The Second Annual Student Research Symposium at Montclair State University

May 3, 2008

Presented by

MSU Chapter of Sigma XI

College of Science and Mathematics

and

College of Humanities and Social Science

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MESSAGE FROM THE DEANS

Original scholarship as part of an educational program is among the most essential components of academia. Studies have shown that students who seek new knowledge through active research attain a deeper level of understanding of their subject. To that end, the College of Science and Mathematics and the College of Humanities and Social Sciences at Montclair State University are proud to present the original work of their students at this, our Second Annual Student Research Symposium, an event that showcases the diligence, excitement, importance and excellence of our student scholarship.

Students pursuing research, often mentored by our outstanding faculty, forms the foundation of this event. We would be remiss if we didn't congratulate the many students who have chosen to pursue this extra effort along the sometimes unpredictable path of original research. Research cannot be conducted in a vacuum and more and more it is teams of scholars from different disciplines who seek answers to questions that have not before been asked. Our faculty act as mentors and guides and bring their enthusiasm, knowledge, insight and energy to our students. The "discovery" component of education can be a hallmark moment in the years spent in college. We know the research efforts of our students stand as an outstanding source of pride for our faculty. Today we will see posters and hear presentations that represent our students' scholarly work to date. We offer sincere congratulations to all student participants and faculty sponsors for a job very well done.

Many faculty, staff and students in both colleges have contributed to the success of this impressive event but special notes of appreciation go to Diana Thomas, Jinan Jaber, Barbara Feldman, and Milos Topic. Thank you also to all of the faculty members who acted as mentors to our students and to all those not mentioned here but who worked tirelessly behind the scenes to make this occasion one of the year's most important events.

Robert Prezant, Dean
College of Science and Mathematics

Claire Taub, Interim Dean
College of Humanities and Social Sciences

SCHEDULE

Opening Remarks: 8:45 AM – 9:00 AM

Poster Sessions: 9:00 AM – 12 :15PM

Oral Presentations: 9:00AM-12:15PM

Closing Remarks: 12:15 PM-12:30PM

ORAL PRESENTATIONS

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11:30-11:45 Justin Kulick
T-CSAM-03 : Geochemistry of the Canada Hill Granite and Relations to Post-Ottawan Deformation

11:45–12:00 Jonathan Marra
T-CSAM-04 Integrating Genomics Research in a Classroom Environment

12:00-12:15 Christine Pettus
T-CHSS-04: Transforming the Identity: Zoraida in the Captive's Tales

Session II 9:00AM-12:00PM UN-3006
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T-CSAM-06: The Optimal Placement of Range Lights

9:30–9:45 Shari Genser
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9:45–10:00 Ashley Ciesla
T-CSAM-07: The Impact of Student Eating Habits on Weight

10:00-11:15 Poster Session UN Lounge

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T-CHSS-06: The Creation-Evolution Controversy: A Division of Beliefs

11:30-11:45 Heavy Mineral Analysis of Offshore Sediment Cores; East Antarctica
T-CSAM-08: Dan Hauptvogel

11:45-12:00 Katarzyna Duda
T-CHSS-07: Forum Non Conveniens as a Means of Dismissing U.S. Jurisdiction in Claims Arising Under International Law

12:00-12:15 Klodiana Malellari
T-CHSS-08 Electoral College and its future

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T-CSAM-09: Stratigraphy and Geochemistry of *Squantum Tillite*; Boston Bay Group: Using Field Log and ICP Analysis

9:15-9:30 Ronak Patel
T-CSAM-10: Optimization of expression of Sunflower Acetoacetyl CoA Thiolase

9:30-9:45 Vanessa Espinosa
T-CSAM-05: Phylogenetic analysis of internal transcribed spacer 1 and 2 sequences among the

rare frog *Rana Cascadae:* Implications for cryptic speciation and conservation

9:45-10:00 Marynn Poku
T-CSAM-11 Downstream effects of RET activation

10:00-11:15 Poster Session UN Lounge

11:15-11:30 Kristina Mirro
T-CHSS-10: Absolutely "Radical" Pornography

11:30-11:45 Cathleen Dale
T-CSAM-12 Igneous petrology; geochemistry; and geochronology of Late Pegmatite Sheets in Hudson Highlands; NY

12:00-12:15 Libertad Urena
T-CSAM-13: Urbanization and Environment; Stickleyville

Session IV 9:00AM-12:00PM UN-2026
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T-CSAM-15: A Computational Study of the Steric Contributions to the Conformational Energy

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11:30-11:45 Medha Persaud
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11:45-12:00 Deborah Katchen
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Abstracts of Talks

T-CHSS-01: Sexual Differentiation Underlying Philosophical Underpinnings

Presenter: Marisa Markowitz; Advisor: Dorothy Rogers

"Philosophy"; literally translated as lover of wisdom; typifies the study of precise and analytical examination of issues pertaining to the human condition; experience;and moral development; an endeavor that which aims to unearth the truths and falsities of daily existence in order to discover a deeper meaning than originally expected. Unfortunately; philosophy as a discourse has been primarily a male-domain; and this research project examines the pervasive imagery of women as "passive" in reproduction and in the private realm; whereas men are "active" during reproduction and in public sphere. Aristotle and Hegel develop this distinction within their works; and a feminist investigation; using the works of Simone de Beauvoir and other feminist philosophers; reveals a strong male bias that perhaps discouraged women from contributing to philosophy. Understanding that female philosophers did exist since the time of Aristotle and were relatively silent reflects the conclusion that male philosophers; and in general patriarchal society; had a strong influence in determining and underestimating women's roles in society and specifically in philosophical cannon.

TCHSS-02 : Edible Skylines

Presenter: Dawn Diamond; Advisor: Elaine Gerber

Current and plentiful scientific studies tell us that food is our best medicine and that locally-grown organic is our best food source. Food cooperatives and urban sustenance gardens; both at the street level and at the rooftop level; have the potential to provide a portion of these foods. At the same time the gardens have the added benefit of reducing the temperature of cities and suburban surroundings; a counter effect on global warming and the rising costs of operating HVAC systems. The principle objective of this individual paper is to explore the feasibility for corporations and property owners in the City of Newark; New Jersey to philosophically; socially; and financially support the development of food cooperatives and local sustenance gardens. The short term goal is to create a research design that is replicable for use in other mid-size cities on the feasibility of urban rooftop gardens as viable healthy food channels. The long term goal; based on the results of research; may be to establish these channels for local organic produce supply to Newark residents at an affordable price or exchange.

This article sketches the backdrop of health care; food security; and economy in the United States and specifically the State of New Jersey; as well as a brief history and current political/socioeconomic picture for the City of Newark. It highlights the expanse of research available on the topics of urban gardening and green roofs and the potential to carry this research over into the feasibility of roof top sustenance gardens or "green" roofs yielding vegetables and herbs.

T-CHSS-03 Supreme Court Policy known as Contextual Reasoning and the Implications behind it

Presenter: Eric Roguski; Advisor: Marilyn Tayler

It is hypothesized that the Supreme Court policy known as contextual reasoning accommodates the demands of groups who wish to see greater incorporation of mainstream Christian religion into government at the expense of the successful integration of differently affiliated American citizens into society. This paper examines contextual reasoning through three disciplines; religious history; law; and social history. An interdisciplinary analysis is required to understand this policy fully in order to assess the meaning of the policy and its beneficial and adverse effects on particular groups in our society. This research draws upon mostly primary legal sources including case such as Lynch v. Donnelly; Schundler v. ACLU; Mellen v. Bunting; and Robinson v. City of Edmond. This research also relies upon historical sources to gauge the effects on people and on religions after each policy-affecting decision in order to address how groups were benefited or affected adversely. The research findings illustrate that there exists substantial evidence that; at its heart; contextual reasoning accommodates directly the demands of groups who hope to see an incorporation of mainstream Christianity with the government at the expense of the demands of other groups who disagree ideologically. The research concludes that contextual reasoning may be a policy used by groups who desire incorporation of certain tenets of religion within government to the detriment of diverse citizens.

T-CHSS-04: Transforming the Identity: Zoraida in the Captive's Tales

Presenter: Christine Pettus; Advisor: Linda Gould Levine

The focus of my investigation is taken from the episode called the "Captive's Tale" in the first part of *Don Quijote* by Miguel Cervantes. Through close reading of the text, researching contemporary literary criticism, and the study of Spanish history, I examine in depth the character of Zoraida. Zoraida is a Moorish woman who has converted to Christianity and come to Spain. She arrives and travels through Spain dressed in distinctly Moorish garb without the ability to speak Spanish. The timing of her arrival is after centuries of tensions and violence between Moors and Christians and about a decade before the Moors are forcibly expelled from Spain. I show how the recently freed Spanish captive that accompanies her successfully transforms the identity of the Moorish woman so that she can be accepted by the fictional audience at the inn where she has arrived. There is

a great emphasis in Cervantes's *Don Quijote* on the transformation of the identity. But while Don Quijote's attempts to transform himself lead only to insults, violence, and ultimately to his downfall, Cervantes opens a space of acceptance for Zoraida through the captive's narrative. My investigation also examines the possible motives for Cervantes' choice to award acceptance to this character.

T-CHSS-05: Ethical Implications of Legal Prohibition on Organ Purchase

Presenter: Shari Genser; Advisor: Marilyn Tayler

This research examines the current United States organ procurement system and tests the hypothesis that the creation of a legal system for the sale of body organs would allow for a medically ethical environment concerning organ transplants. The legal prohibition on organ purchases requires analysis through the interdisciplinary foci of medical ethics and the law because neither discipline alone can fully address this issue. The contrasting application of the legal and ethical principles of human well being; personal autonomy and equality is examined in this interdisciplinary analysis. This research presents and explores the National Organ Transplantation Act; which explicitly prohibits the purchase of organs. A model for a legalized system for the sale of body organs is presented in order to demonstrate the feasibility of legal; ethical organ purchases. Since current legislation prohibits organ purchases; the appropriate path to pursue is nationwide education on transplantation and the critical shortage of transplantable organs. Financial incentives for organ donation will not be accepted by the moral majority until they are educated about the shortcomings of our current altruistic system. This research concludes that the legalized trade of body organs would help to solve the national organ shortage.

T-CHSS-06: The Creation-Evolution Controversy: A Division of Beliefs

Presenter: Nicholas Raspanti; Advisor: Marilyn Tayler

The hypothesis of this research project is to prove that the creation-evolution controversy is a reoccurring issue regarding the separation of church and state in public education. It is necessary to use an interdisciplinary research approach to examine the literature and knowledge derived from the creation-evolution controversy. This project draws upon historical sources including the Bible and Charles Darwin's Origin of Species. It also uses case law such as the Tennessee Supreme Court's Scopes v. State of Tenn.; and the United State Supreme Court cases of Edwards v. Aguillard and Lemon v. Kurtzman. The research project traces the controversy from its beginning in 1925 up to the present day. The evidence suggests that it may be an endless conflict that changes and modifies to each specific issue and period of history. Both evolutionary biology and Christianity's creation story attempt to answer questions of existence and the origins of life on Earth. In that process; they try to attain those answers through different methods. The reasoning and decisions of corresponding cases are consulted to demonstrate that the underlying goal of adjudication is in the best interest of public education. It can be concluded that both sides of the creation-evolution controversy are in disagreement over a simple question of validity. The American legal system attempts answer that question through the adjudication process. History has shown that the range and variety of the creation-evolution controversy puts Constitutional authority; political integrity; and the efficiency of the legal system to the test.

