

Student Research Day

Wednesday, April 24, 2013

Gordon Science Center

Schedule of Events

Welcoming remarks – Dr. Judith Kirkpatrick, Provost, Vice President for Academic Affairs, Utica College - *Donabue Auditorium (Gordon 167)*

2:30 - 2:50 **Opening Speaker: Dr. Thomas Crist, Professor of Physical Therapy**

2:50 - 3:00 **Presentation set-up**

3:00 - 4:00 **Concurrent Oral Presentations, Sessions A, B, C, D, and E**

4:00 - 4:30 **Poster Presentations – Gordon 271**

SESSION A: Donahue Auditorium (Gordon 167)

Moderator: Dr. Lawrence Aaronson, Professor of Biology

3:00 - 3:15: Sequence-Specific DNA Binding of Small Peptides

- **Amanda Marsh and Caitlyn Moccaldi**

3:15 - 3:30: Sequence Specific Protein-DNA Interactions and Novel Peptidomimetic Drug Design

- **Michael Convertino and Jade Bonsel**

3:30 - 3:45: Casein Induced Changes in Surface Tension Modifies the Mode of Surface Translocation in *Bacillus cereus*

- **Kate E. Zeigler, Amanda Ferguson, and Meghan Morreale**

3:45 - 4:00: *Pseudomonas* Quinolone Signal Induces Pyoverdinin Production in a Novel *Pseudomonas* Species

- **Kristina Shikula**

4:00 - 4:15: Gene Expression Patterns in *Candida albicans* as a Result of Sphingosine Induced Hyphal Inhibition

- **Amela Jasarevic**

4:15 - 4:30: Isolation and Molecular Analysis of Enzymes D-Alanine Racemase and D-Alanine in Sphingosine-Resistant *Staphylococcus aureus*

- **Nives Vujanic and Yulia Vabishchevich**

SESSION B: Gordon 261

Moderator: Dr. Luke Perry, Associate Professor of Government and Politics

3:00 - 3:15: The Electoral College and American Democracy

- **Stacey Davis**

3:15 - 3:30: How the Role of 'Commander and Chief' Expanded Presidential Power

- **Alex Hobaica**

3:30 - 3:45: Discrimination and Oppression in American Society

- **Kishon Grant**

3:45 - 4:00: Measuring Political Risk in Turkey

- **Krysta West**

4:00 - 4:15: The Political Risk of Haiti: A good or bad investment?

- **Samuel Getman**

4:15 - 4:30: Pakistan and Political Risk Variables

- **Brandon O'Connor**

4:30 - 4:45: Political Risk Panel Discussion

SESSION C: Gordon 262

Moderator: Dr. Sara Scanga, Assistant Professor of Biology

3:00 - 3:15: Effects of 17- β estradiol on the Growth of *Lemna minor*, a Common Aquatic Plant

- Yulia Vabishchevich

3:15 - 3:30: The Effects of Silver Nanoparticles on Tobacco Growth

- Radhika Thakkar

3:30 - 3:45: Reproductive Success in Hermaphroditic Snails *Helisoma trivolvis* Exposed to Methanol

- Stephanie Calenzo

3:45 - 4:00: The Effects of Vibratory Stimuli During Seed Germination on the Growth of *Raphanus sativus*

- Farah Hamati

4:00 - 4:15: The Effects of Environmentally Relevant Concentrations of the Herbicide Atrazine on the Growth of Duckweed (*Lemna minor*)

- Andrea Blowers

4:15 - 4:30: The Effect of Artificial Night Lighting (Light Pollution) on Levels of the Thyroid Hormone, Thyroxine, in Developing Tadpoles of *Xenopus laevis*

- Praise Njoku Austin

4:30 - 4:45: The Effect of Light Pollution on Nocturnal Activity in Developing *Xenopus laevis* Larvae

- Joshua Visalli

SESSION D: Gordon 271

Moderator: Dr. Joseph Ribaldo, Assistant Professor of Physics

3:00 - 3:15: Hide and Seek: Archaeology of Play and Imagination at a Hypothetical Playground in Central New York

- **ANT 267 – Brian Twomey, Joshua Farro, Marrika Flowers-Dorsey, Wilbert Fernandez-Gonzalez, Maybeline Klepadlo, Allison Kollar, and Paul Ukena**

3:15 - 3:30: Temperature Dependence of the Coefficient of Static Friction

- **William Darman and Armin Rosic**

3:30 - 3:45: Is the Salary Cap an Effective Promoter of Competitiveness in the NBA?

