2008 – 2009
Undergraduate Research Award
Scholars and Projects

Mya Ajanku, Dance and Education
"Field Analysis and Study of Traditional Dance Forms of the Ivory Coast"
Faculty Mentor: Doug Hamby
Expected Graduation Date: Spring 2009

In 2005, an initiative was started to preserve and perpetuate the traditional dance and drum customs of the Ivory Coast. This initiative is spear headed by Nai Zou Oliver (former member of one the Ivory Coast National Ballets) and has caught the attention and interest of the Mayor of Bassam. Through an audition process, I was selected by Nai Zou Oliver, as one of 22 dancers and musicians to represent America in the Ivory Coast. In July the company will take a two-week sojourn to the Ivory Coast to study and perform with companies and villages native to the Ivory Coast. This could be an once-in-a-lifetime opportunity for me to study and to document dances that I have not previously been exposed to in 16-year study of West African dance and culture. This experience will allow me to observe and participate with indigenous cultures in their natural environment. Because some of the dances are performed only in the village, I will gain knowledge and experience that would be impossible for me to obtain in America. This experience enhance both my dance repertoire and our media library, since one of my goals is to create a short documentary that shine light on both African dance technique and the people of the Ivory Coast.

Bridget Armstrong, Psychology
"Effects of Using Head Mounted Display Helmet for Virtual Reality Distraction on Cold Pressor Pain in College Students"
Faculty Mentor: Dr. Lynnda M. Dahlquist, Department of Psychology
Expected Graduation Date: Spring 2009

Immersive Virtual Reality (VR) has gained prominence in the clinical psychology literature as a powerful distractor from procedural pain. VR offers an alternative to pharmacological treatments that may cause adverse side effects or may not be safe for use with young children. Although this new technology has been proven effective in numerous studies, it can be very expensive and thus is not routinely used in clinical settings. This study examines one aspect of VR technology that is thought to increase distraction aspect of VR and thereby enhance pain tolerance—the use of a head mounted display helmet. A sample of 75 college age students will be tested with the VR technology while experiencing cold pressor induced pain. The results from this study will be used to help determine the features of VR technology that are crucial for pain distraction.

Rachel Baker, History and Economics

"Why Denmark? The Unusual Case of a National Rescue of the Jewish Population in Nazi-Occupied Europe"
Faculty Mentor: Dr. Rebecca Boehling
Expected Graduation Date: Spring 2010

The purpose of this research project is to explore the rescue of Jews in Denmark during WWII in order to examine the unique circumstances that contributed to the success of this rescue operation. Although there were courageous individuals in other countries that were able to rescue some of Europe's imperiled Jews, the Danish Rescue Operation was the only successful national rescue attempt. I will explore and analyze the various factors that contributed to this success. These factors include Denmark's proximity to neutral Sweden, the degree to which Jews were assimilated into Danish prewar society, Danish social and political traditions, the relatively lenient Nazi German policy in Denmark, and the political climate of neighboring Sweden. I will seek to understand why such an integrated rescue operation occurred in Denmark and nowhere else. In addition, I plan to use the knowledge that I acquire from studying the Danish Rescue Operation to learn how we can encourage solidarity, empathy, and civic courage, and not divisiveness and indifference, in contemporary society in order to prevent genocide.

Joshua Barnard, Dance and Psychology
"Summer, A Dancer's Opportunity to Grow"
Faculty Mentor: Mr. Doug Hamby
Expected Graduation Date: Spring 2010

This research grant will be assisting my funding in attending a dance festival at Bates College in Lewiston, Maine. I will spend three weeks there studying modern dance, ballet, yoga, and new approaches to teaching dance as well as creating movement and new dances. The knowledge that I acquire during my intensive study will guide me to create a new dance to be performed in the Fall 2008 Dance Showcase by dancers in the UMBC dance department. This dance will not only affect the audiences that view it upon completion but it will also help me grow as an artist and give the dancers an opportunity to learn and grow as well. This dance has the opportunity to be taken to the American College Dance Festival to be critiqued and possibly be submitted to the Maryland's Choreographers Showcase. In addition, I teach at Kinetic's Dance Theatre in Columbia, MD where I can pass on this knowledge to my students.

