOU'RE HAVING FUN?**

**Kelsey Tyler ('12) and Evan O'Neill ('12), Psychology**

Perception is constantly affected by the environment and context effects, even our perception of time. It's common in modern times for music to be present when in commercial areas or consumer environments, but it is usually in the background, as people tend to devote their attention towards other cognitive tasks. Based on these facts, we conducted an experiment focused on the effects of music modality alone, as well as when paired with a brief cognitive distracter task (drawing a picture). We attempted to replicate a past study in which participants listened to major or atonal music and were asked to estimate how long they played. We then had a second manipulated group in which participants sketched a picture while listening to the music and then made the same time estimate. Our findings agreed with past information that atonal music is perceived as significantly shorter than major key music. We also concluded that the cognitive distracter task had no significant effect.

## **REVITALIZING THE SIGNALING POWER OF CLASS RANK AT COLBY COLLEGE**

**Nicholas Van Niel ('10), Economics**

After explaining the causes and effects of grade inflation, grade inflation at Colby College is addressed. A rich data set is used to estimate regression models in order to predict student performance. By comparing the mean predicted grade to the actual mean grade in a department, it is seen that some departments award a mean grade that is significantly higher than the predicted mean grade suggesting that some other factors (possibly including grade inflation) affect GPAs in those departments. With some departments giving significantly higher mean grades than other departments, the current grading system is susceptible to awarding unwarranted higher mean grades to students who major in those departments. Therefore, a normalized system of class rank is proposed in which performance is standardized against the mean grade at that particular class level in the respective department. The alternative system of class rank appears to mitigate the detrimental effects that large discrepancies in mean grades between departments engender.

## **查剎茶 CHÁ CHÀ CHÁ: HOW BUDDHISM MADE TEA WONDERFUL**

**George Venturella ('12), Religious Studies**

Tea seems to be the quintessentially Buddhist drink: calming, subtle, with the gentlest of stimulative power. Native and confined for centuries to southern China, camellia sinensis owes its popularity to the Eightfold Path. As Buddhism spread throughout China during the Tang dynasty (618-907), so did tea, the wandering Buddhist monks of southern China being the most prolific proselytizers of both. By the high Tang dynasty poets were composing rhapsodies on tea, having picked up the habit from their friends the monks. With the publication of 'The Classic of Tea' in the 760's by Lu Yu, an ex-monk, tea became the national drink of the Tang empire. Yet, once tea had spread to the popular sphere, it had outpaced the spread of Buddhism, and those consuming tea no longer consumed Buddhist ideals alongside it. This is an investigation of the relationship between the venerated and the virtual: the story of tea during the Tang is the story of the ideological transformation of Chinese society during a golden age.

## **'BAD COPYISTS': PHOTOGRAPHY IN THE EARLY SOVIET UNION**

**Catherine Vieth ('10), History**

The control of the image--how it was taken and how it was deployed--was a major concern for the Soviet Union. Photographers in the 1920s enjoyed many freedoms not usually acknowledged by popular ideas of Soviet life. State-funded art and journalism schools trained brilliant photographers. Soviet artists pioneered the use of photomontage, while their counterparts, photojournalists, were lauded by international critics. Yet, by the mid-1930s, many photographers found themselves the targets of state investigations and faced a very real fear of death. This study traces the interactions between two groups, avant-garde artists and photojournalists, as they leave the 'laboratory period' of the 1920s to and experience the severe restrictions of the 1930s.

## **SPIKE LEE'S CLOCKERS: A NEW VISION FOR BLACK CULTURAL SPACE**

**Matthew Von Vogt ('11), American Studies**

In Spike Lee's Clockers, the narrative of a young adult black protagonist relegated to dealing drugs on the streets of Brooklyn identifies location as defining the protagonist. By situating the action in the street, Lee's

film recalls the cycle of street films from the 1920s, while the use of a young black protagonist situates the film within a tradition of black narrative fiction. This paper focuses on how *Clockers* functions as both film and social criticism.

