

## 2009-2010 Undergraduate Research Award Scholars



**Stephanie Battle**, Biochemistry and Molecular Biology  
"Structure-function Analysis of the Novel Defense Protein SUP3 in *Arabidopsis thaliana*"  
Faculty Mentor: Dr. Hua Lu  
Expected Graduation Date: May 2010

Pathogen infection activates expression reprogramming of thousands of genes in plants. It remains challenging to identify which genes regulate plant disease resistance and how they function. Taking advantage of the unique defense-dependent dwarfism conferred by the *Arabidopsis* mutant *acd6-1*, we developed a genetic screen to identify *acd6-1* suppressor (*sup*) mutants, which potentially harbors mutations in novel defense genes. Among the genes identified was *SUP3*, encoding a phosphate transporter. The *sup3-1* mutant harbors a T-DNA insertion in the fifth exon of the *SUP3* gene, leading to the accumulation of a partial transcript. When introduced into the double mutant *acd6-1sid2-1* (The *sid2-1* mutant confers disease susceptibility and suppresses *acd6-1* phenotype), one copy of *sup3-1* allele dominantly suppresses *acd6-1sid2-1* morphology. Thus *acd6-1sid2-1* can be used to dissect the functional region of the SUP3 protein. We made a series of deletions of the *SUP3* gene and transferred each fragment into *acd6-1sid2-1* plants. We expect that a functional SUP3 fragment would cause visible morphological changes in *acd6-1sid2-1* transgenic plants. Functional SUP3 fragments will be further tested in wild type for disease resistance. This study will reveal the functional domain of SUP3 that regulates plant defense and helps us to understand the mechanism of SUP3 action.



**Maria Bednarek**, Biochemistry and Molecular Biology  
"Optimization of Drug Nanocarriers via the Construction of a Stealth Dendron"  
Faculty Mentor: Dr. Marie-Christine Daniel  
Expected Graduation Date: 2010

Several challenges need to be overcome in chemotherapy to markedly increase its efficiency against cancer. Although intense research is done on combined therapy and tumor targeting, the simultaneous targeting of different therapeutic entities to the cancer cells is still an area of research to be developed. One possibility has been to generate a potent multifunctional drug delivery vehicle, or nanovector, for the chemotherapy of specific cancers by attaching dendron units with distinct functionalities (chemotherapeutic drugs, targeting ligands and imaging enhancers) around a central anchoring gold nanoparticle. My project will consist of the synthesis of a "stealth dendron" that will contribute to such a nanovector through its combination of dendrons with the aforementioned functionalities around a central gold nanoparticle. This "stealth dendron" will help further elongate the blood circulation time of the nanovectors, and most importantly avoid non-specific entry of the nanovectors into healthy cells in order to maximize the targeting. The specific goals of my project will be to first synthesize the backbone dendron, then modify it with the "stealth" functions, and finally attach it to a spacer that will allow it to anchor onto the gold nanoparticles. Once this has been completed, *in vitro* testing will be performed to assess whether it is successful in minimizing non-specific cellular entry.



**Mikhael Bekkerman**, Biochemistry and Molecular Biology  
"Developmental Occurrence of Solitary Chemosensory Cells  
in the Airway of Mice"

Faculty Mentor: Dr. Weihong Lin

Expected Graduation Date: May 2010

Solitary Chemosensory Cells (SCC's) have been speculated to play a role in signaling environmental stimuli and evoking protective reflexes such as coughing and sneezing, designed to flush foreign particles out of the body. Recent studies from our lab demonstrate that solitary chemosensory cells, specifically those expressing a transient receptor potential channel M5 (TRPM5), are involved in sensing chemical irritants. Our aim is to reveal how TRPM5 expressing cells develop over a time in newborn and adolescent mice. By using immunohistochemical protocols, we will be observing cell densities of SCC's expressing TRPM5 in the airway of mice. Data will be gathered and analyzed from 1, 2, 4, 6, 8, and 12 weeks old mice that transgenically express a green fluorescence protein (GFP) to identify the presence of solitary chemosensory cells. In completion of the experiment, we will understand the points in time when mice begin reacting to noxious chemical odorants.

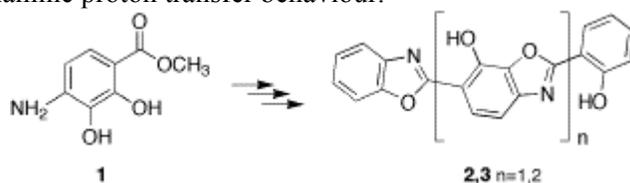


**Richard Brown**, Biochemistry and Molecular Biology  
"Polymers for Long Range Photo-induced Proton Transfer"

Faculty Mentor: Dr. Paul Smith

Expected Graduation Date: May 2010

Photonics and the development of molecular electronic devices are two exciting fields at the interface of modern chemistry and material science. Our objective is the creation of a polymer that, upon absorption of light, will propagate proton transfer over long distances. The resulting photo-induced proton transfer would ultimately be used to transfer protons across membranes, thereby establishing a proton gradient and an electrochemical potential. We envision that incorporation of large numbers of the aforementioned polymers would facilitate photochemical creation of membrane potentials. The energy associated with such potentials would be used to do physical work in energy applications. Such polarized membranes could also serve in more complex molecular electronic devices. The specific aim of this work is to synthesize the monomer **1** (methyl 4-amino-2,3-dihydroxybenzoate), to use this to synthesize oligomeric benzoxazoles **2** and **3**, and to examine their proton transfer properties indirectly by evaluating their photochemical behaviour. In particular, we hope to find that elongation of the oligomeric chain will cause nonlinear variation of absorbance or fluorescence, indicating that the individual chromophores/proton transfer units are acting in a coordinated fashion. The next step would be to implant these oligomers into a membrane and examine proton transfer behaviour.





**Melissa Chapman, Biology**

“Survey of Ashkenazi Jewish Young Adults Attitude about Testing for Gaucher’s Disease”

Faculty Mentor: Dr. Andrea Kalfoglou

Expected Graduation Date: Fall 2010

Ashkenazi young adults in college and even high school have been encouraged since the 1970’s to be tested for their risk of passing Tay Sachs on to their children. Today, “Jewish panels” include carrier tests for from four to ten diseases which vary in terms of their frequency within the population, test sensitivity and specificity, and the penetrance of disease. Recently, controversy has erupted about whether or not Type 1 Gaucher disease ought to be included in the Ashkenazi carrier-testing panel because it frequently has mild to no symptoms and usually can be treated with a new enzyme replacement therapy. In rarer cases, it can be life-threatening and very painful. We can learn from the carrier-testing experiences of members of the Ashkenazi Jewish population. This study will use mixed methods to conduct a public consultation with Ashkenazi young adults to better understand their knowledge, attitudes, and expectations around carrier testing. These data can serve as a model to inform policymakers about the expectations of consumers for the design and implementation of the next generation of carrier testing. We will first qualitatively explore this topic through focus groups with young adults in Baltimore and New York City who have 1) not been tested; 2) been tested through Dor Yeshorim (a private testing organization that serves primarily the Orthodox Jewish community but wants to expand to provide services for less traditional Jews. The organization does not disclose individual test results); and 3) been tested through a physician/center/laboratory where they received their individual test results. Our findings may have broad-based implications for the development of policy and practice guidelines for multiplex genetic-carrier testing.