T-CHSS-07: Forum Non Conveniens as a Means of Dismissing U.S. Jurisdiction in Claims Arising Under International Law

Presenter: Katarzyna Duda; Advisor: Marilyn Tayler

This paper aims at proving that the federal courts of the United States have of ten employed theories such as forum non conveniens to disallow United States jurisdiction in claims arising under international law. No single discipline could possibly be employed to explain this issue; therefore an interdisciplinary approach is necessary. The disciplines that are employed in this paper are inter national law; history and political science. The paper intends to show interrelations among the disciplines as well as examine how and in what circumstances the doctrine of forum non conveniens is applied. The main areas of interest are concentrated around the Alien Tort Claims Act which allows foreigners to bring suits for tort in the United States. Other research areas include the doctrine of forum non conveniens; jus cogens norms and universal jurisdiction. It can be concluded that in the lawsuits brought under ATCA; the United States federal courts most often employ the doctrine of forum non conveniens to dismiss the cases arising under international law.

T-CHSS-08: Electoral College and its future

Presenter: Klodiana Malellari; Advisor: Marilyn Tayler

This research is focused on the fairness and adequacy of the Electoral College in the presidential election; to demonstrate the effectiveness of the system as the national voting system and the current debate that is taking place over the future of the system. This cannot be done by only one discipline; but a closer view into the history; the political science and law is used to give the reader a better understanding of the topic. This is done by analyzing the formation of the system; the historical move-

ments; the process of the election; and the independence of the executive branch through the examination of the problems and the consequences of the 2000 presidential election. The research highlights the importance of the Electoral College in the past during the presidential elections and the present based on the touchstone case; Bush v. Gore. In the 200-year history; there have been a number of critics and proposed reforms to the Electoral College system; most of them trying to eliminate it. The paper does not take sides however; there are also defenders of the Electoral College who offer very powerful arguments in its favor.

TCHSS-09 Chewing the Fat: A Laboratory Analysis of the Fat Content of Food

Presenter: Edgar Briceno-Pinar; Advisor: Charles Feldman; Co-author: Zaira Ahmad

Schools served as an integral part of the community environment exert great influence on the dietary activities of children. The actual amount of fat in foods served in these institutions could directly contribute to overall health status of young students. We proposed that the amount of fat varies from the actual fat reported to the USDA. Middle schools were chosen because the children are at a critical age for the development of dietary behaviors. It has been found that when students transition to middle school; they often gain access to unhealthy food choices in the cafeteria at lunchtime.Thirteen samples were collected. The samples used for analysis correspond to the portion size served to children at lunch time. Samples were stored at -80 C. To determine the total fat content each sample was weighted and only a portion was analyzed. The fat content in the samples were done by extracting using Methanol: Chloroform: Water (2:2:1.8; V/V). Two homogenizations and one centrifugation were performed to obtain a layer of Chloroform. . The chloroform was removed using a rotary evaporator and the rest of the Chloroform was finally removed with high pressure vacuuming. Total lipids present in the samples were determined gravimetrically. The preliminary findings showed variance in the total amount presented in the samples served in schools compared to the reported by the school cafeterias.

T-CHSS-10: Absolutely "Radical" Pornography

Presenter: Kristina Mirro; Advisor: Dorothy Rogers

This research looks at the possibility of what a feminist in office would look at an issue such as pornography. This research draws upon a recent case of a taping of a raped young girl and how the pornography industry might have something to do with it. Most prior research on pornography and its effects really does not take a feminist position or look at a possible choice of action to a female or feminist President or policy maker. This focus takes one that exact role to determine if having a feminist prospective on this issue with have a different result. This case example shows how pornography is not only everywhere we look today; but truly how much it is impacting our lives.

T-CHSS-11 : Opium Production as a Non-Traditional Security Issue

Presenter: Steven Galante; Advisor: Elizabeth Wishnick

According to the United Nations Office of Drugs and Crime (UNODC); the opium situation in the southern provinces of Afghanistan is "out of control." In 2006 alone; opium production in Afghanistan increased over 162 percent. My paper will analyze opium production in Afghanistan with respect to its role as a non-traditional security issue and its effects in Afghanistan and abroad. I will discuss the decentralized method of opium production and its contributions to security issues; both regional and worldwide. Opium production negatively affect the health; stability and humans securty of the Afghan state as well as contributes to criminal elements in other countries; and terrorist cells worldwide. In 2007; Afghan opium accounts for 93 percent of the opiates available on the world market. The export value is around $4 billion dollars which is distributed among the opium farmers; corrupt political figures; regional warlords; terrorists and drug traffickers. There have been crop eradication efforts by the Afghan government and coalition forces present in Afghanistan; but opium production has doubled in just two years. This shows that eradication efforts have proven ineffective. In my paper; I will be drawing from sources such as the United Nations Office of Drugs and Crime; books written by those who witnessed opium production and trade first hand; and news articles and academic journals chronicling different aspects of Afghan opium production.

T-CHSS-12: Rebuilding after Hurricane Katrina

Jessica Taylor

The most important aspect of the effort in rebuilding lies in speaking with the people who have lost their homes, loved ones, neighbors, and communities. It is through speaking with these people that one begins to understand the tragedy that has and is occurring in post-Katrina New Orleans. As a student of anthropology, the most significant problem that New Orleans is facing is apparent to me; gentrification. This city's residents have always faced issues of class and race, but when Hurricane Katrina unleashed its fury on this coastal region these issues exploded. Extreme poverty and discrimination blanket the city. Through speaking with American Friends Service Committee, Dr. Beverly Wright of The Deep South Center of Environmental Justice,

and author Billy Sothern it became exceedingly clear that gentrification was occurring rapidly and without mercy. During, and immediately after the storm, prisoners and the elderly were left to die, and poor African-American communities have been ignored and neglected. Whole communities are gone and lives are destroyed, with no plan of rebuilding their devastated neighborhoods and cultural networks. The mayor of New Orleans, the governor of Louisiana, and our federal government are severely neglecting the rights of these Americans.

T-CSAM-01: Tracing Certain n - Dimensional Space Points

Presenter: Michael Wilson; Advisor: Aihua Li

Given a timely ordered set of n-dimensional space points P1, P2…Pm+1how do we use a mathematical function f to trace the points so that f(P_1)=P_2;f(P_2)=P_3;..f(P_m)=P_{m+1}? If we treat this set of points as a time series; then the tracing function is a model of it. Thus finding such a tracing function is a time series modeling problem. In this paper; we study methods to construct linear tracing functions (linear models) for certain special types of space point sets; called `{\it Jordan-like}' point sets. A characteristic of this type of sets is that the matrix (called the associate matrix) made by the first $m$ points; has the `Jordan-like' column-echelon form. We use linear algebra techniques to investigate conditions on the existence of homogeneous linear models for such point sets and to develop methods of constructing homogeneous linear models when they exist. In addition; when a homogeneous linear model is applied to the time points repeatedly; a Jordan-like time series will be extended to a sequence which has a period point. Periodic behavior of such extended sequences is discussed. The last section of the paper invest tigates the case when the associate matrix is of full rank. A different method; called random selection method; is provided to construct a homogeneous linear model that favors a particular set of variables.

T-CSAM-02: Chutes and Ladders for those with a Short Attention Span or The Effect of Spinner Size on the Length of Chutes and Ladders

Presenter: Leslie Cheteyan; Advisor: Michael A. Jones; Co-authors: Michael A. Jones and Stewart Hengeveld

I will review the rules and game board for Chutes and Ladders; define a Markov chain to model the game with any spinner size; and describe how properties of Markov chains are used to determine that the optimal spinner size of 15 minimizes the expected number of turns for a player to complete the game. Because the Markov chain consists of 101 states; we demonstrate the analysis with a 10-state variation with a single chute and a single ladder. The resulting 10 x 10 transition matrix is easier to display and the manipulations are comparable.

T-CSAM-03: Geochemistry of the Canada Hill Granite and Relations to Post-Ottawan Deformation

Presenter: Justin Kulick; Advisor: Matthew Gorring; Co-author: Christopher Cicerale

The Hudson Highlands; the New Jersey Highlands; and rock bodies extending into eastern Pennsylvania are collectively part of the Reading Prong. The Reading Prong has been regionally deformed from Grenvillian metamorphism and only minorly reactivated in Mesoproterozoic shear zones due to late-Paleozoic compression (Gorring et al.; 2003). The Middle-Proterozoic rocks of the Hudson Highlands consist of meta-volcanic; meta-sedimentary; upper amphibolite to lower granulite facies metamorphism; and intrusive rock groups (Aleinikoff and Grauch; 1990). Rocks within the Highlands have been divided into pre-Ottawan and post-Ottawan groups; respectively. The Canada Hill Granite is a Middle Proterzoic rock with a U-Pb zircon age of 1010 ± 6 Ma (Aleinikoff and Grauch; 1990). It is hypothesized that the Granite is a melt product of local migmatites that were metamorphosed and emplaced during a locally high-grade deformation event. The Canada Hill Granite occurs in the cores of late folds comprising three small plutons as several 5-10 m sheets and lenses within migmatitic metapelitic gneisses. Initial geochemistry by Helenek and Mose (1984) indicated that the granite is a S-type granite with a high initial 87Sr/86Sr (0.7186). Recent geochemical studies have found that the rocks dubbed as “Canada Hill Granite” are geochemically diverse. Differing geochemistry is due to heterogeneous melt and extraction processes between granitic lenses and migmatitic metapelites. The Canada Hill Granite and thus the migmatites are interpreted to have formed by late dextral shearing from late to post-Ottawan deformation and related tectonic escape.

T-CSAM-04: Integrating Genomics Research in a Classroom Environment

Presenter: Jonathan Marra; Advisor: Chunguang (Charles) Du; Co-author: Chunguang (Charles) Du

In an effort to promote the education of genomics; the Genomics Education Partnership; sponsored by the Howard Hughes Medical Institute; has implemented a program for undergraduate institutions; including Montclair State University to; combine a learning environment with real genomics research experience. The overall objectives are to integrate a research project that involves stdents enrolled in MSU's Genomics class; teach students the critical techniques of genomics while allowing them to

understand the importance of basic research; and allow students to gain a better understanding of DNA sequence annotation; alignment; and comparison analysis. This research deals with raw sequence data from the dot Chromosome of Drosophila virilis; erecta and mojavensis generated by the Genome Sequencing Center of Washington University in St. Louis. By utilizing already existing comparative genomic techniques along with D. melanogaster as a model organism; we address the issue of finishing and assembling a portion of the D. virilis; erecta; and mojavensis dot chromosome incorporated in a fosmid cloning vector. Currently; we have assisted in assembling over 12 Drosophila fosmid sequences. Our goal is to discern sequence domains; repeating segments; as well as other gene characteristics that can assist us in analyzing this chromosome further.