Samantha Bier, Psychology and Interdisciplinary Studies

"Associations Among Exercise, Salivary Cortisol, and Health Outcomes in Patients with Breast Cancer: A Pilot Study"
Faculty Mentor: Dr. Lynnda Dahlquist
Expected Graduation Date: Spring 2009

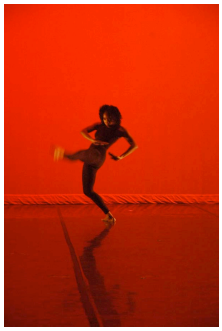
This study will investigate the biological and psychological effects of exercise in women who have a current diagnosis of breast cancer. Cortisol samples will be collected from approximately 30 breast cancer patients undergoing radiation therapy. Participants will be selected based on reported levels of physical activity. We expect to find that breast cancer patients undergoing radiation therapy who participate in regular strenuous exercise will show a healthier cortisol rhythm, a more normal daily cortisol output, and experience less psychological distress while controlling for depression compared with sedentary patients. Studying the relationships among cancer, exercise, and cortisol will fill the void in research linking these variables, and also clarify one possible mechanism by which exercise has an effect on cancer outcomes.

Erin Bounds, Ancient Studies
"Priniatilos Pyrgos: Understanding the Effects of Industrial Activities and Regional Resources on Coastal Settlements in Eastern Crete."
Faculty Mentor: Michael Lane
Expected Graduation Date: Spring 2009

The transition from the end of the palace civilizations in the LBA in Greece to what was formerly known as the "Dark Age" is finally receiving scholarly study and, in fact, the term "Dark Ages" is no longer used by specialists. An analysis of ceramics, which are by far the most ubiquitous type of artifact in the Aegean, can help to establish a chronology of this period. Through participation at the Mitrou Archaeological Project in Tragana, Greece, I will learn to analyze the pottery found via surface survey and archaeological excavation. The establishment of a chronology is essential for understanding the role of Mitrou, which is in an area that is not well known. It will also help to clarify the settlement patterns in this region, as well as connections among different regional centers.

Alexander Bush, History
"Victors' Justice?: Comparing Procedure, Evidentiary Rules, and Sentencing in Three World War II POW Crimes Trials"
Faculty Mentor: Dr. Rebecca Boehling
Expected Graduation Date: Spring 2009

The six year duration of the Second World War left many post-war challenges for the Allies, the victors in this global conflict. Not the least of these tasks was the investigation of alleged war crimes, and the apprehension and trial of suspected criminals. Most of these trials involving crimes committed against Western Allied prisoners were conducted by joint tribunals, often involving American officers in conjunction with the British, Australians, and French. However, because the global conflict involved many nations, the various investigations and subsequent trials were conducted in multiple combinations of nations as prosecutors against either the Nazis or the Japanese. In researching *Victor's Justice?*, I have selected three trials which involve different scenarios of crimes, victors, and vanquished in order to compare how the legal aspects of each trial were affected by the unique combinations in each situation. The selected trials involved the following locations: Cabanatuan Prison near Manilla, Philippines; Stalag Luft III in Żagań, Poland; and the Berga Work Camp in Thuringia, Germany on the German-Czech border. At that time, there was little international precedent regarding war crime trials. The lack of international standards resulted in great differences in procedure, evidentiary rule, and sentencing. Also, although many of the legal aspects of the trials were similar due to the shared legal traditions of the British and Americans, there were different approaches to criminal law between the prosecuting nations which affected the manner in which the proceedings were handled. I intend to research each trial separately to come to an understanding of each individual case, and use this information to write my final document which compares the three trials, to be present as noted below. My goal is to compare the legal aspects of these three trials and note their differences and similarities. In order to share my findings, I plan to present my research at URCAD, and submit a shortened version of my final research to the UMBC Review.



Angel Chinn, Dance Education
"Leaping into a New Understanding, Grounded by Historical Richness"
Faculty Mentor: Mr. Doug Hamby
Expected Graduation Date: Spring 2009

This summer I will attend the American Dance Festival in Durham, North Carolina. For six weeks, I will have the opportunity to train and be engulfed in a professional environment; surrounded by peers, artists, and international experts in dance. I will take several classes daily at the festival, focusing on ballet, modern, and in-depth body conditioning and in the afternoons I will attend repertory rehearsals. I will work with leading contemporary choreographers and experience new choreographic processes, movement, and ideas. By attending the American Dance Festival, I will grow in my artistic and professional capabilities. I am excited to connect and share ideas with fellow dancers and find inspiration in new experiences and teachings. I am hopeful that, when I return from the American Dance Festival, I will be able to better communicate movement and ideas to teach choreography to fellow dancers. I look forward to incorporating new concepts, ideas and techniques into my senior piece in the fall. As I pursue my dance career, I know that teaching will also be a part of that journey. What I learn this summer at ADF will help to sharpen my skills as a performer and a teacher. I want others to experience the joy of dance, either through watching a performance or actually dancing themselves. I anticipate that the exposure to new teachers and choreographers will help me discover new and different approaches to create dance that is universal and emotionally and aesthetically pleasing to audiences.