**Mohsan Chaudhry, Chemistry and Biochemistry**

“Ring-Expanded Nucleotides/Nucleosides as Potential Anti-Viral and Anti-Cancer Agents”

Faculty Mentor: Dr. Ramachandra Hosmane

Expected Graduation Date: May 2011

Cancer and viral infection are the predominant factors for the high mortality rates. A number of ring-expanded nucleosides (RENs) and nucleotides (RENTs) have been reported to be highly active against a wide variety of tumor and viral cell lines. RENs/RENTs are a rich source of inhibitors of the enzymes in purine metabolism, and of those utilizing ATP/GTP either as energy cofactors or as nucleic acid building blocks. Most RENs/RENTs synthesized and screened thus far are planar, aromatic compounds. My project explores the effect of non-planar RENs/RENTs on the biological activity. We hypothesize that the non-planar inhibitors will better mimic the transition states of the relevant enzyme catalyzed reactions and therefore, would act as better inhibitors. My project is aimed at synthesizing the appropriate heterocyclic precursors to the ultimate target RENs/RENTs. The synthesis of the target structure starts with the commercially available 4-Nitroimidazole followed by introduction and hydrolysis of the acetal group to form an aldehyde, reduction of the nitro group to an amino group, followed by ring closure. The final reduction of the imino into an amino group will afford the target ring system.



**Geoffrey D. Clapp**, Mathematics  
“Modeling Sensory Input to the Lamprey Spinal Cord”  
Faculty Mentor: Dr. Kathleen A. Hoffman  
Expected Graduation Date: May 2011

We will develop numerical methods to better understand the effects of sensory input on vertebrate locomotion. Sensory input is known to have a profound effect on vertebrate locomotion but is not well understood. The lamprey, a relative of the eel, is a model system for studying vertebrate locomotion because its spinal cord is experimentally accessible and contains the same types of neurons as its human counterpart, except in smaller quantities. Biological experiments reveal an intriguing dependence on position of sensory organs in the lamprey, called edge cells, which measure the bend in the body. To further understand this phenomenon, we model the lamprey spinal cord as a chain of coupled oscillators. Edge cells are simulated by forcing at various positions along the chain, one at a time, as in the experiment. We will develop an algorithm using numerical continuation to determine entrainment ranges, that is, the range of forcing frequencies for which the electrical activity along the spinal cord oscillates with the same constant frequency as the forcer. Previous results using numerical simulation are in good agreement with the theory for sufficiently high connection strength between the forcer and the chain. However, for smaller connection strengths, simulation was not able to produce the theoretical results. Numerical continuation provides a more direct method for determining entrainment ranges in contrast with numerical simulation which depends on accurately computing transient behavior.



**Ryan Connor**, Chemical Engineering  
"Poor Drug Penetration into the CNS and its Impact on HIV-1 Pathogenesis: A Mathematical Model"  
Faculty Mentor: Dr. Mariajose Castellanos  
Expected Graduation Date: May 2010

The Acquired Immunodeficiency Syndrome is responsible for approximately two million deaths each year and is caused by the Human Immunodeficiency Virus (HIV). An estimated 33 million people are infected and there are as many as 2.7 million new infections per year. With the advent of Highly Active Anti-Retroviral Therapy, there has been much progress in the management of the disease; however, the emergence of drug resistant strains of the virus still poses a major challenge. It has been shown that not all anti-retroviral therapeutics are able to cross the blood-brain barrier effectively. This, coupled with the virus' efficient crossing of the blood brain barrier, prompted studies to investigate the emergence drug-resistant strains of virus derived from the Central Nervous System (CNS). To this end, computer modeling of the HIV-1 infection using a two compartment model consisting of CNS located virus and systemic virus is being carried out. Additionally, in vitro studies are being conducted to investigate how therapeutic agents' effectiveness correlates to their concentration and how their effects are added. It is expected that a clear correlation between CNS derived HIV-1 and the origin of drug resistant strains of HIV-1 will be seen.



**George Cutsail**, Chemistry  
“Copper Amyloid-beta Complex in Alzheimer's Disease”  
Faculty Mentor: Dr. Veronika Szalai  
Expected Graduation Date: May 2010

Alzheimer's disease is the seventh leading cause of death in the United States. Large plaques develop in the brains of Alzheimer patients. These plaques, mainly made of the amyloid-beta ( $A\beta$ ) peptide, are hypothesized to be the cause of dementia. Several metals interact with the  $A\beta$  peptide. My research focuses on the interaction of copper (Cu) with the  $A\beta$  peptide. The structure of the Cu: $A\beta$  peptide complex is unknown. Our work aims to elucidate the molecular-level interaction of copper with the  $A\beta$  peptide. The effect of this complex on neuron survival is controversial: some work claims it is toxic and other work indicates it is protective. Structural changes of  $A\beta$  and Cu: $A\beta$  will be detected using site-directed spin labeling and electron paramagnetic resonance (EPR) spectroscopy. This technique requires attachment of a spin label to a cysteine engineered into the peptide. Through correlating detailed structural information about the Cu: $A\beta$  complex with neuron survival measurements, I hope to help resolve this controversy. The results and data could greatly influence drug design and targeting.



**Han Dong**, Computer Science  
Computer Visualization of Optical Network Behavior  
Faculty Mentor: Dr. Yung-Jui (Ray) Chen  
Expected Graduation Date: May 2010

The goal is to design and code a visualization program to be utilized to study the optical network behavior under the Generalized Multi-protocol Label Switching (GMPLS) management model. The network will be empowered with the Wavelength Division Multiplexing (WDM) technology. The WDM technology allows a single fiber-optic connection between two nodes to carry multiple independent signal channels using different wavelengths. This allows the nodes to have a much greater capacity in communication. Furthermore each channel can be routed through intermediary nodes via its unique wavelength without electronic equipment intervention. This is called wavelength routing. The fiber optics network is a collection of edge nodes and core nodes connected by a fiber optic channel. The edge node collects data packets from users, groups them intelligently into wavelength channels and sends them through the network to reach destination users. The core nodes routes traffic through wavelength routing or regroups the incoming traffic from different sources and sends them out on new wavelength channels. The network research is to study and identify the proper management model and control parameters. The intention of the visualization program is to show how the traffics are arranged and are traveling through the network and to provide statistical display regarding the simulation at each edge and core node. The program shall be written in Java and will utilize two graphical packages, one is called Prefuse while the other is called Profusions.