T-CSAM-05: Phylogenetic Analysis Of Internal Transcribed Spacer 1 And 2 Sequences Among The Rare Frog Rana Cascadae; Implications For Cryptic Speciation And Conservation

Presenter: Vanessa Espinosa; Advisor: Kirsten Monsen

Rana cascadae is a member of a species complex of frogs endemic to the Pacific Northwest of the United States. Over the last 25 years R. cascadae has experienced population declines throughout its range. We have recently shown this species is composed of three unique genetic groups whose mitochondrial DNA is as divergent as well-described species suggesting they may represent unique cryptic species. In order to assess nuclear DNA divergence among these R. cascadae groups relative to other well-described species we designed PCR primers to amplify the Internal Transcribed Spacer regions 1 and 2 from individuals in each R. cascadae genetic group as well as five closely related ranid frog species from the same species complex (Rana *aurora aurora; R. aurora draytoni; R. pretiosa; R. luteiventris; R. muscosa*) and one out group species *(R. catesbeiana*). We sequenced the PCR product of the ITS 1 and 2 regions and analyzed the data using sequence networks in order determine if the *R. cascadae* groups are as divergent as well-described species for these nuclear markers. We discuss *R. cascadae*'s status as a group of genetically distinct cryptic species and discuss the implications for conservation of this unique group of frogs.

T-CSAM-06: The Optimal Placement of Range Lights

Presenter: Rabab Abi-Hanna; Co-authors Michael A. Jones and Kenneth Krott; Advisor: Michael A. Jones

Range lights are pairs of lighthouses on bays, rivers and other waterways that guide boats safely along a linear path, called the *range line*. To keep a boat in a channel bounded by curves $y = f(x)$ and $y = f(x) + h$, optimally long range lines are secant and/or tangent lines to the two curves. Their placement depends on concavity and applies the Mean Value Theorem.

T-CSAM-07 : The Impact of Student Eating Habits on Weight

Presenter: Ashley Ciesla; Advisor: Diana Thomas; Co-author: Diana Thomas

In this study we examine the effects of commuter eating habits on student weight at Montclair State University under the hypothesis that class and work schedules along with limited access to healthy food can lead to infrequent and large meals. Studies have shown that infrequent heavy meals can lower basal metabolic rate tipping the energy-balance equation. In order to determine whether Montclair students eat infrequent large meals we designed a survey to investigate the eating habits of students on campus and their resulting impact on basal metabolic rate and weight. In addition; we simulate a mathematical model to predict the five year effect of a lower basal metabolic rate on weight gain.

T-CSAM-08 : Heavy Mineral Analysis of Offshore Sediment Cores; East Antarctica

Presenter: Dan Hauptvogel; Advisor: Sandra Passchier

The Ocean Drilling Program (ODP) has made efforts to drill several cores from the Prydz Bay area of East Antarctica; located south of the Indian Ocean. It is there that sediment has been deposited; after erosion by the Lambert Glacier; of high grade metamorphic rocks; mafic dikes; felsic igneous intrusions; and siliciclastic sedimentary rocks with coal measures. The core samples were taken from sites 1166 and 1167 for heavy mineral analysis of the fine sand fraction. The portions of the cores that were chosen for analysis had the greatest amount of sand. After heavy liquid separation the heavy mineral fraction was put onto microscope slides for mineral analysis. Optical analysis indicated an abundant amount of garnet and hornblende as well as small amounts of stilpnomelane; tourmaline; augite; silimanite; hypersthene and other pyroxenes and amphiboles. Preliminary SEM/EDX imaging and chemical results show well formed garnet; tourmaline; rutile; crystals. Differences in mineral composition between Pliocene and Pleistocene samples suggest that there was a change in ice flow. Continuing work includes further SEM chemical analysis and complete count/identification of grain mounts.

T-CSAM-09: Stratigraphy and Geochemistry of Squantum Tillite; Boston Bay Group: Using Field Log and ICP Analysis
Presenter: Efe Erukanure; Advisor: Sandra Passchier
The purpose of this study is to ascertain the depositional history of the Squantum Tillite. The Squantum Tillite; which is part of the Neoproterozoic Boston Bay Group; is located in the Boston Basin; and for over a century researchers have come up with contradicting hypotheses about the origin of the rocks in the area. While some believe that the rocks were deposited by glaciers along a prograding submarine margin; others believe the rocks here are of volcanic or tectonic origin. The Boston basin; as records show; is a tectonic basin; as a result many scientists are inclined to believe the rocks here are of tectonic origin. This study involved carrying out field logging so as to find out the characteristic sedimentary facies in the area. A total of 30 samples were collected in situ from the outcrops. Chemical analysis were used to deduce the degree of chemical weathering in this Neoproterozoic sequence using major element ratios; such as the chemical index of alteration (CIA). Rock samples and 12 USGS rock standards were analyzed for major and trace elements via Inductively-coupled Optical Emission Spectrometry (ICP-OES). The data obtained from the ICP-OES spectrometer were further interpreted and results compared with field data from similar research along the Polar Regions and in other locations; such as the late Precambrian Gaskiers Formation in Newfoundland; Canada. Field and laboratory results are further used to draw conclusions on the actual mode of deposition of the Squantum Tillite; Boston Bay Group.

T-CSAM-10: Optimization of expression of Sunflower Acetoacetyl CoA Thiolase
Presenter: Ronak Patel; Advisor: Jim Dyer; Co-author: Anthony Maina
Two separate thiolase activities have been isolated from the glyoxysomal fraction of sunflower (*Helianthus annuus* L.) cotyledons. Thiolase I shows activity only toward short chain acetoacetyl CoA; while thiolase II exhibits activity toward both short and long-chain acetoacetyl CoA and 3-oxoacyl CoAs. The purpose of this research was to optimize the expression of an enzymatically active thiolase I; acetoacetyl CoA thiolase (AACT). The full-length AACT was cloned into the pET100/D-TOPO bacterial expression vector. Soluble active protein was obtained from these cultures; and the active enzyme was purified in one step using Ni-NTA agarose affinity chromatography. The protein was detected in Western blots using the V5 epitope and was shown to be catalytically active when using acetoacetyl-CoA as substrate.

T-CSAM-11: Downstream effects of RET activation
Presenter: Marynn Poku; Advisor: Quinn Vega; Co-authors: Christian Burr; Eliana Vera-Merino and Shani Maslovski
RET is a mammalian receptor tyrosine kinase which is essential for kidney and nervous system development. It is normally activated after association with a protein co-receptor GFR-a (1-4) and its corresponding ligand (GDNF; Neurturin; Artemin or Persephin). RET mutations are associated with both cancer (MEN2A; MEN2B and FMTC) and developmental abnormalities (Hirschsprung's Disease). Under normal conditions; RET exists as two major isoforms (RET9 and RET51) which different amino acids at the end of the protein. In order to analyze how the cell responds to RET activation; isoform expression and downstream transcription were measured in RET expressing cells. QPCR was used to measure the production of the two major isoforms of RET- RET9 and RET51. In these experiments; RET 9 levels increased four-fold in comparison to RET 51. With respect to signaling; downstream luciferase promoter assays demonstrated that wild type RET had increased transcription compared to phosphotyrosine mutants and kinase inactive RET. Future experiments will verify these changes and examine the effect of both specific tyrosines and naturally occurring mutations on RET signaling.

T-CSAM-12: Igneous petrology; geochemistry; and geochronology of Late Pegmatite Sheets in Hudson Highlands, NY
Presenter: Cathleen Dale; Advisor: Matthew Gorring; Co-authors: Cathleen Dale, Rich Derkacs and Jared Slusarczyk
The Hudson Highlands province represents a region of intense magmatic activity resulting in metamorphic and igneous rocks dating back to the Middle Proterozoic. As a result of the complex geology; much of the region's geologic history remains unclear (USGS; 2003). The Ottawan Orogeny signifies a major high-grade metamorphic event; which essentially reset the radiogenic clock in older rocks of the Highlands to the Mid- to Late-Proterozoic. The Late Pegmatite Sterling Forest Granite Sheets of the Hudson Highlands; specifically; have had few studies conducted on them. These intrusive sheets are regionally important because they do not display a metamorphic fabric; indicating that they are younger than the surrounding metamorphic rocks. Samples of the granite sheets were collected and analyzed using an inductively coupled plasma optical emissions spectrum (ICP-OES) and inductively coupled plasma mass spectrometer (ICP-MS). These methods enabled us to determine bulk chemistry; trace element chemistry and rare earth elements contained within the rock suite. However; research determining the exact age of these rocks has not been conducted. Therefore; we have targeted samples from the pink granite pegmatite sheets in Sterling Forest; NY. The outcome of this project would formulate a timeline of tectonic activity for the area and determine the magmatic event(s) that caused the late pegmatite granite sheets.

T-CSAM-13: Stickleyville

Presenter: Libertad Urena; Advisor: Greg Pope

Libertad Urena EUGS 331: Urbanization and Environment Dr. Pope 3 April 2008 Abstract Industries and Utilities in Stickleyville Stickleyville is the new city of a circular perimeter five mile distance from the center of Morris County. The city is used for the industries and utilities. They will be included to support Stickleyville. They will include nuclear power plants; electric based; energy based; geothermal; and many more. Several environmental factors will support several types of industries while other factors; including geological factors support industries like nuclear power plants and geothermal industries. The locations of industries and utilities will be demonstration on a map. The purpose of the project is to present the industries and utilities. The land use will be used for the contemplation of all environmental parameters; which include climatology/ meteorology; hydrology; geology; soils; and ecology. This land use/urban activity also will demonstrate its positive; negative; environmental influences of industry/utility land use on the city. The design on Stickleyville will consist of many things. The first part of the design will have a demonstration of the locations for each industry and utility. The locations of the industries and utilities will not overlap the other land uses. Each one will have its own purpose. They will also have their causes of climate change; soil changes and their needs for water economics and ecosystem factors in their area. The next part of the design will have transportation with roads; mass transit; and many more in the city. Stickleyville will also consider the industries and utilities that cause hazards and numerous amount of pollution. Many of the information on the industries and utilities should be found in many sources. These sources would include informative facts about Morris County and satellite pictures of where Stickleyville is centered. Some internet sites that will be used to find what kinds of industries will include geologic; climatic; and erosion effects. The internet sites will include search engines; such as Google and the library database.