- **Richard Paulsen**

3:45 - 4:00: Consumer Perceptions of Health Based on Packaging

- **Vasiliki K. Feggulis and Alexis March**

4:00 - 4:15: An Application of the Behavior Conditioning Model to the Case Study of a Residential Facility for Individuals with Developmental Disabilities

- **Maria DeStefano**

4:15 - 4:30: De Novo Drug Design Disrupting Domain Closure Present During the Auto-Activation of ERK

- **Romy Bhagat**

SESSION E: Gordon 272

Moderator: Dr. Juan Thomas, Associate Professor of Spanish

3:00 - 3:15: **Family, Society and Catholicism in Mary Doyle Curran's *The Parish and the Hill*, William Kennedy's *Ironweed*, and Frank McCourt's *Angela's Ashes***

- Snezana Djuric

3:15 - 3:30: **Bullfighting in Spain Today**

- Shauna Dieffenbach

3:30 - 3:45: **El Camino de Santiago: Representación literaria y cinematográfica (The Road of St. James: Literary and Cinematographic Representation)**

- Alexandra Almanzar

3:45 - 4:00: **Teaching Vocabulary in the Second Language Classroom**

- Shaylynn Dewey

4:00 - 4:15: **Risk Management in Mexican Agriculture**

- Joseph Buschor

4:15 - 4:30: **A Psychoanalytic Study of *Hamlet***

- Brandy Miller

POSTER SESSION: 5:00 PM Located in Gordon 271

ORAL PRESENTATIONS

SESSION A: Donahue Auditorium (Gordon 167)

Moderator: Dr. Lawrence Aaronson, Professor of Biology

Sequence-Specific DNA Binding of Small Peptides

Caitlyn Moccaldi and Amanda Marsh
Dr. Daniel Barr, Faculty Advisor

The binding of proteins to specific DNA sequences is responsible for several important physiological interactions, such as metabolism regulation. One mechanism by which proteins can identify their respective sequences is through direct readout of the DNA bases via hydrogen bonds between the protein and DNA. It has been demonstrated computationally that only small peptide sequences within the whole protein are necessary for binding with high affinity to specific areas of corresponding DNA. In our research we seek to experimentally demonstrate the sequence-specific DNA-binding ability of peptides that are four to eleven amino acids in length. The lactose and galactose repressor proteins from *Escherichia coli* will be used as models for this study due to wealth of available data for comparison, as well as ease of access to materials. Results will be presented relating to the synthesis of peptides, analysis by NMR spectroscopy, and DNA-binding assays to assess sequence specificity.

Sequence Specific Protein-DNA Interactions and Novel Peptidomimetic Drug Design

Michael Convertino and Jade Bonsel
Dr. Daniel Barr, Faculty Advisor

The interaction between proteins and DNA, specifically the binding of proteins to DNA, can depend on the interaction between a few amino acids with specific base pairs in the DNA. Previous studies have been performed to help better understand the interaction between the two molecules based on a chemical and physical nature by using molecular dynamics simulations of the *lac* and *gal* repressor. Since traditional peptides are unlikely to make effective drugs due to their amide bonds undergoing hydrolysis when introduced to a biological system, the development of peptidomimetic compounds has a bright future in drug design when targeting specific DNA sequences. In this study, we have used data gathered on atomic fluctuations, hydrogen bonding patterns, and interaction energies to not only better understand the binding specificity between the *lac* and *gal* repressors to their respective DNA sequences, but also to design a series of peptidomimetic compounds. Our

compounds were primarily designed on hydrogen bonding patterns, but also designed with software that also uses field points to compare different structural moieties to our reference peptide molecules, as well as very short peptide sequences that only contain two or four amino acids. We believe that the designed compounds will retain sequence-specific DNA-binding ability based on the data gathered from the simulations. Due to the replacement of the traditional amide bonds, our molecules should be better suited, and more stable in a cellular environment.