**Vivian Ekey**, Spanish/Political Science  
"Afro-Porteño Identity Today"  
Faculty Mentor: Dr. Sara Poggio  
Expected Graduation Date: December 2012

The history of people of African descent in Argentina continues to be a mystery to most. Comparing census results from the 18th through 19<sup>th</sup> centuries shows a drastic drop in this population. Perhaps the most obvious place to study this trend is the city of Buenos Aires. In 1806, the Afro-Argentinean population seems to have been at its peak, at 30.1%. By 1887, however, this population had dwindled to only 1.8%. Today, Argentina's census has no specific category to account for people of African descent. Amongst most Porteños (Buenos Aires citizens), the general consensus is that there are no Afro-Porteños. More knowledgeable residents may cite the War of Paraguay and the Yellow Fever epidemic, which are thought to have decimated the population in the mid to late 19<sup>th</sup> century. Within the last decade, research has brought to light two key facts. First, there are indeed existing Afro-Argentines, descendant of the original slaves brought to the Rio de la Plata Region (encompasses Argentina, Paraguay and Uruguay.) Secondly, these descendants are actively seeking social and political recognition. After providing historical insight on the topic, my research will take into account not only this population of Afro-Argentines, but other groups of African descendants living in Argentina in order to characterize Afro-Argentinean identity in Buenos Aires today.



**Jarrett Farmer**, Ancient Studies  
"The Megaron at Pylos: A New Interpretation"  
Faculty Mentor: Dr. Michael Lane  
Expected Graduation Date: May 2010

Linear B, an early syllabic form of Greek, provides little more than economic minutiae about Bronze Age society in the Aegean. From the Linear B tablets, Mycenaean society looks like a bureaucracy run by scribes preoccupied with tribute, inventory, and redistribution lists. The texts contain few explicit references to political, religious, or environmental life. Scholars then must turn to evidence such as building ruins, pottery, frescos, seals, jewelry, metalwork, and mortuary remains for a more complete reconstruction of Mycenaean life. One particular architectural form widespread in Mycenaean citadels (as at Tiryns, Pylos, Mycenae, and Knossos) is the "megaron:" an axially symmetric room with a large central hearth, an anteroom, and a courtyard. While archaeologists commonly assume these rooms to have been political audience chambers, a different conclusion emerges when one scrutinizes the archaeological data from the megaron at Pylos. This summer I will excavate a settlement in the Pylos region called Iklaina, and through artifact analysis, digging, survey, museum work, iconographic study, and examination of the relevant literature, I intend to assemble and put forward evidence that, instead of having been a "throne room," the Pylos megaron was in fact the regional hub for ceremonial feasting. If the Mycenaean elite maintained authority through ritual eating and drinking, and not exclusively by warfare, trade, and diplomacy, we would have to rethink what we know about power in Mycenaean society.



**Sandra Gammon**, Ancient Studies  
The Vaccaei: "Studying a Pre-Roman Society in Central Spain through Its Mortuary Remains"  
Faculty Mentor: Ms. Carolyn Koehler  
Expected Graduation Date: May 2010

Pre-Roman Spain is a relatively new field of interest to archaeologists. During the Bronze Age, central Spain was occupied by a number of tribes including the Vaccaei, of which the Romans reported little. I will be working at the archaeological field school at Pintia, a fortified settlement occupied by the Vaccaei from the fourth century BC to the first century AD. The field school focuses on the necropolis, where I will be able to examine the grave goods they chose to leave with their dead. Through a study of the mortuary remains and intensive research, I will assemble an interpretation of the Vaccean culture, focusing on their burial practices and grave goods but also reflecting Celtiberian living patterns.



**Scott Gautney**, French  
"Cultural Effects on Sexuality-based Linguistic Differences"  
Faculty Mentor: Dr. Thomas Field  
Expected Graduation Date: May 2011

There is only a rudimentary understanding of the ways in which sexuality and culture interact in structuring language. This study is an exploration in quantitative sociolinguistics in which I interview both heterosexual and homosexual men in France and America. The interview is designed to elicit lexical (or word-based) responses. I am specifically interested in the lexicon of these men as related to sexuality itself. Certain questions in the interview are designed to elicit the words that heterosexual and homosexual men use to talk about men's sexuality. Additional questions are personal in nature in which the subject discusses his feelings towards these words. Once the results are quantitatively analyzed, I will compare them cross-culturally to determine whether there is a difference between French and American speakers (as regards the type of words used and their attached significance) and whether or not any differences could be correlated to culture.



**James Gerity and Tyler Schmitz**  
“Cloud-CubeSat: Designing a Picosatellite”  
Faculty Mentor: Dr. Vanderlei Martins  
Expected Graduation Date: May 2011

At this time, measurements of cloud structure (vapor content, etc.) are difficult to obtain. Generally, these data are collected during *in situ* aircraft experiments, which typically last several hours. The snapshot they provide is therefore incomplete; the structure of the cloud has changed by the time the measurements are complete. The goal of the Cloud-CubeSat project is to design and create a picosatellite (10x10x30cm, 3kg) to take these measurements from orbit around the Earth, using Cal Poly's CubeSat satellite standard as a base. Unlike previous CubeSats, this satellite has very specific pointing requirements, necessitating a sophisticated attitude control system. Such systems, although frequently implemented on larger satellites, are virtually unproven on the scale of a CubeSat. Using hardware and algorithms designed by engineering students at Olin College, our goal is to assemble a prototype of Cloud-CubeSat and construct a testbed to investigate the problem of three-axis stability.



**Sabah Ghulamali**, Gender and Women's Studies  
"Exploring Students' Knowledge and Perceptions of Sexual  
Assault Resources On-Campus"  
Faculty Mentor: Dr. Sarah Chard  
Expected Graduation Date: May 2011

The goal of this mixed methods project is to assess the connectivity of on-campus resources for sexual assault to the students they are meant to serve. For this project, I will analyze UMBC's sexual assault policies and the university's sexual assault education and prevention programs, and conduct focus groups to determine UMBC students' knowledge of their rights and their perceptions of the programs themselves. Additionally, I will examine the possible avenues for students seeking to report assault and how case treatment varies depending on the reporting method. These findings will be useful to university programs by revealing students' views of on-campus resources.