T-CSAM-14: An Evaluation of the Effects of Method, Basis Set, and Software Package on the Consistency and Efficiency of Geometry Optimization and Determination of Conformational Energy

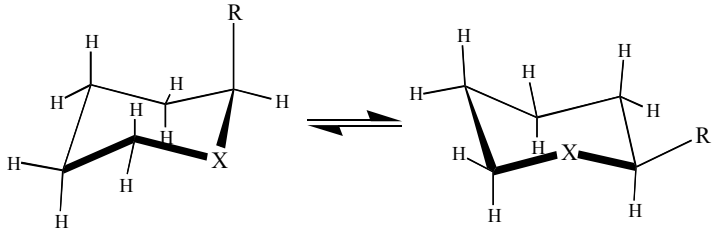
Presenter: Andrew K. Mauro; Advisor and co-author: Marc L. Kasner

The optimized geometries and energies of a series of substituted six-member rings were done using Gaussian and Spartan software packages. A series of different methods (*ab initio* – Hartree Foch, Density Functional Theory – DFT, and Moller-Plesset – MP2) and basis sets (3-21G, 6-31G, 6-311+G, and 6-311++G) were used and variations in the values of the energies, conformational energies and the time for the calculations were compared and evaluated.

T-CSAM-15: A Computational Study of the Steric Contributions to the Conformational Energy

Presenter: Olayinka Adeyemo; Advisor and co-author: Marc L. Kasner

Conformational searches and geometry optimizations of a series of substituted six-member rings were done to determine the relative energy differences of the lowest energy axial and equatorial conformers. By changing the geometry of the ring by



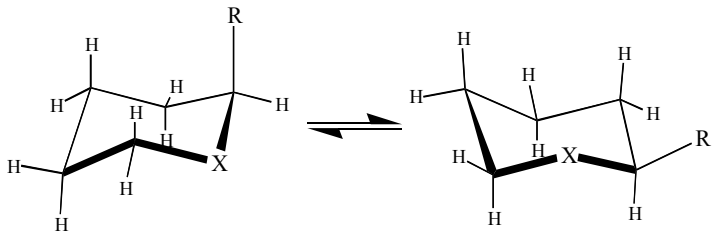
substituting heteroatoms (X = CH_2, O and S) in the ring and changing the geometry of the exo-cyclic substituent (R = H, CH_3, OH, OCH_3, SH, and SCH_3), the changes in the steric interactions and their contributions to the conformational energy is evaluated. Conformational searches were done using Spartan and the optimized geometries and energies were determined using Gaussian. HF/6-311+G(d,p)//HF/6-311+G(d,p), DFT/6-311+G(d,p)//HF/6-311+G(d,p), MP2/6-311+G(d,p)//HF/6-311+G (d,p), .and DFT/6-311+G(d,p)//DFT/6-311+G(d,p) methods were used to determine the conformational energies and geometric parameters were determined with HF/6-311+G(d,p)//HF/6-311+G(d,p) and DFT/6-311+G(d,p)//DFT/6-311+G(d,p).The effects of the longer C-O and C-S bonds have observable impact on the steric interactions and conformational energies.

T-CSAM-16: An Evaluation of the Effects Of Electron Withdrawing Groups on the Magnitude of the Exo- And Endo-Anomeric Effect

Presenter: Marc N. Muniz; Advisor and co-author: Marc L. Kasner

A ring containing a substituent with non-bonded electrons can lead to electronic interactions which will lead to electron delocalization and a lower energy. This electronic interaction with the ring substituent is called the endo-anomeric effect and is

only possible with a axially oriented substituent. An exo-anomeric effect is also possible in the ring contains an atom with non-bonded electrons and an axially oriented substituent. Electronic interactions with an axially oriented exocyclic substituent will also lead to electron delocalization and lower energy. The effects of the exo- and endo-anomeric effects on the bond lengths, bond angles and conformational energies are examined by a computational study of series of substituted six-member rings:



where X = CH_2, O and S and R = CH_3, OH, OCH_3, SH and SCH_3. Calculations were done using Spartan and Gaussian and HF/6-311+G(d,p)//HF/6-311+G(d,p), DFT/6-311+G(d,p)//HF/6-311+G(d,p), MP2/6-311+G(d,p)//HF/6-311+ G(d,p), .and DFT/6-311+G(d,p)//DFT/6-311+G(d,p) methods.

T-CSAM-17: Modification of nanofibers with growth factors to create an artificial basement membrane for the culture of astrocytes

Presenter: Medha Persaud; Advisor and co-author: Sally A. Meiners

Spinal cord injuries are responsible for diminished function or complete loss of sensory and motor function in individuals with dislodged bone fragments, torn disc fabric, or bruised or torn ligaments of the spinal cord. Statistics from the National Spinal Cord Injury Association reveal that close to 250,000 - 400,000 individuals in the United States suffer from spinal cord injuries with approximately 11,000 additional injuries per year. However, despite many advances in spinal cord injury research, there iswith approximately 11,000 additional injuries per year. However, despite many advances in spinal cord injury research, there is currently no restorative therapy. The focus of this lab is to create implants formulated from biodegradable electrospun nanofibers to bridge spinal cord injury sites. The success of the implants is dependent on axonal and cell growth, which will facilitate a reformed neuronal circuitry following implants. Regeneration and growth of axons are highly influenced by astrocyte-derived extracellular matrix (ECM) molecules; hence, astrocytes are utilized *in vitro* to recreate extracellular matrix ideal for axonal growth. To construct an applicable model, astrocytes are cultivated on nanofibers designed to mimic the three-dimensional scaffolding of the ECM *in vivo*. Nanofibers are derived from polyamide polymer, which provides nanotopography, cytoskeletal organization and adhesion properties. To enhance conditions for proliferation of astrocytes and axonal growth, the nanofibers are covalently modified with fibroblast growth factor-2 (FGF-2), vascular endothelial growth factor (VEGF), and transforming growth factor- β (TGF- β). Initial results show increased adhesion and proliferation with all three growth factors although, FGF-2 and VEGF were more active than TGF-β. Furthermore, covalently bonded growth factors were more active than soluble growth factors despite the fact that the concentration of soluble growth factor far exceeded that of bonded growth factor. These results suggest that polyamide nanofibers derivatized with growth factors might provide a good scaffolding material for the introduction of astrocytes into the damaged spinal cord.

T-CSAM-18 Groundwater Analysis at a Contaminated Site, Bloomfield, New Jersey

Presenter: Deborah Katchen Advisor: Duke Ophori

Hydrochemical data that were previously collected at a contaminated site in Bloomfield, New Jersey have been analyzed to determine whether: 1) the contaminants are still at detectable concentration levels, 2) natural attenuation of contaminants is occurring, and 3) natural attenuation will remove the contaminants in a reasonable period of time. Plots of the distribution of trichloroethene (TCE), and its daughter products, dichloroethene (*Cis*-1,2 DCE) and vinyl chloride (VC) show that these contaminants still exist at the site. A initial decreasing trend in the concentration of TCE, and the presence of its daughter products, *Cis*-1,2 DCE and VC suggest that natural attenuation is occurring at the site. However, increase in TCE concentration in some groundwater wells may indicate unknown additional sources of TCE. Dissolved oxygen (DO) occurs in concentrations greater than 1 mg/l, indicating that natural attenuation is occurring under aerobic conditions. Numerical modeling of groundwater flow and contaminant transport, using the MODFLOW and RT3D codes, shows that an effective natural attenuation process should completely remediate the site within a period of eight years. The continued presence of TCE and the aerobic conditions at the site suggest that natural attenuation has not remediated the site as predicted by the models.

T-CSAM-19 : Poisson pulsed control of particle escape

Presenter: Marie McCrary; Advisor: Lora Billings; Co-authors: Lora Billings, Ira Schwartz and Mark Dykman

We consider the problem of predicting the position of a particle in a double well potential. By adding background noise to the equations of motion, we can induce the particle to switch between the two stable states. We measure the average time it takes to escape from one basin to the other basin under different types of noise. The escape time of the system under Gaussian white noise is well known, following the theory of Brownian motion. We derive theory for predicting the escape time if we add small amplitude Poisson noise. Poisson noise is described by pulses of constant amplitude occurring at a given frequency. We find that weak Poisson pulses can lead to a significant change in the escape rate. We compare analytical results with extensive numerical simulations.

Abstracts of Posters

P1: Presenters: Rabia Akhtar, Tahira Naqvi and Nahid Shahidi
Advisors: Lee H. Lee and Tin-Chun Chu

The Effect of Phosphate on the Growth of the Cyanobacterium Synechococcus sp. IU 625

Synechococcus sp. IU 625 is a unicellular, prokaryotic photoautotroph cyanobacterium. Overgrowth of *Synechococcus* sp. IU 625 often causes dense algal bloom which makes Syn. sp. IU 625 a good environmental indicator. Phosphate is one of the required nutrients for the growth of the bacteria. Many studies have been done but the results were inconclusive in regards to whether phosphate is an essential nutrient for the growth of Synechococcus sp. IU 625. Different concentrations of phosphate (0X, 0.5X, 1X, 5X, 7.5X and 10X) have been used to study its effect on the growth of cells. Two repeatings of each concentration have been carried out. Growth was monitored by direct count with a hemocytometer and by turbidity studies with a spectrophotometer. The results suggest this microorganism is sensitive to different concentrations of phosphate. At concentration of 0X of phosphate, the growth of the cells is severely inhibited. At concentration of 0.5X, the growth was less than the control (1X). With the concentration of 5X, the growth was similar to that of the control. When the concentrations of phosphate reach to 7.5X and 10X, the growth are severely inhibited. The results suggested that phosphate is important but may not be the limiting factor for the growth of the cells.

P2: Presenter: Elizabeth Arango
Advisor: Aihua Li

The Behavior of DS-Divisors of Positive Integers

We study behavior of DS-divisors of positive integers. Here "DS" stands for "divisor-squared" and an integer q is called a DS-divisor of c if q^2 divides c - q. Such a pair (c, q) is called a DS-pair. From a table generated for DS-pairs, we examine the existence and the numbers of DS-divisors of prime powers, product of two primes, and other cases. We also investigate patterns and structures of DS-divisors based on the table.*P*

P3: Presenter: Dy-Anni Austin
Advisor: Sandra D. Adams

The Effect of Heparin Sulfate on Sindbis Virus Infection

Sindbis virus (SIN) is a member of the *Alphavirus* genus, family Togaviridae. The SIN is an enveloped virus with a genome of single stranded RNA. Alphaviruses are able to infect cells through an array of both viral and cellular glycoproteins and receptors. The E1 and E2 glycoprotein's of SIN function in attachment of the virus to the cell surface. Glycosaminoglycans, such as heparin sulfate, further promote attachment and entry of the virions to the host cells. The purpose of this project is to investigate the effect of the addition of heparin to cultured BHK-21 cells on Sindbis virus infection. We compared the viral titers and found that the addition of heparin sulfate affected the ability of the virus to infect cultured cells.