Casein Induced Changes in Surface Tension Modifies the Mode of Surface Translocation in *Bacillus cereus*

**Kate Zeigler, Amanda Ferguson, and Meghan Morreale
Dr. Lawrence Aaronson, Faculty Advisor**

Bacillus cereus is a motile Gram-positive bacterium that dwells in soil. On bovine milk agar, *B. cereus* exhibits sliding motility characterized by dendritic outgrowths from the colony mass. Data from our laboratory demonstrated that sliding in *B. cereus* was not due to a starvation effect. This suggests that one or more components of milk stimulate sliding motility in *B. cereus*. Previous data in our laboratory showed that major milk components do not induce sliding motility in *B. cereus*. Therefore, *B. cereus* was grown on tryptone agar supplemented with casein in concentrations equivalent to that in whole milk. Under these conditions, casein successfully induced sliding in *B. cereus*. Casein is a hydrophobic protein, so we hypothesized that the bacteria are responding to a change in the surface tension of the agar. To test this, *B. cereus* was grown on agar supplemented with the hydrophobic detergent NP-40, which also induced sliding in *B. cereus*. We tested whether the addition of casein or NP-40 altered the surface tension of tryptone agar and found that that these agents do alter the surface tension of the agar. This suggests that *B. cereus* modifies its mode of surface translocation in response to the physical change in its environment. Using transposon mutagenesis, we have isolated sixteen strains of *B. cereus* 14579 that do not exhibit sliding when grown on agar supplemented with milk or NP-40. DNA from mutant strains has been isolated and cloned in an effort to identify the genes involved in the regulation of sliding.

***Pseudomonas* Quinolone Signal Induces Pyoverdinin Production in a Novel *Pseudomonas* Species**

**Kristina Shikula and Stephanie Seifert
Dr. Lawrence Aaronson, Faculty Advisor**

Pseudomonas species produce quorum sensing molecules which relay signals regarding population dynamics of their surroundings. *Pseudomonas* sp. UC17F4, isolated in our lab in 2003, produces brown-pigmented colonies on nutrient-enriched media due to the synthesis of pyomelanin. Pyomelanin production in UC17F4 is cell density dependent, suggesting that quorum sensing may regulate synthesis. To study whether the addition of *Pseudomonas* quinolone signal (PQS) affects pyomelanin synthesis, we added PQS to UC17F4 growing in

minimal medium supplemented with L-tyrosine. Normally UC17F4 produces pyomelanin in this medium, but PQS induces secretion of a green fluorescent pigment. We hypothesized that this pigment is the iron siderophore, pyoverdinin, which was confirmed by spectrophotometric analysis. To investigate the mechanism of this pigment switch, we grew UC17F4 in the aforementioned medium at 30° C for 24 h, adding PQS at the time of inoculation, unless otherwise indicated. Secreted pyoverdinin was expressed as A₄₀₀/g wet cell mass. We observed concentration-dependent stimulation of pyoverdinin production, with a peak at 12.5µM PQS. Pyoverdinin levels were 2x greater in cultures receiving PQS at t=0 than t=12h after incubation. Addition of the quorum-signaling compound C4-HSL to media did not stimulate pyoverdinin production when added alone, nor did C4-HSL affect pyoverdinin production when added with PQS. Pyoverdinin production in minimal medium is tyrosine dependent, though the pigment is not produced in amino acid enriched media. PQS induction of pyoverdinin is also repressed by Fe³⁺ concentrations greater than 0.1µM. These data reveal a regulatory switch in pigment production in UC17F4 worthy of further study.

Gene Expression Patterns in *Candida albicans* as a Result of Sphingosine Induced Hyphal Inhibition

Amela Jasarevic

Dr. Lawrence R. Aaronson, Faculty Advisor

The ability of *Candida albicans* to undergo a yeast-to-hyphal transition has been shown to play an important role in its pathogenicity. Previous research on *C. albicans* has demonstrated that sphingolipids have an inhibitory effect on the morphological transition. The mechanism behind how sphingolipids inhibit hyphal formation in *Candida* is still unclear. Transcriptional profiling has shown that the expression of a number of genes in *C. albicans* is regulated during the yeast to hyphal transition, and we hypothesize that sphingosine may alter the patterns of gene expression in this organism leading to the inhibition of hyphal formation. Therefore, we examined the effects of sphingosine on the expression of selected regulated genes during hyphal induction. *Candida* was grown in both N-acetylglucosamine (NAG) supplemented media and calf serum supplemented media due to previously demonstrated differences in hyphal induction pathways between the media. Levels of mRNA were analyzed using reverse transcription-polymerase chain reaction (RT-PCR) with primers for the following genes: HWP1, ECE1, DDR48, CHT2. In NAG supplemented media, DDR48 shows a clear concentration-dependent decrease as well as a time-dependent decrease in gene expression. Inconsistent results were obtained for the other three primer sets. When compared to *Candida* grown in serum, a noted increase in gene inhibition was observed. These data suggest that sphingosine alters patterns of gene expression during hyphal induction and shows a media dependent difference in gene expression during sphingolipid inhibition of hyphal formation.