**Wayne Heavener**, Political Science  
"Consensus and Legitimacy in Supreme Court Opinions"  
Faculty Mentor: Dr. Jeffrey Davis  
Expected Graduation Date: May 2011

This research seeks to determine whether consensus in a Supreme Court opinion makes for a more legitimate, long-standing, rule of law. Throughout the history of the United States, many Chief Justices have sought a unanimous majority on the assumption that a consensus in an opinion makes the rule of law contained within it more legitimate or having more longevity. The research proposal at hand will seek to investigate this fundamental assumption. This project hypothesizes that the greater consensus makes a more legitimate rule of law. Otherwise stated, a higher percentage of justices in the majority of an opinion will correlate to fewer subsequent negative citation. This project defines consensus as the percentage of justices that vote in the majority of an opinion. Legitimacy is defined as a legal precedent that is neither overturned nor distinguished, and is cited frequently in subsequent opinions. Each case that the Supreme Court has decided will be compiled, as will the number of justices in the majority of each opinion, and the respective number of negative and positive citations. The data will then be analysed, to determine whether a correlation exists between consensus and legitimacy, refuting or supporting the hypotheses.



**Lucas Horn**, Biology  
"Assaying Phagocytic Ability of Adult Blood Cells In  
*Drosophila melanogaster*"  
Faculty Mentors: Dr. Jeff Leips and Dr. Michelle  
Starz-Gaiano  
Expected Graduation Date: 2011

While physiological changes in the immune system with age are well-known, very little is known about the genetic basis of such changes. First, I will test the hypothesis that genetically based differences in the ability to clear infection with age results from differences among genotypes in the ability of blood cells to phagocytise (engulf) bacteria. The second aim tests the hypothesis that the gene *lola* (which also has a homologous gene in humans), influences age-specific phagocytic ability of blood cells. This project will contribute to our understanding of the genetic basis of immunosenescence. The immune response of *Drosophila* has two main components, clearance of bacteria by phagocytic blood cells and production of antimicrobial proteins. Until now, no protocol was available to reliably and quantitatively measure the phagocytic ability of adult blood cells in *Drosophila*. I have modified a protocol designed for use with fly larvae to measure the phagocytic ability of adult blood cells. This procedure will allow me to determine if differences in the age-specific phagocytic ability of blood cells among the lines contributes to the differences in clearance ability among lines. Extension of this procedure to larger populations will allow us to map genes across the genome affecting this trait. I focus on phagocytosis because phagocytic ability declines with age in many organisms. Phagocytosis may also be more important for clearing infection than production of antimicrobial peptides. A microarray study in our laboratory identified a candidate gene called *lola* who expression is potentially involved in the ability to clear infection at different ages. Mutations in this gene affect the phagocytic ability of cells in cell culture, making *lola* an ideal candidate for testing its effect on phagocytic ability among our lines.



**Betty Irungu**, Political Science  
“Ethnic Identity and Election Violence”  
Faculty Mentor: Dr. Tyson King-Meadows  
Expected Graduation Date: May 2010

The principle importance of this study is that it aims to evaluate two major concepts. The first concept is the role that identity politics play within Kenyan politics. The second concept to be evaluated is the effect of the reforms of the governance in Kenya, on citizenship. This project is an eight week cumulative study, and is divided into three components. The first component analyzes how social informal institutions, such as ethnic identity inform political culture, through open ended interviews of targeted citizen stakeholders through focus group interviews. The second component, content analysis of newspapers in Kenya, analyzes the frequency of ethnic based terms and themes in print media, and the effect on the electoral process. The final component is the analysis of the semi structured interviews; identification of patterns and analysis of published regional survey data from the Afrobarometer. Kenyan political culture heavily favors regional and tribal stratification rather than national identity. Tribalism, which sparked and exacerbated the election violence following the December 2007 General election, reinforces regional identity, rather than multiethnic national identity. The main battle should be over preserving political institutions which have promoted growth, and not the futile attempt to save the current political institutions. This project will establish where and how this battle will be fought.



**Allison Isberg**, Interdisciplinary Studies – Medieval Linguistics  
“Translating a Medieval Will for Modern Readers”  
Faculty Mentor: Dr. Gail Orgelfinger  
Expected Graduation Date: May 2011

The purpose of this study is to explore the process of translating a medieval document for a modern audience. Medieval wills are particularly suited to introducing an audience to the medieval world, since they record details of people’s daily lives, from those they loved and the faith they practiced, to the dishes on their tables. I will start my research this summer, exploring the different methodologies involved in handling medieval texts and translating them, as well as the different theories on translation. In the fall, I will travel to the Borthwick Institute for Archives in York, England in order to gain access to a medieval will. I will research the document and its historical context and produce several different translations. In the spring, I will pull my research and translations together and present them at URCAD. My presentation will be oriented towards an audience that may not be familiar with the Middle Ages at all. This will allow me to demonstrate how a medieval document can be translated and presented in such a way that the audience can gain a new, and hopefully much greater, understanding of the people and culture of the Middle Ages.



**Sara Kibrom**, Biochemistry and Molecular Biology  
"Ternary Complexes of Crotonamine"  
Faculty Mentor: Dr. Richard Karpel  
Expected Graduation Date: May 2010

A small cell-penetrating peptide, crotonamine, found in snake venom carries plasmid DNA into cells. Crotonamine-DNA complex interaction with actively proliferating (AP) cells might be due to crotonamine's unique interaction with cell surface glycosaminoglycans (GAG) such as heparin sulphate proteoglycans (HSPG). The determination of the binding properties of crotonamine with DNA, in Dr. Karpel's laboratory, led to an interest in crotonamine's unique interaction with cell surface HSPG. We want to continue studying crotonamine's binding properties by further exploring its interaction with GAG and DNA. The affinity of crotonamine for DNA and HSPG will be established by using a fluorimeter and looking for protein tryptophan quenching, which occurs when crotonamine binds to either DNA or HSPG. The main goal of this research is to characterize ternary complexes of crotonamine with GAG and DNA. Analyzing this will help us determine how crotonamine delivers DNA into AP cells, such as cancerous cells.



**Nathaniel Kim**, Chemistry  
"Size Extended Pyrimidine Nucleosides: A Fundamental Study of DNA Structure and Stability"  
Faculty Mentor: Dr. Katherine Seley-Radtke  
Expected Graduation Date: May 2011

Deoxyribonucleic acid (DNA) is the genetic blueprint for all living organisms. Structurally, DNA consists of two polymeric chains of nucleotides, anti-parallel to each other forming a double helix. Intermolecular hydrogen bonding across the helix, stacking interactions, and the width of the helix are some of the important features of DNA crucial for its stability. In order to investigate these requirements of DNA, we have designed and synthesized size-extended pyrimidine nucleosides. These thymidine and cytosine analogues have a heterocyclic spacer ring, which results in displacement of the pyrimidine ring away from the deoxy-ribose and is expected to increase the width of the double helices. Since the hydrogen bonding units are intact these unnatural nucleosides will afford base pairing similar to thymidine and cytosine. Presence of an additional hetero-aromatic ring should enhance stacking of these nucleosides within the helix, thus providing greater stability than the natural nucleosides as well as to provide additional hydrogen bonding interactions. The biophysical effect of the unnatural nucleosides will be evaluated by incorporating them into oligonucleotides and monitoring their melting temperatures.