P4: Presenters: Monika Bojda and Nneka Obi
Advisor: Jeffrey Toney

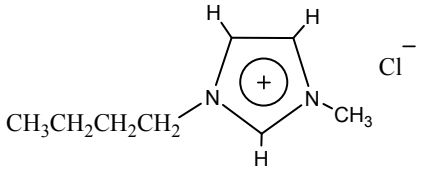
Detection of Food Borne Pathogens

Food Borne pathogens are a major cause of infections worldwide. Detection of bacteria in food can prevent illness in a large population and save distributors and restaurants millions of dollars. To approach this problem, we chose to simplify known methods of bacterial detection and to determine the minimum amount of bacteria that can be detected. To answer those questions, we used a classical method to determine the detection limit. As a model system for pathogenic Escherichia coli O157:H7, we chose the harmless strain HB 101. Bacteria contain distinct sequences of RNA in the form of 16S ribosomal RNA (rRNA). The Polymerase Chain Reaction (PCR) was used to specifically amplify *E. coli* 16S rRNA sequences. Amounts as low as 1 picogram (pg, pico 10-12) of DNA can be amplified to several micrograms (1 µg, micro 10-6) in just a few hours. One of the biggest challenges of detecting bacteria in food is to account for the "matrix effect" of the complex components of food products on the detection method. We have followed up on a published method using the immobilization of bacteria by metal hydroxides. Zirconium was evaluated for a range of concentrations of E. coli. This is a rapid cell immobilization process. PCR detection of E. coli was possible after DNA extraction of the immobilized bacteria, as well as using whole cell bacteria. The application of this simplified procedure with a variety of food samples is now being studied.

P5: Presenters: Allyson Bress, Monika Pitynski and Maryam Alapa
Advisor: Jack Isidor

Synthesis of Novel Ionic Liquids

Ionic liquids are ionic salts that, unlike traditional metal-based salts such as sodium chloride, consist of a resonance stabilized organic cation and a conventional anion, such as halide, nitrate, tetrafluoroborate, etc. The structure of one of the most popular ionic liquids, [BMIM][Cl], is shown on next page. The presence of the bulky, asymmetrically-shaped organic cation prevents the close-packing crystal structure that is characteristic of traditional ionic salts. The lack of a well-defined, closely-



[BMIM][Cl]

packed crystal structure is responsible for e low melting points of organic liquids, many of which are liquids at room temperature (RTIL). While ionic liquids have been known for many years, in the past decade interest has soared because ionic liquids have many unique solvent properties that make them attractive as replacements for traditional volatile organic solvents, like dichloromethane or ethyl acetate. The rapidly growing emphasis upon "green chemistry" has spurred research into the synthesis, properties, and applications of ionic liquids throughout chemistry. Recent research has shown ionic liquids to be very promising not only in green chemistry applications, but in many other areas of chemistry as well. These ionic liquids have new and unique properties useful in catalysis, environmental separations, electrochemical applications, biochemical processes, and many more areas of chemistry and biochemistry. The goals of this research project are: 1. to prepare a variety of known ionic liquids, 2. to investigate their physical properties, and 3. to synthesize and investigate several compounds that represent a new class of ionic liquids. This new class of ionic liquids is based on a heterocyclic ring system that has not previously been investigated in this context. Data on the synthesis of several new ionic liquids is presented.

P6: Presenter: Nicole Bujalski
Advisor: Michael Kruge
Gas chromatography-mass spectrometry analysis of polycyclic aromatic hydrocarbons in sections of the Hackensack River, Newark Bay and Gowanus Canal
Samples from the mouth of the Hackensack River, the northern end of Newark Bay by Kearny Point and the lower end of the Gowanus Canal were subjected to Gas chromatography-mass spectrometry analysis. All three sample locations are known to have been highly polluted by a range of industrial waste. This study inquires into the presence of polycyclic aromatic hydrocarbons (PAHs), biomarkers and petroleum products currently remaining in the sediments from these bodies of water. The results confirm the presence of PAHs in all samples. The Gowanus Canal was found to contain the largest range of pollutants. Biomarkers for aquatic and woody plants were found in both the Gowanus Canal and Kearny Point. All sample locations are in certain need of remediation since critically hazardous materials currently remain.

P7: Presenter: Joel Concannon
Advisor: MarilynTayler
The Old Testament's influence on the United States Constitution
This research tests the hypothesis that the Old Testament of the Bible influenced the framers in drafting the Constitution. It is necessary to approach this issue using interdisciplinary methods to develop a full understanding, because the issue cannot be adequately examined through one disciplinary lens. Therefore, three lenses are employed: Religion, namely Biblical Studies and Old Testament Theology, Political Science, namely Modern Political Philosophy, and Law, namely Constitutional Law. The research methodology entails examining the Constitution's content, influences and interpretation. To do this, it is necessary to examine, simultaneously, disciplinary concepts such as original intent, the Constitutional Convention, United States Supreme Court cases, modern political philosophy and Christianity in the 1700s. By analyzing the framers' personal influences and intentions in light of those disciplinary concepts, the conclusion that the Old Testament affected the Constitution is a sustainable one. The poster for the Student Research Symposium will entail particular parts of the Constitution and how the original intent was religiously inspired.

P8: Presenter Cathleen Dale
Co-authors: Stefanie Brachfeld, Sidney Hemming and Tina van de Flierdt
Advisor: Stefanie Brachfeld
Tracing Antarctic ice-sheet stability through sediment provenance
The implications for global sea level rise rely on the stability of polar ice sheets, as they remain the world's largest freshwater reservoir. The goal of this study is to trace ice rafted debris in the Southern Ocean back to its terrestrial source from the West Antarctic Ice Sheet (WAIS), East Antarctic Ice Sheet (EAIS), or the Antarctic Peninsula Ice Cap (APIC). We have focused on two regions of Antarctica, Marie Byrd Land and the Antarctic Peninsula, which has undergone recent ice shelf retreat and collapse, and pose the potential threat for sea level rise. The bedrock beneath the three ice sheets has characteristic lithologic and geochemical signatures which are preserved in the sediments that the ice sheets erode and then deposit in the ocean. This study involves the determination of characteristic features of near-shore glacial-marine sediment from each source area that are representative of the sub-ice bedrock, and which will be used to develop a geologic fingerprint of each source region. To accomplish this, a suite of geochemical and petrologic techniques are being applied. Bulk sediment elemental abundances and trace

elements such as heavy metals and rare earth elements (REEs) are measured from the < 63 micron grain size fraction. Nd is isolated through a two-stage column chemistry, first from the matrix by cation exchange chemistry, and subsequently separated from the other REEs using Eichrom Ln-Spec resin. This allows for isotopic analysis of the single element. These data sets are used in conjunction to assign a geochemical fingerprint to each source region. Preliminary geochemical data from Mary Byrd land yields Al/Ti of 15-21, suggesting a continental crust source. The 500-2000 micron grain size fraction is used for petrographic lithic clast identification on an optical microscope. There are few regions of Antarctica with exposed bedrock, therefore this study serves to identify ice covered rock compositions based on sediment analysis.

P9: Presenter: Francisco De La Cruz
Advisor: Marilyn Tayler
Marriage Trends
This research relates the religious to the religious institution of marriage with regard to same sex marriage. One discipline alone cannot fully explain the underlying religious factors in civil marriages therefore an interdisciplinary approach is necessary. Same-sex marriage is analyzed with respect to its historical, legal and religious context. Information is focused on the history and philosophy of the early American Puritans, Christian sects and Judaism. Historical and legal perspectives of marriage show underlying religious influences. The New Jersey Supreme Court case of Lewis v. Harris provides a current case study of underlying religious influence in civil marriage. This research demonstrates how these social and religious bodies have affected the way civil marriage is treated with regard to the legality of same-sex marriage. The presentation board is a timeline of the evolution of marriage with respect to religious, legal and historical changes. The timeline is divided into three separate timelines, religious, legal and social institutions of marriage. It provides a visual guide to the changes of marriage in religion and law and demonstrates how religion affects law.

P10: Presenter: Frank DeRienzo
Advisor: Marilyn Tayler
Prejudice Momentous Political Trials of the 20th Century
This project examines trials at significant moments in 20th century United States history that have been influenced by external forces such as immigrant status and national security concerns. The purpose is to show a correlation between attacks perpetrated by foreign or immigrant groups and a failure in the legal system due to external forces. An interdisciplinary methodology encompassing both history and law is necessary because of the scope of the topic. By examining the cases of Commonwealth v. Sacco, Korematsu v. United States and Hamdi v. Rumsfeld and the historical settings in which they took place, it is evident that a correlation does indeed exist between attacks perpetrated by foreigners or immigrants and failures in the justice system. Through the examination of these cases, a continuum becomes apparent in which the influence of external forces builds in Sacco, peaks in Korematsu and then recedes post 9/11 in Hamdi. The study concludes that the presence of external forces at a trial, namely prejudice towards immigrants and national security fears, at times of high tension in American history, indicate a probability that a miscarriage of justice will occur if these factors unduly influence the trial.

P11*:* Presenter: Christina Evers
Advisor: Gregory Pope
Commercial and Services of Stickleyville
Stickleyville is a hypothetical city located in the center of Morris County, New Jersey. The goal is to develop a town that addresses various issues faced by today's cities. Stickleyville must be able to sustain human life and provide adequate transportation while not drastically impacting the environment. I want the commercial area to be a couple blocks away from the highway RT. 80. This will ensure that these services and jobs are easily accessible from within and outside of Stickleyville. I intend to have parking garages located under the civic centers to reduce clutter and street congestion. The roads are to have various one way streets and speed bumps to help make them pedestrian-safe. I also believe that it would be best if this area followed the guidelines of New Urbanism, mixed use buildings that encourage higher densities and reduce the friction of distance. Frequent bus and train stops coming into and out of the city are a must if Stickleyville is to be an environmentally conscious and human efficient city.

P12: Presenter: Frantz Fils-Aime
Co-author: Shekerah Primus
Advisor: Katherine G. Herbert
Creating a database to assist in the statistical analyses of biological research data
Biological data presents a unique problem in computing, its irregularity makes organized database storage quite challenging. In addition, the mere nature of biological research, in which the future goals and procedures of the research is determined by previous results, poses an even bigger problem: how do we mold a database that is both time and space efficient, while still staying true to the research data, and meeting the needs of the scientist? Do we sacrifice space to achieve efficient processing or do we sacrifice time to ensure the most accurate and meaningful data representations. The answer may seem clear to the biological researcher, the data is of utmost importance. And while that is true, a computer scientist may find such a design al-

most impossible to data-mine. This project deals with diabetes research data, with a goal of not only representing this data in a meaningful way using a relational database, but also of providing a design with the capacity to reveal unanticipated relationships in the data, by running relevant statistical analyses on them.

***P13**:* Presenters: David Gaipa, Sergio Perez, Constantino Lambroussis, Caitlin Ament and Anise Elie
Advisor:: Ann Marie DiLorenzo
In Vitro Toxicological Analysis of World Trade Center Dust in Stressed and Unstressed Human Lung Cell Cultures
The purpose of this study is to determine a toxic level of World Trade Center Dust in mammalian cells grown in culture. In this in vitro study, cultures of human lung (MRC-5) were exposed to World Trade Center Dust collected from a location on Market Street, New York City, shortly after the tragedy of September 11, 2001. Dust concentrations ranging from 1.25ppm to 250ppm were used in conjunction with serum levels of 1%, 2.5% and 10% Fetal Bovine Serum (FBS) in Ham's F-12 Nutrient Medium. 96 well plates were seeded with lung cells. The resulting lung cultures were then analyzed with a colorimetric based cell viability assay to establish a viable cell count. The preliminary results indicate that lower serum level, simulating physiologically stressed in vivo conditions, have lower viability. Exposure to higher dust concentrations appears to indicate a negative influence on cell viability. Stressed cells were highly susceptible to dust exposure and demonstrate the lowest level of viability. These results indicate that World Trade Center Dust, with its complex chemical composition, has a negative influence on cell viability in both stressed and unstressed conditions. Additional testing is planned for future studies to more accurately determine potential damage to DNA.