## **THE IMPACT OF CIVIL SOCIETY ON DEMOCRATIZATION IN CHINA**

### **Haolu Wang ('10), Government**

Recent years have seen an emerging civil society in an authoritarian China. The authoritarian embrace of civil society challenges the conventional wisdom that civil society is closely linked to democracy. In Beijing, the rhetoric of civil society linked less to democracy than to modernization. However, does civil society development have any impact on democratization in authoritarian regimes? The thesis tries to provide a tentative answer by studying civil society and democratization in post-Mao China. As a result of economic development and political reforms, gradual political liberalization has marked a shift of state-society relations that gives rise to a certain degree of democratization and a growing civil society. The thesis uses a statistical correlation study to examine the relations between grassroots democratization and civil society development. The study concludes that civil society development may have contributed to democratization at the grassroots level but not on the national level. The impact of civil society on democratization depends on the political structure of the state and will remain limited unless the government allows for further state-led democratic openings.

## **ATLAS OF MAINE: WATER RESOURCES IN THE BELGRADE LAKES REGION OF MAINE**

### **Angela Warner ('11), Environmental Studies**

The Belgrade Lakes region in central Maine has a diverse array of water resources including lakes, ponds, rivers, and streams. This map, which is a part of the Atlas of Maine: Belgrade Lakes Edition shows bathymetry data for the lakes and ponds in the Belgrade Lakes region. This data was interpolated from lake depth measurements from Maine PEARL and depth measurements taken by Whitney King in the Colby College Chemistry Department. In addition, the map displays elevation data for the Belgrade region terrain, which was obtained from the Maine Office of GIS.

## **IMPACT OF DAM REMOVAL ON THE BELGRADE LAKES WATERSHED IN MAINE**

### **Angela Warner ('11) and Adrienne Bowles ('12), Environmental Studies**

The dams in the Belgrade Lakes Region of central Maine control water flow in the watershed. This project simulated removal of the six main dams in the Belgrade watershed and analyzed the impact of removal on land exposure and change in surface area of the lakes.

## **I'M REALLY, REALLY BAD AT MATH: COMPETITION AND SELF-VERIFICATION THEORY**

### **Alexandra Wesnousky ('10), Psychology**

Previous research has demonstrated that people hold very strong beliefs about themselves, and that it is important that these beliefs are preserved. Self-verification theory states that individuals strive to maintain a stable self-concept by soliciting feedback that confirms their self-concept, even if the beliefs they hold are about themselves negative. However, research has yet to examine what happens when two individuals are both seeking feedback from each other to verify their self-concept on the same domain. It was hypothesized when individuals were competing against someone to verify their self-concept, they would try to seek more polarized feedback, especially when the domain was highly important to their self-concept. Participants were informed that they would receive computer feedback on their responses to identity-related questions, either based on their own responses or on how they compared to the other participants. Experiment 1 demonstrated that when participants were competing on a domain of high importance, they rated themselves more extremely and thought their peers would perceive them more extremely. However, when the domain was of low importance, they sought less polarized feedback and rated themselves more neutrally. Experiment 2, which examined how competition influenced self-verification of negative rather than positive self-concepts, failed to yield significant results. These results have important implications for identity-confirming processes in clinical populations that may inhibit recovery.

## **COSMONETTE: HOW THE SPACE RACE INFORMED AMERICAN GENDER CONSTRUCTION IN THE 1960S**

### **Amy Weston ('10), Women, Gender, Sexuality**

The techniques by which women are elided from the historical record are revealed by a careful investigation of the discourses surrounding the Space Race of the 1960s. These discourses did much more, however, than erase women from a future history. Dominating news coverage for the whole decade of the sixties, the Space Race was a powerful reinscriptive force with regards to American gender construction. Through rhetorical strategies that simultaneously essentialized gender, trivialized women, and promoted nationalism, an array of politicians, journalists, scientists, administrators, and in some cases women themselves, meticulously and systematically constructed a reactionary gender system at the nexus of scientific, political, and popular media discourses. I look at two events—the 1962 Congressional Hearings on the Selection of Astronauts and the 1963 space flight of Valentina Tereshkova—and examine the conversations they spark to demonstrate the clear and the subtle ways in which gender is constructed and to identify the conservative impulse that drives this construction.

## **FALSE COLOR IMAGING OF NEARBY SPIRAL GALAXIES WITH COLBY'S COLLINS OBSERVATORY**

### **Amy Weston ('10), Physics and Astronomy**

Through imaging of spiral galaxies from apparent magnitude 5 to apparent magnitude 10 with the Collins Observatory's 14-inch telescope, techniques for capturing and processing high-quality images of faint, extended objects were investigated. Additionally, images were processed to create VRI false-color images. With the proper data collection and post-processing techniques, galaxies as faint as 10th magnitude can be imaged to a high degree of detail with a relatively small telescope in an area with high light pollution. Future work should aim to develop a superflat technique to remove fringing effects on I-band images.