**Areej Kuraishi, Psychology**  
“Adolescent Mother’s Perceptions of the Infant’s Father’s  
Involvement and Parenting”  
Faculty Mentor: Dr. Charissa S. L. Cheah  
Expected Graduation Date: May 2010

According to the Guttmach Institute, approximately 750,000 adolescents between the ages of 15 to 19 years become pregnant each year. Research on the relation between interactions of adolescent parents and subsequent caregiving has been limited. As many romantic relationships end by the infant’s first birthday, the likelihood of father involvement is reduced. However, father involvement is associated with improved financial and psychological outcomes for adolescent mothers, and support from the infant’s father may also be increasingly important to mothers over time. The proposed research will examine the relation between adolescent mothers’ attachment security and her perceptions of the quality of her relationship with the infant’s father, his involvement and parenting. Self-report data will be gathered from a sample of 69 first time adolescent mothers between the ages of 12 and 20 years. The research findings will assess positive outcomes of father involvement, guiding community efforts to encourage adolescent mothers to remain in contact with the father.



**Shane Logue, Video/Film and Art History**  
“Heinrich Schliemann: Odyssey of the Mind”  
Faculty Mentor: Ms. Cathy Cook  
Expected Graduation Date: May 2010

This research grant will be assisting my funding as I study abroad in Athens, Greece. I will be attending the Hellenic Center for Mediterranean Studies through Arcadia University. During this time of study I will also be researching the controversial German archaeologist Heinrich Schliemann. Schliemann advocated the historical reality of places mentioned in the works of Homer. Schliemann was an important excavator of Troy, along with the Mycenaean sites Mycenae and Tiryns. His successes lent material reflecting actual historical events. I would like to interview art historians in Greece about their views of Heinrich Schliemann. I will be documenting my experience with video and audio taken at some of the ancient sites. I will present my short documentary video upon returning to my Special Topics: Documentary class in the fall.



**Tahira Mahdi**, Psychology  
"Myopia and the Need for Cognition in a Community  
Sample of Adults"  
Faculty Mentor: Dr. Shawn Bediako  
Expected Graduation Date: May 2010

*Need for cognition* refers to the extent to which people enjoy and participate in effortful cognitive activities. This study is motivated by my observation that the classic definition of a “nerd” is very consistent with what the literature suggest are characteristics of a person who is “high in need for cognition”: both terms describe someone who enjoys solving complex problems and analyzing situations. Glasses, or need for vision correction, fit the prototype of such individuals who have been portrayed in popular media as conscientious and prone to engage in esoteric pursuits. Do people whose physical characteristics force them to attend closely to visual stimuli actually have a similar type of personality? A sample of 80 adults varying in age, educational background, and quality of vision will complete a brief demographic survey, the Need for Cognition Scale and two perceptual tasks. Significant group differences on the outcome measures in expected directions would indicate that individuals who are nearsighted possess a higher need for cognition compared to those who are not. The goal of this study is to provide evidence that personality traits - and the way we cognitively process information - may be uniquely related to physical characteristics.



**Jessica Michaels**, Biochemistry and Molecular Biology  
“Novel Site Directed Affinity Reagent for Cross-Linking  
Human Hemoglobin: A Tetra-Aldehyde Cross-Linking  
Reagent”  
Faculty Mentor: Dr. Ramachandra Hosmane  
Expected Graduation Date: December 2009

The advantages of a blood substitute continue to grow as disease and viruses proliferate and the need for blood donations rise, especially in other countries where risks for receiving transfused blood are much greater. In the project scheme we set forth to create an oxygen therapeutic through a cross-linking molecule through a series of organic synthetic reactions forming a ten-carbon backbone compound affixed with four aldehyde moieties. This allows two or four cell-free hemoglobin molecules to be attached, facilitating efficient oxygen delivery without hemoglobin diffusion into tissues. The first reaction combines 1,10-diiododecane with tris(cyanoethyl)phosphate then we subject the product to organic reactions forming a tetra-diol followed by a tetra-aldehyde. The aldehyde group provides a connection to the hemoglobin molecule. Preliminary work has attempted the tetra-diol product and the current results suggest that the molecules are attainable. The next step requires the development of the tetra-aldehyde and then reaction with amines.



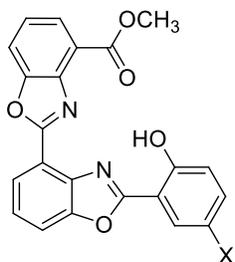
**Matthew J. Murphy**, Biological Sciences  
“How Black are Blackbirds? An Analysis of Plumage  
Darkness and Habitat in Icteridae”  
Faculty Mentor: Dr. Kevin Omland  
Expected Graduation Date: May 2010

The family of chemicals known as melanins is the primary source of dark pigments in animals. Organisms vary widely in the amount of melanin they express, some expressing little or no dark pigment while others are completely black. Such a wide spectrum of traits suggests that there are strong selectors involved in determining a species' average amount of dark pigment. A hypothesis, called Gloger's Rule, has been proposed which attempts to explain this wide variety of traits and introduces a basis for selection based on the darkness of an organism's hair, feathers, or skin. Working in collaboration with the UMBC chemistry department and the Smithsonian Museum of Natural History, I will measure the relative eumelanin and pheomelanin concentrations in feather samples from many species of the New World blackbirds (Icteridae). Using this data, I will test Gloger's Rule, a hypothesis that endothermic (warm-blooded) animals tend to be dark in more humid climates, particularly around the equator. In addition, I will investigate the degree of evolutionary plumage lability within this taxon, using a molecular phylogeny of New World Icterids published by Dr. Omland (Lanyon and Omland 1999).



**Kevin O'Malley**, Biochemistry and Molecular Biology  
“Photochemical Identification of the UK-1 Binding Site on  
DNA Topoisomerase II”  
Faculty Mentor: Dr. Paul J. Smith  
Expected Graduation Date: December 2010

The natural product UK-1 is known to catalytically inhibit the enzyme DNA topoisomerase II (topo II) and is also known to kill cancer cells in culture. Our goal is to identify where UK-1 binds to topo II using photoaffinity labeling. We will synthesize a photochemically reactive analog of UK-1 which will covalently attach to the enzyme binding site when irradiated with light. Protein digestion followed by liquid chromatography and mass spectrometry will identify the protein residues attached to UK-1. The results will provide an understanding of the mechanism of inhibition as well as guide the synthesis of better inhibitors related to UK-1 with the long-term goal of identifying clinically useful anti-cancer drugs.