Theresa Columbus, Visual Art
"Performance Art and Sound Piece"
Faculty Mentor: Steve Bradley
Expected Graduation Date: Fall 2009

My goal is to expand upon my performance piece entitled "Fear and Wisdom" to include new elements of sound, movement, sets, and costumes. We will perform two shows in Baltimore, and then take the entire production to Philadelphia to participate in the Philadelphia Fringe Festival. "Fear and Wisdom" investigates why people make art, and especially what motivates them to put their story on the stage. The desire to hold on to something precious, mythologize one's personal experience, be heard as an underrepresented voice in culture, and make a live earnest connection with an audience all motivate my character, the writer of this piece. Fear of missing my backyard leads my character to write a semi-humorous lecture about embracing one's fears, recited by players who, dressed in green and blue, also represent the yard at dawn. The piece will also combine my recorded voice and sounds with the live performance, avant-garde with more traditional theatrical devices, and improvisational with more planned out elements. These contrasts do not allow the audience to simply categorize the piece, but forces them to continuously examine its structure. This addresses a dire reason to make art: to explore new ways to say what is dire.

Tim Courtney, Chemical Engineering
"Evaluation of Protein Quantitation Assays for Use with Two Dimensional Gel Electrophoresis"
Faculty Mentor: Dr. Mark R. Marten
Expected Graduation Date: Spring 2009

Two Dimensional Gel Electrophoresis (2DE) is used to separate complex mixtures of proteins for further analysis via mass spectrometry. Before a protein mixture can be separated using 2DE, it is critical to know the total protein concentration; using too much or too little protein will not yield useful information. Protein quantitation assays allow us to determine the concentration of a protein sample; however, the detergents and reducing agents necessary for 2DE interfere with common assays. A variety of specialized protein assay kits (e.g., 2D-Quant, RC-DC, and EZQ) have been developed to overcome this problem, but proteomics results from the Marten lab have shown that results depend on which assay is used, and there is no available literature comparing the efficacy of these assays. My goal is to analyze results from a variety of 2DE compatible assays and recommend the best assay in terms of accuracy, reproducibility, and ease of use. Utilizing the best assay available will benefit proteomics research in the Marten lab and in the entire proteomics community.

George Cutsail, III, Chemistry
"Copper Amyloid-beta Complex in Alzheimer's Disease"
Faculty Mentor: Dr. Veronika Szalai
Expected Graduation Date: Spring 2010

Alzheimer's disease (AD) is the seventh leading cause of death in the United States. Extracellular proteinacous plaques of the amyloid-beta (Aβ) peptide are linked to dementia in patients. Metal ions like copper (Cu) are in the Aβ plaques from AD patients, but the significance of this finding with regard to disease etiology is unknown. We aim to characterize the interaction of copper with Aβ to elucidate its role in AD. The Aβ gene has been amplified by PCR and ligated into a modified *pET-21* vector designed by Dr. Garvie (UMBC, Chemistry and Biochemistry). This vector allows for controlled expression and includes a protease site that allows for cleavage of the Aβ peptide. Expression will be evaluated using gel electrophoresis. The Cu:Aβ complex changes its size/structure over time and the effect of these changes on neurotoxicity is not known. We will determine neurotoxicity of these Cu:Aβ complexes using a rapid neurotoxicity assay developed by Dr. Good (UMBC, Biochemical Engineering). After we have identified which Cu:Aβ complex has the largest effect on neuron survival, we will determine its structure using site directed spin labeling. Correlation of neurotoxicity with Cu:Aβ structure will aid drug intervention strategies for AD.

Danielle Durbin, Music Performance
"Flute Lineage"
Faculty Mentor: Dr. Lisa Cella
Expected Graduation Date: Spring 2009

I will research the lineage descending from the two most influential flute players in American history: William Kincaid and Marcel Moyse. I will examine their teaching concepts and playing styles. I have compiled a list of several generations of flautists, descending from these two main figures. I will take private flute lessons and have interviews with many descendants from each "father". I will record every lesson and/or conversation that I have with each flautist. I will take the same three well know flute works to each lesson, in order to closely relate one style or teaching to another. I will compare/contrast these recordings to find an overall style of Kincaid's teachings versus Moyse's teaching. This detailed American flute lineage will create an insight to the styles and techniques of our forefathers.