## **THE WESTERN ABENAKI EXPERIENCE AND THE RACIAL-ETHNIC CLOSET**

### **Amy Weston ('10), Sociology**

The history of the Western Abenaki in what is now Vermont is examined with an eye to issues of racial and ethnic survival. Issues of passing and assimilation are interrogated through the mechanism of the 'racial-ethnic closet,' a theoretical construction based on Eve Sedgwick's *Epistemology of the Closet*. The historical focus of the presentation is the Vermont Eugenics Project and Abenaki survival in the 20th century.

## **THE ECCENTRICS**

### **Annelise Wiersema ('10), English**

A young adult novel-in-progress that deals with issues of exclusion, identity, and family in a fantastical context.

## **CHOPIN: IDIOT OR GENIUS?**

### **Emily Wolf ('10), Music**

Traditional music theory is often the only method used to analyze a piece of music. In the case of Chopin's Etude in C# minor, a traditional analysis leaves many questions unanswered. However, Schenkerian theory fills in many of the gaps that a traditional analysis leaves unexplained.

## **BEHAVIORAL RESPONSES TO NEW DAM CONSTRUCTION IN RURAL CHINA**

### **Qianwen Xu ('12), Economics**

With an estimated total capacity of approximately 380,000 megawatts (MW), China has the greatest hydropower potential in the world (Cheng 1999; National Bureau of Statistics 2006), much of it as yet untapped. In 1989, the government identified 12 large hydropower bases with a total exploitable potential of 214,726 MW (China Electricity Council 2008) and announced plans to develop them concurrently. If fully developed, these dams would be sufficient to meet approximately 45% of China's current demand for electricity. The advantages that dam construction brings to China include providing flood protection, reliable sources of drinking and irrigation water, hydropower, recreation, navigation, and income (World Commission on Dams 2000). Despite such benefits, new hydropower development brings a wealth of biophysical, geopolitical, and socioeconomic costs. Of these, socioeconomic impacts of dams are perhaps the least understood, but they also stand out as being potentially critical. Dams have displaced more than 80 million people worldwide (World Commission on Dams 2000), including approximately 15 million people in China since 1949. Vulnerabilities associated with such displacement may be felt in various combinations of income, material well-being, social capacity, and health (Cernea 1999). In the summer of 2009, we conducted a survey of 400 households situated along the Nu River in Yunnan Province, China in order to evaluate the

socioeconomic impact of new dam construction in rural China. The goal of this project is to assess the local people's behavioral response to the proposed dam construction. In particular, we evaluate the impact of knowledge about the Nu River dams on patterns of gift giving, borrowing and lending, and traveling outside the village, either to the township or beyond.

## **THE EFFECTS OF A 2-POSITION NITRILE GROUP ON OXACALIX[4,6]ARENE FORMATION IN [3+3] FRAGMENT COUPLING**

**Mengfei Zhang ('11), Chemistry**

Calixarenes are [1n]-metacyclophanes bridged with carbon atoms. Calixarenes in which the bridging atoms are oxygen instead of carbon are called oxacalixarenes. It is now well known that oxacalix[4]arenes can be selectively formed in high yields under equilibrating SNAr conditions. Kinetic conditions, on the other hand, often produce mixtures of oxacalixarenes of different sizes along with linear oligomers. In this project, nucleophilic and electrophilic triaryl compounds are used as building blocks to synthesize oxacalix[6]arenes by nucleophilic aromatic substitution reactions (SNAr). In order to reduce the formation of oxacalix[4]arenes, which are the major competing products, a nitrile group is introduced on the 2-position of the electrophilic rings of the building blocks. The effects of this bulky, electron withdrawing group are studied based on one [3+3] fragment coupling reaction. This reaction is then compared with two other [3+3] reactions. Experiment results show that this nitrile group hinders oxacalix[4]arene formation as expected, but the yield of the nitrile substituted oxacalix[6]arene is not satisfying enough to make such [3+3] fragment coupling reactions synthetically useful.