X=H: UK-1  
X=N<sub>3</sub>: Azido-UK-1



**Sarah Paquette, Music**  
“A New Perspective on a Bach Partita”  
Faculty Mentor: Dr. Airi Yoshioka  
Expected Graduation Date: May 2010

For years violinists have performed Bach’s Gavotte en Rondeau from Partita No. 3 in E Major with a variety of ornamentations (i.e., turns, trills), articulations (i.e., legato, spiccato), vibrato, and bowings (i.e., slur, direction). My research and culminating performance are geared towards the fusion between historical information of Baroque violin performance and my own personal aesthetics. They include the investigation of performers, teachers, theorists, and historians since the Baroque era such as: Francesco Geminiani and Johann Joachim Quantz (two scholars of Baroque performance practice), Leopold Mozart (W.A. Mozart’s father), and Judith Tarling (a contemporary violinist who specializes in Baroque performance practice). In addition, I plan to attend the Summit Chamber Festival in Pleasantville, NY where a teacher will be assisting me through the process. I will also be experimenting with replicas of a Baroque violin and bow as a part of preparing the Partita I will be performing at the end of the year. The information acquired from the research process will aid music education of the Bach Partita as they are an essential component of violin repertoire.



**Shane Parks, Music Composition**  
“A Structural and Thematic Analysis of *Children of Eden*”  
Faculty Mentors: Ms. Anna Rubin and Ms. Susan McCully  
Expected Graduation Date: May 2011

My research will analyze and categorize a major work in Musical Theatre repertoire: *Children of Eden*, by Stephen Schwartz. I will conduct this research by thoroughly studying and dissecting the script and score as well as seeing various performances of the composers works and studying his history as a composer. This analysis will be conducted from two points of view. First, the research will focus on the dramatic perspective. I will analyze the dramatic structure and themes of the play from a theatrical standpoint. Then I will evaluate how these themes and structures are employed musically. By taking these two different analytical strategies, I hope to create a thorough and exciting study of the work. This study will show how the librettist and composer/lyricist work together to bring the story alive, both in dialogue and in song. The work will also be an example for others on how to analyze a musical, employing the same scholarly strategies. The final printed analysis will also give those who produce the show a detailed breakdown as to refer to.



**Anand Patel**, Mechanical Engineering  
“Wear Behavior of Micro-Textured Metal Component Surfaces Used in Artificial Joints”  
Faculty Mentor: Dr. L.D. Tim Topoleski  
Expected Graduation Date: December 2009

The purpose of the research is to determine the wear behavior of micro-textured carbide (brain coral) surfaces under conditions relevant to artificial joints. The hypothesis to be tested is that the use of modified micro-textured surfaces on metal surface in artificial joints will result in less wear of the surfaces compared to the non-textured surfaces, or surfaces that have not been modified. The motivation behind the research is that the micro-textured carbide surface layer is more wear-resistant than a non-coated alloy. Using micro-textured surfaces can reduce wear in artificial joints which is the prime factor for prosthesis loosening and initiating osteolysis – the destruction of bone surrounding the prosthesis. Examining the wear behavior of the surfaces can be a vital factor in developing breakthroughs leading to ‘ideal’ bio-materials and failure-free artificial joints.



**Elizabeth Plum**, Biochemistry and Molecular Biology  
"Aggregation of Potential Drug Delivery Vehicle"  
Faculty Mentor: Dr. Richard Karpel  
Expected Graduation Date: May 2010

Rattlesnakes are well known for their poisonous bites but surprisingly, the venom of the South American rattlesnake *Crotalus durissus terrificus*, possesses a valuable protein called crotamine. This protein is a 42-residue polypeptide with unusual properties not known to other toxins. It is a cell penetrating protein (CPP) and once inside cells, it localizes on chromosomes. Crotamine is not only able to penetrate, but is also a transporter, able to carry small molecules or even entire genes into cells. For example, it has been previously shown that crotamine facilitated the transfection of plasmid DNA into mice bone marrow. Crotamine specifically enters only actively proliferating (AP) cells through an interaction with heparin-glycosaminoglycans (GAG). It forms ternary complexes with these GAGs and DNA. Crotamine is able to bind to negatively charged DNA because it is highly basic, containing 9 lysine and 2 arginine residues. Crotamine-DNA complexes then enter the cell by endocytosis and localize on the nucleus. Past experiments I have carried in the laboratory have shown that heparin can break up these aggregates and now I seek to characterize both crotamine-DNA and crotamine-GAG aggregates. Researchers have demonstrated that the internalization of these peptides is dependent on the size of the complex, signifying that different aggregate sizes have different transfection efficiencies. Therefore, the rate of endocytosis is dependent on the size of these aggregates and the optimum size will lead to better gene delivery. Because crotamine carries DNA into the cell in aggregated form, the characterization of these complexes is extremely important for understanding of this cell penetrating protein. The purpose of this research is to determine the conditions under which these aggregates form and the size of these aggregates, including the hydrodynamic radii.



**Patrick Rife**, Art History  
“The Cyclical Nature of Obsolescence”  
Faculty Mentor: Mr. Steven Bradley  
Expected Graduation Date: December 2009

This research grant will be assisting my funding in building a sculpture/installation that investigates our cultural involvement in the consumption and rejection of technology. My research will allow me to investigate the sculptural properties of vinyl LPs in their physical presence as well as investigating the sculptural abilities of the content that exists on each of the LPs. In addition to aiding in the development of this piece my research will lend invaluable insight into my continued work with sound and how it can be represented in a physical space. This piece aims to initiate a dialogue that will span both cultural and generational boundaries in an effort to find a middle ground and our cultural commonalities.



**Joseph Ring**, Biological Sciences  
“Creation and Screening of Second-Generation Peptide  
Library Targeting HIV-1 Packaging Signal”  
Faculty Mentor: Dr. Daniele Fabris  
Expected Graduation Date: May 2010

Human Immunodeficiency Virus (HIV) has killed over 25 million people worldwide since its discovery in 1981, with almost three million people being infected in 2007 alone. The goal of this project is to ultimately identify lead compounds, which can specifically target the human immunodeficiency virus type 1 (HIV-1) packaging signal ( $\Psi$ -RNA). This signal, located near the 5' long terminal repeat of the genomic RNA, is responsible for the encapsidation of the retroviral RNA. This region is highly conserved, making it an ideal candidate for modification and, in turn, disruption of the HIV life cycle. Toward this direction, we have obtained a synthetic peptide library containing ~16,000 unique peptide sequences. The short term goal involves chemically modifying the C- and N- termini of the peptides in order to increase affinity and specificity for the target substrates, providing more robust lead compounds.