***P14**:* Presenter: Nicole Grasso
Advisor: Gregory Pope
Developing Stickleyville: The Residential Area
Stickleyville is a fictitious, newly developing city that is located in what is currently the center of Morris County. The invented city will have a population of about 250,000 and will be centered near the coordinates 40 51 00'N and 74 28 00'W and at least two highways running East to West and North to South will boarder the city. The particular area that the project focuses on is the plans for residents to commute to the core for work and shopping but still have a private area of their own to come home to and raise families within, thus creating communities outside the city. The growth ideas include housing units in the form of private homes with yards and some apartment style housing, but with a sustainable and an environmentally friendly twist. Amongst builders and developers, to park recreation programs to farmsteads and environmental protection agencies, the idea of open land has become a demand. And like most prosperous things, open space is scarce, especially in areas such as North New Jersey. Overall the development project displays the ideas behind a sustainable and diverse living area that may one day be factual, futuristic city.

***P15**:* Presenter: Vanessa Harries
Advisor: Gregory Pope
The General Plan for the Central Business District of Stickleyville
The project stresses the idea that the central business district is the heart of the city. The main points include proper transportation into and out of the district, mixed-use zoning, and plentiful open spaces. Stress has been placed on integrating with the environment and causing the least possible disruptions to the surroundings. The goal of the project is to build a central business district that promotes vitality and success for the city's present inhabitants, as well as those of the future. Attention has been placed on details such as potential natural disasters, air and noise pollution, and soil and slope stability. To support the plan, the project includes maps and layouts of central business district. It includes the suggested solutions for preventing and mitigating natural disasters, as well as projections into the future to show the durability and the success of the designs.

***P16**:* Presenter: Stephanie Haupin
Advisor: Lora Billings
Streptococcus Pyogenes: A Continuous Threat?
The purpose of this research project is to model the endemic effects of *Streptococcus pyogenes* (better known as Strep Throat) in our area. This disease interested me upon noticing that there was an outbreak of Strep Throat in our area this year, infecting many, including myself. When researching the disease, I found that it is characterized by an unusual timeline, not following the normal stages of being infected, becoming symptomatic, and recovering. First, an asymptomatic person may not show signs of Strep Throat, but can spread it to others. Secondly, a person that does not see a doctor for the disease will remain infectious for up to three weeks, and finally, upon taking antibiotics from a doctor, a person will only stay immune for about ten days. These characteristics helped me develop my own model for Strep Throat, similar to an SIR (Susceptible, Infected, Recovered) model, but including a class of asymptomatic people who are still infectious, and allowing for the fact that a percentage of the population will not go to see a doctor, so they will remain infectious for a longer period of time. I will discuss the dynamics that my model predicts for Strep Throat, including the measures we would have to take for the disease to die out in New Jersey.

P17: Presenter: Andrew Huth
Advisor: Baojun Song

Impact of Water Fowl Migration on the Dynamics of Avian Influenza Transmission

Highly pathogenic H5N1 is a strain of Avian Influenza that has recently been studied to have a long period of facilitating virus transmission in water fowl this presents a pandemic threat. By incorporating the migration of water fowls, we construct an epidemiological patch model to investigate the dynamics of the spread of highly pathogenic H5N1 virus. The patches cover North America, Europe/Asia, and Africa based on the flyways for water fowl between the continents. Model analysis shows how different parameters effect the migration rates and epidemics. We use valid data to estimate the migration rates of water fowl between the continents. Based on our model and parameter values, our numerical simulations support our theoretical analysis.

P18: Presenters: Tatjana Jelacic and Rania Ahmad
Advisor: Ann Marie DiLorenzo

In Vitro Examination of Food Dyes on Wound Healing in the Presence and Absence of Stressful Conditions in Chinese Hamster Ovary Cell Cultures

The European Union will ban the use of live animals for the testing of cosmetic products and perfumes after March 2009. It is imperative that suitable in vitro tests be developed for the survival of this gigantic industry. The purpose of this investigation is to study the effects of food dyes on cells grown in culture and to measure the ability tissues to recover from wound healing. This in vitro experiment attempts to provide a better understanding of the consequences of food coloring used in cosmetic products. Mammalian cells were cultured in both normal media and serum level reduced media which mimics human physiological stress. The potential problems which might arise with the use of food coloring will be correlated to ability or inability for monolayer growth after wounding(scraping). Chinese Hamster Ovary cells (CHO cells) in 10% Fetal Bovine Serum (FBS) were grown in MEM Nutrient Medium under stressed and unstressed conditions of 1%, 2.5%, and 10% FBS to serve as a series of normal and stress controls. The three different food dyes, Yellow 5, Red 3, and Blue 1 were prepared in MEM with 1% FBS as 1% solutions (10,000ppm). Food dyes concentrations of 0.25ppm were prepared in combination with the three different serum levels. Sterile plastic 12-well plates were used to test the effects of these concentrations of food dye on the in vitro recovery of damaged tissue monolayers.

P19: Presenter: Ian Johnson
Co-authors: ANDRILL SMS Science Team
Advisor: Sandra Passchier

Particle Size Analysis of Antarctic Drill Cores

The Antarctic climate plays a critical role in Earth's climatic system. Understanding how Antarctica's climate has changed in the past is an indicator to the present and future of our world. The objective of the study was to determine the presence of sea ice in the Antarctic region during the Pliocene and Pleistocene. Through samples taken of drilling cores, sediment size analysis of the underlying beds was used to interpret the sedimentary depositional environment. The core samples themselves were obtained from the ANDRILL SMS drilling project located in Southern McMurdo Sound. These samples were individually prepared and put through a laser particle size analyzer to determine grain sizes of particles. The evaluation of the individual samples were judged on particle size, how well the particles were sorted, and in cases of larger clasts, shape. The observations from the instrument were then compared to a core log of the underlying strata taken in Antarctica. The grain size and sorting of the core samples less than 100 meters below sea floor (mbsf) were generally poorly sorted and of smaller grain size than those below the 100 m mark. This poorly sorted material is typically characteristic of diamictites, a sedimentary facies that is typically associated with glacial or ice environments. The larger and well sorted clasts found at 100-120 mbsf are associated with near shore high energy environments. The research suggests a lack of sea ice during the Pliocene which might indicate a several degree warmer climate than that of current Antarctic conditions.

P20: Presenter: Nemwel Kebati
Advisor:: Michael Kruge

Natural and contaminant organic matter in Passaic River sediments

Flash pyrolysis-gas chromatography/mass spectrometry (Py-GC/MS) is a microanalytical tool used in the characterization of macromolecular organic materials (OM), including polymers and biomass. For this study, organic-rich sediment samples from the lower Passaic River were collected from mudflats during low tide at three locations moving progressively upstream: Riverbank Park (Ironbound district of Newark), Riverbank Park (Kearny) and Passaic River Park (Lyndhurst). These were quantitatively analyzed by Py-GC/MS to determine the contributions of natural OM (microbial and terrestrial plant) and contaminants (e.g., petroleum and combustion products) to the sediments in the environment. The results were compared to pyrolyzates of microbes and plant matter.

P21: Presenters: Edmond Knesevitch, Christine L. Vadovszki and Timothy J. Buli
Advisor(: Mary Lou West

Variability in Quasars

Quasars are high energy galaxies that have as their engines a single or double black hole, usually surrounded by an accretion disk. Particularly bright quasars, called blazars, exhibit strong optical variability on very short timescales (often less than a few days). Quasars experience violent flare-ups as mass falls into the primary black hole and produces a jet, oriented toward earth in the case of blazars. Some quasars have been monitored for decades in visible light of several colors, infrared, radio waves, and recently UV, X-rays, and gamma rays, as observed from satellites. The blazer OJ 287 has been monitored the longest, beginning in 1880 and continuing today for a span of nearly 130 years. Many quasars show periodic behavior for a few decades, but do not repeat their cycles. Quasar OJ 287, however, has had a steady period of variability throughout its observed life. We are monitoring OJ 287 with MSU's 12 inch telescope (Meade LX200GPS) using a sensitive CCD camera. This blazar is located in the constellation Cancer with the position RA 8:54:48.88 and DEC +20/6/30.6 . We chose to monitor this object because of its convenient position in the sky, and only later did we realize its uniqueness. We have examined and analyzed the historical data on this source from many observatories around the world and fit the data in various ways. On the long-term, the empirical data of blazar OJ 287 suggests a periodicity of 60 years. There is also a secondary periodicity of nearly 12 years, as well as short episodes of quasi-periodicity down to several hours. This blazar has a redshift of 0.307, indicating that the object is receding from us at almost 1/3 the speed of light. The light we are detecting now left this object approximately 3.5 billion years ago, when Earth was in the early stages of its development. We will continue to monitor this intriguing object.

P22: Presenter: Tomasz Kurcon
Co-author: Nina M. Goodey
Advisor: Nina M. Goodey

Determination of Kinetic Parameters of Indole-3-Glycerol Phosphate Synthase from Sulfolobus solfataricus by fluorescence methods

Indole-3-glycerol phosphate synthase (IGPS) belongs to a broad family of (&#946,&#945,)8-barrel enzymes. It catalyses the fifth step in tryptophan biosynthesis, converting 1-(o-carboxylphenylamino)-1-deoxyribulose-5-phosphate (CdRP) to indole-3-glycerol phosphate (IGP). Studies of catalytic mechanism were performed on IGPS isolated from hyperthermophilic archaeon Sulfolobus solfataricus (sIGPS). The fact that the product IGP is a fluorescent compound (excitation at 280 nm and emission at 350 nm) can be used in determining kinetic parameters for the conversion of CdRP to IGP by sIGPS. Cary Eclipse fluorescence spectrophotometer was used to measure increase in the fluorescence with time, observed upon mixing of sIGPS with CdRP. The rate of change in IGP fluorescence was found to depend on substrate concentration. We are in the process of determining most compatible CdRP concentration and instrument settings as part of optimal conditions necessary to generate Michaelis-Menten plot that will be used to establish the kinetic parameters Km and Vmax for the enzyme. To generate the complete catalytic pathway, identity of the rate limiting step as well as the Kon and Koff will be found by studying the pre-steady state kinetics of sIGPS with a stopped-flow instrument.