Ejiofor Ezekwe, Biology
"Damage-Induced Proliferation of Nasal Chemosensory Cells"
Faculty Mentor: Dr. Weihong Lin
Expected Graduation Date: Spring 2009

The aim of this project is to study a relatively novel population of cells within the respiratory nasal epithelium called solitary chemosensory cells (SCCs). SCCs seem to play a role in conjunction with trigeminal never fibers in sensing adverse stimuli. In a preliminary study, we discovered that in mice with an occluded nostril, the number of SCCs increased dramatically. We hypothesized that this increase was due to the damage done to the nostril surgically, which led to increased SCC division in the respiratory epithelia. So in order to determine the effects of damage to the epithelium on cell division of SCCs, we plan to use the thymidine analog, Bromodeoxyuridine (BrdU), which can be incorporated into the DNA of dividing cells and used as a marker of cell division. In addition we will be using TRPM-5 GFP mice in which the TRPM-5 promoter drives the expression of green fluorescents protein (GFP) in SCCs allowing us to identify the cells. After euthanizing mice and obtaining and preparing the tissue we will be using immunohistochemistry and fluorescence microscopy to obtain a baseline number of cells. This data will be used in further studies to determine any changes in overall number or proliferation patterns in these cells.

Tyler Frankel, Biological Sciences
"Negative Frequency-Dependent Selection in *Xiphophorous helleri*"
Faculty mentor: Dr. Tamra Mendelson
Expected Graduation Date: Spring 2011

One of the fundamental aspects of maintaining population heterogeneity is the retention of novel or rare phenotypes in the population. One of the ways in which populations can maintain such heterogeneity is through negative frequency-dependent selection. Based on this mode of selection, females would be expected to seek out and mate with males that exhibit rare phenotypes (i.e, traits having low genetic frequency), thereby ensuring that those phenotypes remain viable within the population and, thus, maintain genetic variation for that characteristic. Indeed, negative frequency-dependent selection has been the focus of studies utilizing natural and artificial populations. The present research project is designed to investigate the validity of negative frequency-dependent selection of novel traits in the freshwater swordtail *Xiphophorous helleri* (Poeciliidae). This species is ideally suited to this study since it exhibits several distinct color morphs and utilizes an ovoviviparous reproduction strategy, which will allow for observation of courting behavior (mate selection) prior to copulation. Using green, black and brick color variations, I will attempt to verify whether *X. helleri* females will preferentially select phenotypically novel males from an otherwise homogenic population of males exhibiting the female's color phenotype.

Mike German, Chemical Engineering and Biochemistry
"Evaluating Deoxyribozymes as a Novel Antiretroviral Therapy in HIV-1"
Faculty Mentor: Dr. Daniele Fabris
Expected Graduation Date: Spring 2009

Due to the rapid emergence of strains that are resistant to one or more of the active agents used in typical multidrug regimens targeting the human immunodeficiency virus type 1 (HIV-1), it is necessary to explore the development of novel antiretroviral therapies. As such, we aim to evaluate deoxyribozymes (DZs) as possible therapeutic agents targeting specific, highly conserved domains of the 5'- untranslated region of the HIV-1 genome, such as the packaging signal (Y-RNA) and transactivation response element (TAR), which each play crucial roles during the viral life-cycle. DZs provide substantially more attractive candidates for antiviral applications as compared to their ribozyme counterparts due to their superior chemical stability, lower potential toxicity, and improved catalytic efficiency. While in principle viral infections of any kind might be treated with nucleic acid enzymes designed to cleave essential mRNAs, those viruses that carry an RNA genome, such as HIV-1, appear to be the most promising targets.

Nikoletta Gjoni, English
"Communism and Censorship: A Stunting of Albania's Literary Culture or the Birthing of a Unique National Movement?
Faculty Mentor: Dr. Raphael Falco, English Department
Expected Graduation Date: Spring 2009

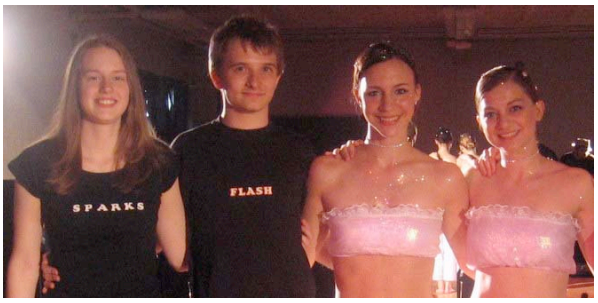
My project will focus on Albanian literature between the communist years of 1944-1991 (roughly) and to acknowledge how literature changed in terms of textual content, style, and diction due to conflicting opinions and views between the authors and the communist government in Albania; I want to further study the affects of communist censorship and how that hindered creative expression. My research will take me to Albania and I will be interviewing two prominent Albanian authors: Ismail Kadare and Dritero Agolli. In doing so, I hope to better understand the motives these two authors had in continuing to write and how creative limitations led to different and newer styles by incorporating, for example puns, personification, hidden messages, parallelisms, etc. in order to communicate with the public while hiding from the government. As an aspiring journalist, I believe this project will enable me to fully practice and advance my research, speaking, and interviewing skills.