**Elizabeth Scott**, Visual Arts and Political Science  
“The Effect of Nationalism on Czech Design”  
Faculty Mentor: Mr. Joseph Coates  
Expected Graduation Date: May 2011

This research project will investigate how Czech Nationalism and history has affected the type graphic design that Czech designers produce. The project will delve into what design has been produced during the cold war and after, specifically between the late 1980s (the Velvet Revolution) to the early 1990s (the formation of the Czech Republic). It will exam the visual and typographic elements used to create work and look at the impact of politics and history, in an attempt to understand a country that has a unique position in Western history and Modern design practice. Czech nationalism is especially interesting because of the relatively recent peaceful split of Czechoslovakia, into the Czech Republic and Slovakia. By utilizing the time I will be in the Czech Republic in the fall during study abroad and research done over the summer to learn about how design was effected by a much more turbulent history, to gain a better understanding of how design can be used and a better understanding of a culture that has different roots due to history and location.



**Annah Seo**, Psychology  
“Examining Parental Acculturation, Goals, and the Development of Korean Immigrant Children”  
Faculty Mentor: Dr. Charissa Cheah  
Expected Graduation Date: May 2012

In 2000, it was estimated that 1,077,000 Koreans resided in the U.S., and ranked as the 5th largest Asian American ethnic group. Despite the growing number of Korean families, there is limited research on Korean American parents and children. The proposed research will examine the associations among Korean immigrant mothers’ acculturation, parenting goals, and their children’s social, emotional, and behavioural outcomes. The findings from this study will provide needed information on factors that predict effective parenting and healthy psychological and behavioral adaptation of Korean immigrant mothers and their young children. These results will also contribute important scientific and practical information to guide community, regional, and national planning, policy development and advocacy regarding the successful adaptation of Korean immigrant children and their parents.



**Sarah Solomon**, Gender and Women's Studies  
“*La Revanche Du Coeur*: Women's Oral Traditions as Strategies For Resistance in Mali”  
Faculty Mentor: Dr. Gloria Chuku  
Expected Graduation Date: May 2010

During my semester studying abroad in Mali, I plan to explore the following research question: do women in Mali use oral traditions as strategies for resistance? I am interested in gathering stories from women who engage in oral traditions, such as ritual songs, ceremonial songs, and oral stories and family histories. I would like to investigate whether or not these oral traditions are liberating for women in Mali by analyzing whether or not they allow women to create strong social networks, to challenge or resist existing gender norms and expectations, or to increase their participation in political, cultural or social activities. I am also particularly interested in the incorporation of women's oral traditions by contemporary female pop singers in Mali. I plan to research how contemporary pop music is an emerging space in which to examine shifting gender norms among new generations of Malians.



**Meghan Sommers**, Musicology  
“Medieval and Renaissance Shawms: A Critique of Modern Performance Technique”  
Faculty Mentor: Dr. Joseph Morin  
Expected Graduation Date: May 2010

Despite prolific use during the twelfth through seventeenth centuries, shawms are rarely included in early-music ensembles, unlike arguably better understood instruments such as recorders. This is likely due to the perceived difficulty of the shawm as an uncapped double-reed instrument, but also because it can be difficult to obtain information and instruction on how to go about playing the instrument. In addition, modern instructional texts are contradictory. Through my research I seek to reconcile these modern instructional texts with historical evidence of performance practice in order to gain a more clear understanding of various performance techniques of the instrument. The primary method of research for this project will be an evaluation and critique of extant modern texts about shawm playing by consulting original medieval and Renaissance documents, art work, and surviving original instruments. Understanding the historical performance practices of music is essential to understanding the very music itself, as well as the nuanced role that music and musicians played in their respective contemporary societies.



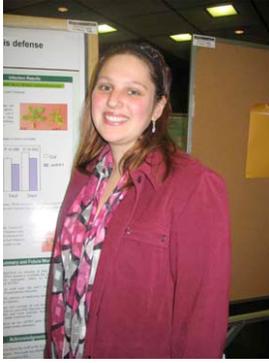
**Cristina Teixeira, Chemistry**  
“Development of a Food Quality Indicating Sensor”  
Faculty Mentor: Dr. William R. LaCourse  
Expected Graduation Date: December 2010

This project involves the production of an industry compatible food quality indicator. The consumption of fish that contain elevated levels of scrombotoxin (histamine) causes scromboid poisoning, which is a particularly severe form of food poisoning. This histamine is not removed or destroyed upon cooking and is not volatile, leaving no odor on the fish, and therefore, making it particularly difficult to detect accurately at actionable levels. An accurate detecting dye has been established to detect the presence of histamine and other amines in aqueous solutions. The primary mode of action is via reaction of amines generated during spoilage with chemicals within the device to form stable dye/amine adducts. These adducts, which have visible color, then diffuse to the outer surface of the device, resulting in a visible color change. Overall, the device will act as a dosimeter to determine the total amount of amines generated as a result of fish spoilage. The color change will be calibrated to indicate when food is no longer safe for consumption. This dye has already been validated as a reliable reagent for primary and secondary amines. These amines were derived with good reproducibility under optimized conditions and also tested for histamine analysis in samples of blue fish.



**Stephanie Tkacz, English**  
“Comparing Cognitive Writing Processes across the World”  
Faculty Mentor: Dr. Lucille McCarthy  
Expected Graduation Date: May 2010

The cognitive writing process is a procedure that is unique to every individual writer, and often varies also depending on the type of writing the writer is performing. Whether a writer engages in a pre-writing process or a revision process may depend on whether the writer is writing extensively or reflexively. To observe how cognitive writing processes vary (according to the type of writing, as well as the geographical and personal backgrounds), I plan to observe international studies in a summer study program at Middlesex University in the United Kingdom. I will have the students write two prompts, one reflexive and one extensive, and compose aloud to me while doing so. Composing aloud while writing is a method set forth by researcher, Janet Emig, and consists of participants writing as they would normally do, but explaining their process aloud, i.e. what they are thinking before, during, and after writing. Following having my participants compose aloud for two prompts, I will conclude each session with an interview, that asks the participant questions about their general feelings towards writing, as well as how they were taught to write in their home countries. Though my project will not acquire any type of quantitative data, I will be able to make some conclusions about how different methods of teaching writing shape a student's cognitive writing process.



**Margarita Tsionsky, Biology**  
“Characterization of SUP3 Homologues in Arabidopsis defense”  
Faculty Mentor: Dr. Hua Lu  
Expected Graduation: May 2010

Plant diseases have devastating effects on world agriculture. Effective control of plant diseases depends on a thorough understanding of disease resistance mechanisms. It remains challenging to identify genes controlling plant defense and characterize the functions of these genes. The *acd6-1 SUPPRESSOR 3* (SUP3) gene was identified in a large genetic screen aimed to uncover novel defense genes. SUP3 belongs to a small protein family previously shown to have anion transporter (ANTR) activities. There are six members in the SUP3 family; however, physiological functions of these members have not been well understood. We found that SUP3, previously designated as ANTR1, was a negative regulator acting in the key defense signaling pathway mediated by salicylic acid. To begin to understand functions of other members in the SUP3 family in plant defense, we used a reverse genetic approach to identify mutants for all five SUP3 homologues (designated ANTR2-5). So far we have identified mutants in four of the five *antr* genes. Preliminary data indicated that some of the ANTR mutants were compromised to the infection of *Pseudomonas syringae*. We will further assess the defense phenotypes conferred by these mutants. Our work will reveal if members of the SUP3 family regulate plant innate immunity.