P23: Presenters: Gary Landis and Sean McLearie
Advisor: Matthew L. Gorring

Comparison of Middle Proterozoic Diorite and Quartz diorite in the NJ and Hudson Highlands

A suite of distinctive intermediate composition igenous rocks (diorite and quartz diorite) in the New Jersey Highlands have a complicated history as a result of high-grade metamorphism dating back to 1.3-billion years in the Middle Proterozoic. The diorite (Yd) is characterized as a massive-textured, quartz-poor charnockitic (orthopyroxene-bearing) diorite gneiss. The quartz diorite (Yh) is characterized as a medium grained, well layered and foliated hypersthene-quartz-plagioclase gneiss metamorphic rock of uncertain age (Drake et al, 1994). Lake Tiorati diorite is coarse grained sheared mafic meta-plutonic rock containing hornblende, plagioclase with minor clinopyroxene and biotite located in the Hudson Highlands (Gorring et al, 2003). Richard Volkert of the New Jersey Geological Survey and colleagues continued the evaluation of these formations through publications in 1984, 1988, 1990, 1999, and 2004. Additional research used in this project was provided by (Gorring et al, 2003) and from the unpublished research conducted by Christopher Blake (Blake, 2003). The purpose of this project is to compare the geochemical data from the three different sources (Volkert and Drake, 1999, Gorring et al, 2003, Blake, 2003) and with new samples collected from the massive diorite (Yd) unit, the quartz diorites (Yh), and the Lake Tiorati metadiorite in order to determine similarities (or lack of) in the geochemistry that would suggest a common origin between the formations. This research will result in a better understanding of the igneous and metamorphic events that took place during the Middle Proterozoic in the NJ/Hudson Highlands.

P24: Presenters: Jennifer LaPoma and Eric Sonnenwald
Advisor: Matt Gorring

Pressure - Temperature Conditions of the New Jersey Highland's Metapelites

New Jersey Highlands metapelites will be analyzed to determine the protolith and the pressure-temperature conditions during

the Ottawan Orogeny (1080-1030 million years ago). Protolith will be determined based on thin section mineralogy and bulk rock analysis from ICP-OES. SEM work will provide a historical metamorphism analysis through chemical zoning of the biotite, sillimanite, and garnet minerals found in thin section. These results will help to provide a resolve to the discrepancies of metamorphic conditions in the New Jersey Highlands. Past geothermobarometry work on the NJ Highlands metapelites (Dallmeyer, 1971) showed metamorphic P-T conditions ranging from 3.0 to 5.5 kbar and 700 to 750°C. Our preliminary results using modern calibrations of the garnet-biotite geothermometer have shown a deviation in previous findings with a new range from 675°C at 3.0 kbar to 715°C at 5.5 kbar. At present there is not enough information available to process prior results through the GASP (thermobarometry) software. New compositional data collected from the SEM, on the garnet, biotite, and plagioclase crystals will provide more detailed chemical analyses. The additional information will be analyzed using GASP thermobarometry software which will provide an updated estimate of the pressure and temperature conditions of metamorphism in the NJ Highlands.

***P25**:* Presenters: Claudia Lechuga, Lisa Hazard, Claudia Lechuga and Stephanie Zilinskis
Advisor: Lisa C. Hazard
Regulation and response of the salt gland of insectivorous lizards Novoeumeces schneideri and Anolis carolinensis to ionic and osmotic challenges
The reptilian kidney cannot produce concentrated urine. Some reptile species, therefore, rely on extrarenal salt glands to secrete excess salts. Composition of the secreted fluid depends on the ion load incurred: marine and intertidal reptiles secrete primarily sodium chloride, while herbivorous lizards secrete mainly potassium chloride. The cranial salt glands of lizards are unique among reptiles in their ability to secrete potassium and bicarbonate, as well as sodium and chloride. Most studies on lizard salt glands have been performed on herbivorous and marine species, yet many insectivorous species also possess salt glands. We studied secretion by the nasal salt glands of two insectivorous lizard species, *Novoeumeces schneideri* (Scincidae) and *Anolis carolinensis* (Polychrotidae) in response to different combinations of and anions. Lizards were injected with ion solutions or controls daily for 4 days. Secreted salt, feces and urine were collected daily and analyzed for sodium, potassium, and chloride. Daily cation/anion secretion rates and budgets were calculated. The salt glands of Anolis secreted only in response to chloride, regardless of the accompanying cation. Novoeumeces also secreted in response to chloride, but secreted at higher rates when histidine or potassium were also present, suggesting possible inhibition of secretion by sodium. Both species showed low variation in cation secretion, Anolis secreted almost entirely potassium, even when sodium loaded, while Novoeumeces secreted ~62% potassium regardless of cation load. The responses of these two species differ from each other and from herbivorous and marine species, indicating considerable plasticity in the physiology of the salt gland.

P26: Presenters: Jacqueline Lim and Marcel Castor
Advisor: Sandra D. Adams
Cloning the Genes of Sindbis Virus Sindbis (SIN) is the prototype species of the Alphavirus genus of the family Togaviridae The purpose of this project is to begin to clone genes of the structural proteins open reading frame (SP-ORF) of SIN. Alphaviruses have been used as gene therapy vectors. Therefore, this project will enable us to investigate the effects of deletions of various regions of the genome to understand how these viruses can be used as vectors. We infected cultured BHK-21 cells, extracted the RNA, created cDNA of various regions of the SP-ORF by using the combination of RT-PCR, and inserted the products plasmids.

***P27**:* Presenter: Shani Maslovski
Co-author: Maryann Poku
Advisor: Quinn Vega
Analysis of RET mutations in a luciferase reporter gene assay
RET, a receptor tyrosine kinase, interacts with one of the four ligand-binding co-receptor, GFR-a, and its corresponding neurotrophic factors (GDNF, Persephin, Artemin or Neurturin). RET plays a critical role in development of nervous system and kidney. Once activated, RET undergoes an autophosphorylation event leading to the phosphorylation of multiple tyrosine amino acids in the cytoplasmic domain of the protein. Mutations of RET gene have been associated with cancer (MEN2A, MEN2B and FMTC) and some developmental abnormalities (Hirschsprung's Disease). In order to analyze the effects of mutations Using RET expressing cells, COS cells were transfected with wild type and mutant forms of ret and RET activity measured through a luciferase reporter gene assay. Specifically, a RET dependent transcription factor, ELK-1, was fused with the DNA binding domain of the GAL protein and co-transfected with a GAL dependent promoter linked to the luciferase gene. Upon transfection with various RET constructs, it was determined that wild type RET increased transcription over phosphotyrosine mutants and kinase inactive RET. Preliminary data suggests that the MEN2A mutants activate transcription better than the MEN2B mutants but this work is preliminary. Future experiments will confirm these changes and study the effect of both specific tyrosines and naturally occurring mutations on RET signaling.

P28: Presenter: Jen Nicholas
Co-authors: Mike Messina, Marjan Poposki and Aiko Edrolin
Advisor: Paul Bologna
Diel habitat utilization by fish and decapods of exposed and protected mangroves and seagrass beds in St. John, USVI
Mangrove and seagrass beds serve as essential habitats fish and decapod species. This study sought to identify exchanges between mangroves and seagrass beds and to look at abundance, biodiversity, and species richness. Great Lameshur Bay has a mangrove forest that was destroyed during Hurricane Hugo in 1989 while Hurricane Hole represents a relatively pristine mangrove that is free from natural and anthropogenic influences. Using one inch minnow traps, seagrass and mangrove habitats at the two sites were sampled at sunrise and dusk. Species richness for fish and decapods in Hurricane Hole was twelve and ten respectively. However, in Great Lameshur fish species richness was higher (15), while only eight decapod species were present. The most significant finding is the lack of mangrove use at Great Lameshur for fish, despite its disturbance eighteen years ago. At Hurricane Hole, during the day, fish dominated in both systems, while at night decapods were more abundant. An exception to this is Great Lameshur's destroyed mangrove where significantly fewer fish were collected but the decapod abundance did not change. Water quality data indicated that this area had very high temperatures and lower levels of dissolved oxygen which are detrimental to the survival of fish and reaffirms the lingering effects of Hurricane Hugo.

P29: Presenter: Perry Nikolica
Advisor: Gregory Pope
Stickleyville &#8211, A Game Plan for Recreation
What if we could take an existing town and wipe it clean, then use the land to plan an entirely new city. In this report, Littleton in Morris County will be a clean slate for Stickleyville to be planned on top of. From the said coordinates, a five mile radius will encompass Stickleyville. We will focus on the aspects of open space and recreation to be planned. The aim is to plan a city that can be environmentally sound, and also attract residents to live an auspicious life. Hazards, pollution, and any other environmental challenge such as hydrology or climatology, will be discussed within the project. Proposals such as parks, reserved open space, and buildings for recreation (ex, small stadiums and malls) will be addressed within the project. Also, a rational system of transportation between all proposals will be touched upon. The final result will show the most reasonable way of planning Stickleyville so it will be an environmentally healthy and strong community where residents can live without a number of problems.

P30: Presenters: Michael Pekosz and Sara Saber
Advisor: Lisa Hazard
Road salt tolerance of adult spadefoot toads (Scaphiopus couchii)
Road salt (primarily NaCl) is used as a winter de-icing agent in many countries in the northern part of the world. In the U.S. alone, about 14 million tons of road salt is used every year. Although this salt is very beneficial to humans, it may have many detrimental effects on various organisms including amphibians. Even though they are applied to the roads, saline solutions can still travel approximately 200 m from the roads into the wetlands, thus resulting in the contamination of amphibian habitats. Several studies have shown negative effects of road deicers on eggs and larval amphibians, which are sensitive due to their aquatic nature, however, no studies have yet examined responses of adult amphibians to road salts. We examined the behavioral tolerance of adult spadefoot toads (*Scaphiopus couchii*) for NaCl. Adult spadefoot toads (n=8) were dehydrated to ~85% of standard mass and placed in Petri dishes containing 20 ml of 0, 125, 250, 375, or 500 mM NaCl, within a glass terrarium. Trials were ten minutes long, with the initial trial followed by a 10 minute control trial using distilled water. Observed behavior during each trial was timed (min) and classified as water absorption (WR), sitting (SIT), standing (ST), or out of the dish. As NaCl concentration increased, toads spent less time in the dish. Reduced time in the dish was associated with increased mass loss during a 10 min. trial, likely due to continued evaporative water loss while out of the dish. Toads showed increasing aversion to NaCl above ~125 mM, suggesting that adult spadefoot toads may preferentially avoid habitat contaminated by road salts. Future studies will investigate the effect of road salt on the eggs of amphibians since these eggs are unshelled and permeable and so may be greatly affected by road salt, and will also compare effects of standard road salt to salt substitutes such as calcium chloride.