Aurelius Graninger, Computer Engineering
"Stand-Off Chemical Detection Using Acoustic Beam Forming and Photoacoustic Sensing"
Faculty Mentor: Dr. Fow-Sen Choa
Expected Graduation Date: Spring 2009

The goal of this project is to develop a new method for standoff chemical detection by combining elements of acoustic beamforming and photoacoustic spectroscopy. By using microphone arrays, acoustic beams will be formed that will enable us to listen in to a specific point in space where a given chemical or gas may exist. Two Quantum Cascade Lasers will then be aimed such that the cross-point of their beams overlaps with the cross-point of the acoustic beams. The QCLs will then be modulated until their wavelengths match the vibrational energy of the given gas molecule. The subsequent heat that is generated from this excitation will emanate sound waves, which will be detected by the microphone array. We will use a Field Programmable Gate Array to process the acquired spectrum and identify the gas. Using this system, we can dynamically tune the lasers to determine the presence and density of a given gas, and by shifting the cross-point, we can map the density in the surrounding location.

Ana Hageage, Anthropology
"Belize Valley Archaeological Reconnaissance"
Faculty Mentor: Mrs. Esther Read
Expected Graduation Date: December 2008

There is much speculation regarding the collapse of the Maya civilization. Currently there are three theories surrounding the abandonment of large Maya cities in the southern lowlands encompassing the Cayo district of Belize. These theories include ecological disaster caused by overuse of land, economic warfare, and catastrophic changes such as drought and famine. Specifically, the Belize Valley Archaeological Reconnaissance Project (BVAR) will concentrate on the site of "Baking Pot," a capital city containing a temple palace, administrative structures, a central plaza and a ball court, located on the Upper Belize River Valley. Through the excavation and mapping of this site and subsequent analysis of lithic and human remains, as well as analysis of the hieroglyphs found on the structures themselves, I hope to find evidence to support any or all of these theories leading to the development of a hypothesis on which I can springboard future research.



Patrick Jensen Durbin Petrovic

Jacob Jensen, Una Petrovic, Kimberly Patrick, Danielle Durbin, Visual and Performing Arts
"What's Inside a Rose"
Faculty Mentor: Dr. Anna Rubin
Expected Graduation Date: Spring 2009

We will create a stimulating environment in which our artwork is presented. The instillation will incorporate mixed media art, designed to arouse each sense of the human body individually via music, sound recording, voice recording, photography, light projection, video, sculpture, and found objects. We will research Surrealist and Dada art as a basis for the construction of our project. We will present this with the purpose of creating a noticeable reaction in our audience. Our audience will be exposed to familiar objects in an unfamiliar way. We will create an installation that the audience will walk through and will be able view, touch, hear, smell, and taste. The space that we are using is the west wing stairwell of the Fine Arts Building from the third floor to the fifth floor. Our audience will be viewing photography by Una Petrovic and music by Danielle Durbin and Jacob Jensen recorded by Kim Patrick. Each landing of the stairwell will act as its own separate room targeting one of the senses. After the viewing, we will ask our audience members to fill out a questionnaire about their reaction. We are interested in the relationship between the comfortable and the unexpected and between the real and the surreal. The viewer will be completely engulfed by the abundance of random objects in each room, to create a state of confusion. The overall purpose of this collaboration is to bring a sense of uneasiness to the audience.

Sara Kibrom, Biochemistry and Molecular Biology
"Crotamine Interaction with Polysaccharides and Ternary Complex Formation"
Faculty Mentor: Dr. Richard Karpel
Expected Graduation Date: Spring 2010

Crotamine, a toxin from the venom of the South American rattlesnake, has the ability to be used as a drug delivery vehicle. Crotamine and crotamine-DNA complexes are observed to interact with actively proliferating (AP) cells. Other studies have also suggested that crotamine might have unique interaction with cell surface glycosaminoglycans (GAG) such as heparin sulphate proteoglycans (HSPGs) in order to enter cells. The binding properties of crotamine with oligosaccharides and long stranded DNA have already been determined in Dr. Karpel's laboratory. We now want to expand our investigation and show its unique specificity for cells with cell surface HSPGs. This will be done by analysing its binding properties with heparin sulphate alone and then with the formation of ternary complexes of crotamine with GAG and DNA. Studying the formation of ternary complexes will help us understand how DNA can enter AP cells with cell surface HSPGs, such as cancerous cells, via crotamine. Establishing these properties will help us in the future to produce variants of crotamine that are less toxic, and have more focused and effective activities.