**Susan Wilmes, English**  
“Lemony Snicket’s *A Series of Unfortunate Events*:  
Holocaust Undercurrents and Implications for Children’s  
Holocaust Literature”  
Faculty Mentor: Dr. Michele Osherow  
Expected Graduation Date: May 2011

Through my research, I aim to establish that Lemony Snicket’s *Series of Unfortunate Events* deserves legitimate inclusion in the genre of Holocaust literature. The series addresses a need in our culture to provide children with literature that acknowledges the world as an imperfect place, in order to prepare them to comprehend the events of the Holocaust. I intend to investigate how the pervasiveness of the Holocaust in modern culture has influenced Daniel Handler (“Lemony Snicket”), as the son of Holocaust refugees, in the writing of the series. My research will take me to the West Coast Regional Conference on Jewish Literature for Children as well as several Holocaust museums. I will investigate how the thirteen texts in the series address the core characteristics and concerns of both Holocaust and children’s literature. Furthermore, I will investigate the ways in which information about the Holocaust is presented to children and consider how the series functions in this capacity.



**Hannah Wilson**

“Investigating *Staphylococcus aureus* Biofilm Response to Biofilm Growth Enhancers and Inhibitors”

Faculty Mentor: Dr. Julia Ross

Expected Graduation Date: May 2010

*Staphylococcus aureus* infection poses a serious public health threat in both healthcare and community settings. Persistent infection results from the formation of bacterial biofilms, which allow evasion from the host immune response and antibiotic treatment. Biofilms may grow under a wide range of nutrient conditions in the vasculature; thus isolating the effect of nutrient concentration on biofilm growth will help elucidate the process of *S. aureus* biofilm formation. This study aims to quantify static biofilm formation of *Staphylococcus aureus* under various nutrient conditions. Overall, the study will analyze the effect of nutrient concentration and the addition of various chemicals purported to either enhance or prevent biofilm growth. First, I will study the effect of nutrient concentration on biofilm growth by varying the concentration of the media, tryptic soy broth. Next, I will analyze the effect of the addition of glucose, sodium metaperiodate (INaO<sub>4</sub>) and surfactants to the growth media. Glucose has been shown to enhance biofilm growth, while INaO<sub>4</sub> and surfactants have been shown to detach biofilms to their associated surfaces. By measuring the amount of biofilm growth under these various conditions, I will determine which, if any, of these conditions have a measurable effect on *S. aureus* biofilm growth. Ultimately, this understanding could lead to new therapeutic strategies for the treatment of *S. aureus* infections.



**Michelle Wilson, Visual Arts**

“Male Breast Cancer: Three Portraits”

Faculty Mentor: Ms. Calla Thompson

Expected Graduation Date: December 2009

In 2008, according to the National Cancer Institute, men accounted for one percent or 1,990 of all breast cancer cases in the United States. My research will combine documentary photographs of three male breast cancer survivors with their written narratives as a way to record the physical and psychological effects of male breast cancer. Because of the relative rarity of breast cancer in men, some men prolong discussing changes in their bodies with a physician. My research will, through photographic documentation and intimate dialogue with survivors, examine the stigma of male breast cancer, extending the current dialogue that represents it as a female disease. I will produce portraits of shirtless male breast cancer survivors post-surgery, as well as photographs of the subjects involved their daily lives. In addition to acting as a record of three men’s struggles and triumphs, the images combined with written testimonies will convey the importance of awareness and early detection as critical to long term survival.



**Naomi Wolford**, Physics  
“Freezing Point of Super Cooled Water Droplets”  
Faculty Mentor: Dr. Manfredo Tabachiks  
Expected Graduation Date: May 2011

A gas calorimeter will be constructed to measure the heat exchanges that take place as water droplets change from a liquid to a solid. The goal of constructing the gas calorimeter is to study and measure the freezing point of water droplets in supercooled atmospheric conditions in order to develop better climate models. The information obtained in this research will have applications in the study of clouds and the climate, and understanding the problem of aircraft icing. The data collected in the experiment will be compared to simulations created in a computational fluid dynamics program. The most significant result that can be obtained through this research is that the freezing point of supercooled water droplets may actually differ considerably from previously gathered data.



**Gabrielle Wyatt**, Political Science  
“Homeless Children and the Foreclosure Crisis: Implications of the McKinney-Vento Act”  
Faculty Mentor: Dr. George La Noue  
Expected Graduation Date: May 2010

The purpose of this research is to analyze how Maryland public school districts are responding to the increase of homeless children due to the rising foreclosure rate. While home foreclosure is not a foreign concept, the United States is currently in the midst of a historic foreclosure crisis. The crisis is seen in the stock market, the housing industry, and in the economy as a whole. A forgotten causality of the rising home foreclosure rate is the increasing number of homeless children in need of services. Under the McKinney-Vento Act of 1987, federal law guarantees homeless children the right to a free and appropriate public education. Historically, however, school systems have been weak in compliance, making it difficult for homeless children to access, enroll, and be successful in school. Throughout the upcoming summer and school year, I will be reviewing accommodation policies passed by local Boards of Education in Maryland, as well as interviewing key school officials in Maryland to measure how schools are responding to the increase of homeless children. The results will hopefully not only help us to gauge the effect of increasing foreclosure rates on public schools systems, but also how accommodation policies can be revised to provide homeless children access to public education.



**Rebecca Zia**, Psychology

“Maternal Depression, Parent-Child Relationships, and Child Aggression in Chinese Immigrants”

Faculty Mentor: Dr. Charissa Cheah

Expected Graduation Date: May 2010

This study will examine the role of maternal depressive symptoms on preschool children’s aggressive behaviors through mother-child relationship quality among Chinese immigrants. Specifically, my study aims to test: (1) the correlations between maternal depressive symptoms and mother-child relationship quality; (2) the association between mother-child relationship quality and preschool children’s aggression; and (3) the mediating role of mother-child relationship quality in the relation between maternal depressive symptoms and preschool children’s aggression. Approximately 70 first-generation Chinese immigrant mothers around the Maryland area will be administered questionnaires during home visits. Correlations and regression analyses will be conducted to test the association between the variable and the mediation role of parent-child relationships. The results will be presented to the scientific community in the form of manuscript publications and presentations. The results of the study will be summarized and disseminated to the participating families and organizations that serve Chinese immigrants in the form of a newsletter.