P31*:* Presenters: Winder Perez and Constantino Lambroussis
Advisors: Lee H. Lee, Quinn Vega and Tin-Chun Chu Major:
Identification of Plasmids, Mercury Resistance Genes and Primers Design for PCR-Based Assay in Cyanobacterium Synechococcus sp. IU 625
Synechococcus sp. IU 625 (Anacystis nidulans) is a freshwater unicellular cyanobacterium and an obligate photoautotroph that readily harbors plasmids. Dense harmful algal blooms (HAB) of cyanobacteria in freshwater can affect human and animal health either due to acute intoxication or allergic reactions. High liver and colon cancer cases are found in communities near algal polluted lakes and rivers. In addition, algal blooms also have a large impact on aquatic biodiversity by oxygen depletion which could be great threats on water ecosystems. Therefore, the early detection and prevention using molecular approach of

HAB are important issues in water quality management. In this study, primers have been designed to be used for PCR-based assay for priming *Synechococcus* sp. IU 625. Two approaches have been taken, one was to identify plasmids in Syn. IU 625 and the other is to identify the mercury resistant genes. It has been reported that Syn. elongatus PCC 7942, high genome similarity to Syn. sp. IU 625, contains two plasmids with the size of approximately 4kb and 0.7kb, respectively. The primers have been designed based on the genomes information from Syn. elongatus PCC 7942. There were four sets of primers, two for the large plasmid and two for the small plasmid. The designed primers have shown positive results on priming against Syn. IU 625 cells, Syn. IU 625 DNA and plasmid mini-prep. The second approach was to design primers from common mercury-resistance genes such as the heavily studied and widely present mer operon. Some conservative regions from merA and merR have been used to design two sets of primers. These primers have been used to prime Syn. IU 625 cells, Syn. IU 625 DNA and plasmid mini-prep and the results indicated that these genes exist in Syn. IU 625. Future studies will be carried out to detect Syn. IU 625 from environmental samples by using these primers.

P32 Presenters: Elyse K. Peterson and Dan Hauptvogel
Advisor: Matthew Gorring
Geochemical Analysis and Comparison of the Byram Intrusive Suite with the Storm King Granite, NJ/Hudson Highlands
The Hornblende granite gneisses of the New York Hudson Highlands (Storm King) and the Byram Intrusive granite gneisses of the New Jersey Highlands are believed to be similar in chemical composition as well as age. Despite prior research done on both suites individually and comparatively, an exact age correlation between the two is hard to discern. The Byram suite has been dated using 207Pb/235U of zircons. In two separate published works, this suite has been dated as 1088 ± 41 Ma and 1116 ± 41 while the Storm King Granite has been dated at 1134 Ma. New research has been done, using the SHRIMP II dating method, that suggests that these ages are too young and that the Byram suite is actually 1164 ± 10 Ma and 1174 ± 8 Ma for the Storm King. Representative samples of the Byram suite have been collected and are in the process of undergoing ICP-OES analysis. The results will then show any geochemical relation to the Storm King Granites. In addition, the samples will be compared to similar granitic rocks in the Adirondacks by analyzing K2O concentrations and Fe/(Fe + Mg) concentrations and what the tectonic interpretations may be.

P33: Presenter: Shekerah Premus
Co-author: Frantz S. Fils-Aime
Advisor: Katherine G. Herbert
Creating a database to assist in the statistical analyses of biological research data
Biological data presents a unique problem in computing, its irregularity makes organized database storage quite challenging. In addition, the mere nature of biological research, in which the future goals and procedures of the research is determined by previous results, poses an even bigger problem: how do we mold a database that is both time and space efficient, while still staying true to the research data, and meeting the needs of the scientist? Do we sacrifice space to achieve efficient processing or do we sacrifice time to ensure the most accurate and meaningful data representations. The answer may seem clear to the biological researcher, the data is of utmost importance. And while that is true, a computer scientist may find such a design almost impossible to data-mine. This project deals with diabetes research data, with a goal of not only representing this data in a meaningful way using a relational database, but also of providing a design with the capacity to reveal unanticipated relationships in the data, by running relevant statistical analyses on them.

P34: Presenter: Matthew Reid
Advisor: Greg Pope
Stickleyville: Natural Resources
The personal study and design I have undertaken relates to the fictional urban town of 'Stickleyville', situated in Northern New Jersey in what is today Morris County for some 5 mile radius. The specified personal topic for this project is Natural Resources, which includes minerals, water, and agricultural features of the area, and possible ways to make 'Stickleyville' an environmentally friendly city. Generally, all geologic features and surrounding areas from the present are assumed to still exist, with the exception of central Morris County. The township is to accommodate a population of approximately 250,000. Interpreting local geology and mapping the area is the first step, as it is paramount to any further planning. Any environmental aspects of importance (e.g. wetlands) must be maintained or relocated as they are detrimental to its surroundings and the local ecosystem. If local geology is not fit to build upon, such as unstable silts and clays, then this must be addressed and planned around, or rather produce sound engineering facets that tackle such issues. After observing the area, it is situated over predominantly granite and gneiss to most areas and sedimentary rocks in others. Mapping skills are a positive for designing Stickleyville. The proposal and design of any new city or rural setting requires much deliberation and analysis so as to maximize its potential and not to harm surrounding environments which themselves can be detrimental to a new settling's success. Planning for this project earns no such exemption in detail, as 'Green' cities and technologies are extremely important and the way of the future for a sustainable human society.

P35: Presenter: Lady Ruiz
Advisor: Marilyn Tayler

The Humane Lethal Injection: Cruel and Unusual punishment?

The purpose of this research is to determine that lethal injection is cruel and unusual punishment even if administered by medical doctors. It is essential to examine the administration of lethal injection through an interdisciplinary approach in order to obtain a better understanding about its connection to cruel and unusual punishment. This research examines lethal injection through two sub-disciplines: constitutional law and medical ethics. Constitutional law considers the Eighth Amendment's cruel and unusual punishment clause and medical ethics considers the Hippocratic Oath as well as other doctrines of the medical profession that prohibit doctors from participating in executions. In addition, medical ethics considers the lethal injection protocol. This research demonstrates that because doctors are forbidden from participating in executions the issue of the inadequate administration of lethal injection is exclusively legal and that as such, the Supreme Court must consider an alternative method of execution if it decides to continue to have the death penalty.

P36: Presenter: Steven Spero
Co-author: Andrew McDougall
Advisor: Andrew McDougall

Modeling the Air Quality of the Hackensack Meadowlands

The Hackensack Meadowlands region is an ideal setting for monitoring atmospheric air conditions. The preserved wetlands are surrounded by Routes 3 and 46 to the North and South, and Route 7 and Interstate 95 on the West and East. Since these wetlands are preserved, we know atmospheric pollutants must be caused by the automobiles which travel these highways. By measuring pertinent air quality variables in this region, we can evaluate the environmental impact of pollutants through statistical analysis. Currently, times series methods have been employed to model certain pollutants (such as Nitrogen Oxides and Ozone) for the purpose of conducting a valid analysis of factors such as rush hour vs non-rush hour and weekday vs weekend. Future research will investigate how some of the important meteorological variables (e.g. sunlight, temperature, and wind speed) impact the observed pollutant levels. Ultimately, we would like to develop a reliable prediction model which could be used in real-time for monitoring pollutants in the Hackensack Meadowlands region.

P37: Presenter: Anna Tomaszewska
Advisor:: David Konas

Preparation and Characterization of 3-Aminopyridine Adenine Dinucleotide Phosphate

3-Aminopyridine adenine dinucleotide phosphate (AADP) is a structural analog of nicotinamide adenine dinucleotide phosphate (NADP). Unlike NADP, the AADP molecule is enzymatically non-reducible, and has fluorescence properties. These two features make it an attractive tool to study the NADP binding properties of enzymes involved in catalyzing electron transfer reactions. AADP was prepared from NADP through the action of mammalian NADase, and then purified by sequential ion-exchange and gel filtration chromatography. The purified AADP obtained was characterized by a variety of spectroscopic techniques.

P38: Presenters: Bijin Vadasserril and Vanessa Soto
Advisors: Lee H. Lee and Tin-Chun Chu

Study of Phycocyanin Gene and Primer Design in Cyanobacterium Synechococcus sp. IU 625 Cyanobacteria Synechococcus sp.

IU 625 is a unicellular photosynthetic prokaryote. It is a major causative agent of algal blooms in the environment. It possesses a light-harvesting complex containing many pigments such as chlorophyll, phycobilisome, phycoerythirin and phycocyanin etc. to absorb light at different wavelength. Phycocyanin is a unique blue pigment in cyanobacteria which gives them blue-green in color. This gene is a good candidate to use for PCR-based assay to detect cyanobacteria. In this study, 10 sets of primers have been designed from the entire phycocyanin gene using the genome information obtained from a very close related strain *Synechococcus elongatus* PCC 7942. The primers have been used to prime Syn. IU625 cells or DNA prepared from different methods. PCR products have been analyzed by using agarose gel electrophoresis. The obtained fragments from different priming sets have been sequenced using ABI prism 3700 Genetic Analyzer. The sequences have been assembled using CodonCode Aligner. BlastN and BlastP searches have carried out for the sequences generated. The results suggest that phycocyanin gene is highly conserved among *Synechococcus* species. The designed primers can be further used as general probes for indentifying cyanobacteria in the environment. This can be a useful tool for early detection and prevention of algal bloom.

Alphabetical List of Advisors

Adams, Sandra
Billings, Lora
Bologna, Paul
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Chy, Tin-Chun
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Gerber, Elaine
Goodey, Nina
Gorring, Matthew
Passchier, Sandra
Pope, Greg
Hazard, Lisa
Herbert, Katherine
Isidor, Jack
Jones, Michael
Konas, David
Kruge, Michael
Li, Aihua
Lee, Lee
Levine, Linda
McDougall, Andrew
Monsen, Kristen
Ophori, Duke
Rogers, Dorothy
Song, Baojun
Tayler, Marilyn
Thomas, Diana
Toney, Jeffrey
Vega, Quinn
West, Mary Lou
Wishnick, Elizabeth

Alphabetical List of Oral Presenters

Abhi-Hanna, Rabab	T-CSAM-06
Adeyemo, Olayinka	T-CSAM-15
Briceno-Pinar, Edgar	T-CHSS-09
Cheteyan, Leslie	T-CSAM-02
Ciesla , Ashley	T-CSAM-07
Dale , Cathleen	T-CSAM-12
Diamond, Dawn	T-CHSS-02
Duda, Katarzyna	T-CHSS-07
Erukanuree , Efe	T-CSAM-09
Espinosa, Venessa	T-CSAM-05
Galante, Steven	T-CHSS-11
Genser, Shari	T-CHSS-05
Hauptvogel, Dan	T-CSAM-08
Katchen, Deborah	T-CSAM-18
Kulick , Justin	T-CSAM-03
McCrary, Mary	T-CSAM-19
Malellari, Klodiana	T-CHSS-08
Markowitz, Marisa	T-CHSS-01
Marra, Jonathan	T-CSAM-04
Mauro, Andrew	T-CSAM-14
Mirro, Kristina	T-CHSS-10
Muniz, Marc	T-CSAM-16
Patel, Ronal	T-CSAM-10
Persaud, Medha	T-CSAM-17
Pettus, Christine	CHSS-04
Poku, Marynn	T-CSAM-11
Raspanti , Nicholas	T-CHSS-06
Roguski, Eric	T-CHSS-03
Urena, Libertad	T-CSAM-13
Wilson, Michael	T-CSAM-01

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