Michal Levitas, Music Performance
"Learning the Essence of German Leider and Introducing it to the UMBC Community"
Faculty Mentor: Mr. David Smith
Expected Graduation Date: Spring 2010

I will focus my research on 19th century German art song and poetry. Specifically, I will investigate the history of the 19th century classical period, and the poetry to which the songs are set. The key to my research will be to perform and study as near as possible to the native roots of this art form, in a German speaking community. In the summer of 2008, I will travel to Graz, Austria to study at the American Institute of Musical Studies. This will provide me with extensive contact to prominent German and Austrian singers, coaches and conductors who are embedded in this culture and understand it intimately, I hope to discover a vast sum of knowledge on the topic and present my research to the UMBC community through a workshop for voice forums on campus.

Monica Talcott April Melton

April Melton and Monica Talcott, Social Work
"Motivation Behind Volunteering Versus Not Volunteering in the Aging Population"
Faculty Mentor: Dr. Laura Ting
Expected Graduation Date: Spring 2009

The purpose of this study is to increase our understanding of volunteerism among the aging population. Specifically, the goal and research question is to explore the motivation behind volunteering or not volunteering in the over 65 age group, as well as benefits and disincentives associated with volunteering. A qualitative study with a grounded study approach will be conducted with 40 men and women over 65 from diverse racial, ethnic, economic and educational backgrounds to explore any differences or similarities in their motivations. Data will be collected, transcribed and analyzed using Atlas.ti software. Research on understanding the motivation of volunteers and non-volunteers, including perceived benefits and disadvantages, is important as this knowledge may assist in the development of new policies that 'best promote productive aging" (Kim, Kang, Lee & Lee, 2007, p. 69) have clinical implications for practitioners working with the elderly, as well as impact agency administrators' efforts to recruit and retain volunteers.

Ian Nolen, Physics and Mathematics
"Ellipsometric Measurements of the Electro-Optic Coefficient"
Faculty Mentor: Dr. Michael Hayden
Expected Graduation Date: Spring 2009

A device will be fabricated that will be used in an experiment crucial to the non-linear optics research group here at UMBC. The aim of building the device is to enable the group with the ability to get more precise measurements of the Electro-optic (EO) coefficient, r33, of polymers used in Tera-Hertz generation. The aim of the research involved with building the device is to explore the possibility of diminishing the amount of error present in the current method. Meanwhile, a lasting understanding of EO coefficient measurement will be developed, and recorded in a user manual to aid future undergraduate research assistants in understanding the physics behind the measurement. The project was chosen in order to provide the group with a means of recording publication quality measurements of the EO coefficient. In effect, this device will save the group from trips to the labs of similar research groups to make the measurements. Upon completion of the project, the research group will have a new apparatus to teach new undergraduate researchers with and a responsible device for recording the EO coefficient with publication quality precision.

Nicholas Pinkin, Chemistry
"Synthesis of Potential Inhibitors of Thymidylate Synthase Based on Quinazoline Structural Skeleton"
Faculty Mentor: Dr. Ramachandra Hosmane
Expected Graduation Date: Spring 2010

Cancer is a group of diseases that causes about 13 percent of all deaths in the world, estimated at 7.6 million in 2007 alone. My research aims to create a set of drugs to inhibit an enzyme in the body fundamental to the out-of-control growth that cancer cells exhibit. This enzyme, Thymidylate Synthase (TS), catalyzes the conversion of Uracil Monophosphate to Thymidine Monophosphate using N^5,N^{10}-methylenetetrahydrofolate (THF) as a methyl donor. Cancerous cells need Thymidine to replicate, and therefore proliferate quickly in a TS rich environment. The compounds we propose are potential competitive inhibitor analogs of THF. Already, the necessary intermediates to the final six different THF analogs have been synthesized by condensation of commercially available carboxaldehydes and 1-ethoxy-3-methyl malonate to give **UMR-150 (a-f)** in 51 percent yield. Subsequent dehydration and decarboxylation of **UMR-150 (a-f)** with sodium ethoxide in ethanol formed the mono-ester product **NP-001** in 63 percent yield. Both compounds have been verified through the use of ^{1}H and ^{13}C nuclear magnetic resonance spectroscopy. This initial progress in synthesizing these drugs makes us confident that the final proposed analogues can be synthesized in a timely fashion. Once synthesized, we plan to carry out enzyme assays to determine their inhibitory properties.

Michael Reid, Mathematics
"Numbering Simulation of Silicon Wafer Etching Using Parallel Programming"
Faculty Mentor: Dr. Matthias Gobbert
Expected Graduation Date: December 2008

When creating new microchips for computers, part of the process involves etching holes and trenches in particular patterns onto a silicon wafer. This is done by covering the plate with a resistance stencil that outlines the trenches, then applying an etching agent that reacts with the surface. The ionized gas particles are pulled directionally downward due to an applied magnetic field. When the gas molecules interact with the surface, other molecules emanate from the surface. The problem is that these resultant molecules collide with the molecules of the etching agent. This is undesirable, as these interactions cause the etching agent molecules to go off course and reduce the efficiency of the process. To investigate this problem, I will use the power of parallel computing. The idea of parallel computing is to distribute the work load for a mathematically complex problem which might take days or weeks to solve on one computer to a large number of computers, which will solve the problem in a fraction of the time. I will be using the Mathematics department's parallel computer to perform such computations. The way I will implement parallel code is through the C++ programming language, using Message Passing Interface, or MPI.

Mary Hannah Rzasa, Dance and English Literature
"Exploring Jane Austen Through Video and Dance"
Faculty Mentor: Mr. Doug Hamby
Expected Graduation: Spring 2009

With the assistance of grant funding, I intend to create a performance piece combining filmed dance, live dance, and recorded text. The video component would be projected concurrently with intervals of live dance in a theatrical setting. This project, influenced by the letters and novels of author Jane Austen, will effectively suggest the correspondence maintained between Austen and her elder sister, Cassandra. Austen's life and works have found frequent portrayal through motion pictures and television programs, but have rarely been depicted through a predominantly dance medium. The filmed dance sequences will be shot on-location in Southampton, England, the former home of Jane Austen. I plan to work in collaboration with Elena Consoli, a current dancer, Austen enthusiast, and graduate student attending Southampton University for Film Studies. The completed project will have a running time of 5-8 minutes, and will be presented publicly on the UMBC campus. The performance piece will ultimately provide further insight into the life and humanity of Jane Austen from a personal perspective. The project in its final form will ideally pay homage to Austen and present a fresh perspective on her life and career.

Hannah Saeed, Political Science
"Stopping the Cycle of Violence in Afghanistan – The Role of a Truth Commission"
Faculty Mentor: Dr. Jeffery Davis
Expected Graduation Date: December 2008

Since 1974, Truth Commissions have been recognized, in at least twenty countries, as an instrumental apparatus for justice. Advocates and scholars agree that countries in transition from dictatorship, civil war or authoritarian regimes need to deal with the past crimes in order to establish a stable and durable democracy. Afghanistan is one such country. The events of September 11th lead to the removal of Taliban, but justice has not been brought to the perpetrators of the past three decades of crimes under three different regimes. To the contrary, their power has been legitimized through their presence in the current government. Although there have been some efforts by organizations such as Human Rights Watch, International Center for Transitional Justice and Afghanistan Independent Human Rights Commission, no tangible step has been taken in this direction. This study tends to explore whether and why a Truth Commission might be necessary for an effective transitional justice system that will lead to a stable democracy in Afghanistan.

Sasan Salimian, Biochemistry and Molecular Biology
"Characterization of *SUP8,* a suppressor of the constitutive defense mutant *acd6-1* in *Arabidopsis thaliana*"
Faculty Mentor: Dr. Hua Lu, Department of Biological Sciences
Expected Graduation Date: Spring 2009

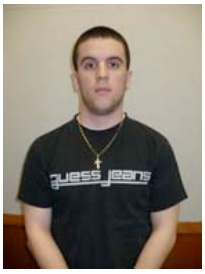
The goal of my research is to characterize the role of *SUP8,* a histone H2A gene, in defense regulation in *Arabidopsis thaliana*. Plant diseases are very deterrent to agriculture worldwide. Identification and characterization of novel defense genes will help us to design better strategies to enhance plant disease resistance. The *sup8* mutant was isolated from a large-scale mutant screen aimed at identifying novel defense related genes in *Arabidopsis*. This screen was based on the unique defense-dependent size change in a mutant called "*accelerated cell death 6-1" (acd6-1)*. *acd6-1* is a tiny plant with constitutive defense. Suppressors of *acd6-1* are larger plants associated with reduced defense. A mutation in *SUP8* suppressed *acd6-1* dwarfism, suggesting a role of *SUP8* in defense regulation. To confirm this, I will complement the *acd6-1sup8-1* plants with a correct *SUP8* to see if this causes a rescue phenotype, returning larger-sized *acd6-1sup8-1* plants to smaller *sup6-1*-like plants. I will also infect *acd6-1* plants with *SUP8* amiRNA to check for compromised defense. If so, I will further characterize how *SUP8* regulates defense responses by infecting *acd6-1sup8-1* and *acd6-1* plants with *Pseudomonas syringae* and examining bacterial growth and disease symptom development in the mutants. This work will elucidate if *SUP8*, a gene involved in chromosome remodeling, also plays a role in plant defense.

Barbara Scheffter, Music Education
"Curriculum Development for Summer Music Camp"
Faculty Mentors: Dr. Linda Dusman and Dr. Airi Yoshioka
Expected Graduation Date: Spring 2009

The goal of this project is to develop a curriculum for a week-long music camp to be held during the summer of 2009 at Mount Airy Presbyterian Church, Mount Airy, Maryland, where I currently serve as Director of Choirs. This camp will be offered to residents of Mount Airy and surrounding communities as well as to members of the church. The purpose of the camp is to teach music fundamentals in an engaging way to children ages 4-10, using melody bells, choir chimes, handbells, singing, and methods of music education recommended by the Early Childhood Music and Movement Association. For my research I will conduct a curriculum study of various music education and handbell teaching methods that are currently in use. The final product of my research will be a notebook of daily lesson plans for a week-long camp, held for three hours each day, tentatively entitled "Spectacular Summer Singing and Ringing Symposium." These lesson plans will combine the best methods my research reveals in the areas of Music and Movement music education, solfege and sight singing instruction, and bell ringing instruction.

Nirav Shelat, Biochemistry
"Structural Development of Unknown Streptococcus Pneumonia Polysaccharide through NMR Spectroscopy Analysis"
Faculty Mentor: Dr. C. Allen Bush
Expected Graduation: Spring 2010

The polysaccharide called "10F" is molecule attached to the cell surface of the bacteria *Streptococcus Pneumoniae*. This polysaccharide is one of the many serotypes for the *Strep. Pneumoniae* strain, and has a proposed structure that was published in 1979. However, research upon the polysaccharide's gene cluster suggests that this published structure maybe quite different from the actual structure. In order to confirm these new findings, two-dimensional H1 and C13 NMR spectroscopy proves to be an extremely useful tool. By extracting data through the employment of various NMR spectra such as COSY, TOCSY, NOESY and HMBC, we will determine a definite molecular structure of this polysaccharide. Ultimately, our findings may help in the creation of new vaccines or treatments against the *Streptococcus Pneumonia* strain.



Daniel Shook, Biochemistry
"Mass Spectroscopy of Crotamine"
Faculty Mentor: Dr. Richard Karpel
Expected Graduation Date: Spring 2010

This study will examine Crotamine, a snake venom protein that can carry plasmid DNA into the nucleus of a host cell. In its wild type form, Crotamine is extremely toxic. The goal of this study is to utilize Mass Spectrometry techniques to discover the specific amino acid residues that bind to DNA. Mass Spectrometry data of isolated Crotamine as well as Crotamine-DNA complexes will be observed using a Top Down method that will allow the protein to be broken up at a variety of locations. This information will give a better understanding of which lysines in the protein bind to DNA. In the future, this data could allow nontoxic variations of Crotamine to be created that retain the DNA binding properties.

Marcus Simmons, Music
"Techniques for Developing and Enhancing Vocal Spontaneity and Musical Expression"
Faculty Mentor: Dr. David Smith
Expected Graduation Date: Spring 2011

The goal of this study is to learn techniques that will enhance vocal spontaneity and musicality in while singing. The focus of this study will be on learning a singing technique that will allow for vocal freedom, spontaneity, and musicality while utilizing the proper vocal techniques. As a winner in the Marietta Piccolomini International Vocal Competition I have received an outstanding opportunity to go Italy for this summer from mid July to August to perform a new operatic production of Romeo and Juliet. This study will further hone my skills in music and, more importantly, in the Italian language. During the four to six weeks in Italy, I will receive coaching from native speaking Italians and members of one of the best

opera houses in the world, Teatro alla Scala. With this knowledge as a base, my studies at UMBC will be immensely more productive.

Samantha Watts, Social Work
"Examining the Barriers and Facilitators to Breastfeed in the Workplace: Impact of Women in Low Income Occupations"
Faculty Mentor: Dr. Tiffany Baffour
Expected Graduation Date: Spring 2009

Previous research has shown that breast feeding children during infancy confers significant health and economic benefits to mothers, employers and the wider society in general. The proposed study will examine the barriers and facilitators that women experience to breastfeeding in the workplace. Qualitative interviews will be collected from seven mothers who have breastfed while working in low wage administrative or service jobs in the Baltimore area. A content analysis will be conducted to ascertain key themes from the transcribed interview data. Information gathered by this research has potential implications for improving public health policy by providing the basis for the development and implementation of more effective breast feeding promotions and social support interventions. Moreover, since low income and single mothers typically have little choice about returning to work immediately after giving birth, the benefits realized by this study will directly target those most impacted by health disparities and support health equity for this vulnerable and underserved segment of the population.