Isolation and Molecular Analysis of Enzymes D-Alanine Racemase and D-Alanine in Sphingosine-Resistant *Staphylococcus aureus*

**Nives Vujanic and Yulia Vabishchevich
Dr. Lawrence Aaronson, Faculty Advisor**

The salty quality and particularly DNA-rich epithelium of our skin provides an exceptional environment for *Staphylococcus aureus* colonization. However, naturally-occurring antimicrobial and skin lipid, sphingosine, has been discovered on the outermost layer of healthy skin and suggested to play a crucial role in skin health in maintenance of healthy levels of bacterial growth and colonization. Electron microscopy images suggest that sphingosine directly inhibits bacterial cell wall regeneration and plasticity, leading to lesions, lysis, and cell death. In this study we aimed to, at least partially, deduce the mechanism through which sphingosine induces bacterial lysis, with particular attention to the enzymes necessary for cell wall maintenance, D-alanine racemase and D-alanine ligase. Initially, a mutant library of sphingosine-resistant bacteria was created via ethylmethanesulfonate mutagenesis, and the DNA was subsequently extracted. These resistant strains functioned as enzymatic comparisons to wild-type sphingosine-inhibited stains. Our next objective includes PCR amplification and sequence analysis of the D-alanine racemase and D-alanine ligase genes of both mutant and wild type bacteria. Comparative sequence analysis may point to areas responsible for sphingosine resistance.

SESSION B: Gordon 261

Moderator: Dr. Luke Perry, Associate Professor of Government and Politics

The Electoral College and American Democracy

**Stacey Davis
Dr. Luke Perry, Faculty Advisor**

The Electoral College has been in place for over 200 years and successfully determined forty-four United States Presidents. Through evolution of the system and democracy, this research concludes the Electoral College undermines Democracy through removing the basic right of citizens to directly vote upon their president. Through examining controversial elections like those of 1800, 1876, and 2000, questions are raised whether or not the Electoral College system in the United States adheres to the ideas of democracy or not.

How the Role of ‘Commander and Chief’ Expanded Presidential Power

Alex Hobaica

Dr. Luke Perry, Faculty Advisor

Since its creation in the Constitution the Presidency has grown in tremendous power. Under Article II of the Constitution the President is given the titles of Chief Executive Office, Head of State and Commander and Chief. This report focusses on the growth of power in the Presidency as claimed under the title of Commander and Chief. More specifically, this report examines how the Presidency gained power as the Commander and Chief through Constitutional interpretation, executive orders and unilateral power. Through extensive research of American history this report tries to establish that the growth in power of the President as Commander and Chief can be categorized into three distinct periods based on the use of Constitutional interpretation, executive order and unilateral power.

Discrimination and Oppression in American Society

Kishon Grant

Ted Orlin, Faculty Advisor

Even though we try to progress forward and rewrite the wrongs we have committed in the past, discrimination has played an intricate part of our American history. Different forms of discrimination has affected our political, social, and even constitutional ideology and thought process in the molding of our great nation. Since the founding of this country many groups of people have been prosecuted and oppressed because of the labels we have attached to them. America has a history of discriminating individuals on the basis of race such as denying Africans Americans the right to vote or creating internment camps to hold Japanese American citizens. Women have also been denied certain rights and liberties simply because they were born female. Regardless of what type of discrimination has been implemented in American history, it had a significant part in shaping our government system and even our social norms. By using the method of intersectionality the different variables of discrimination are shown to be connected, and in doing so, manifest this system of oppression within society.

Measuring Political Risk in Turkey

Krysta West

Dr. Nathaniel Richmond, Faculty Advisor

The objective of this presentation is to demonstrate the level of political risk in Turkey. Doing so helps us understand the country of Turkey and the impact of recent and on-going events on its people. Two key variables, geopolitical and terrorism are used to determine the current level of political risk in Turkey. The terrorism variable, because of its catastrophic and unpredictable nature, is weighted for the purpose of this paper at 60%. The geostrategic

variable, whose sub-variables include relations with the European Union and Syria's on-going civil war, is weighted at 40%. Using an alpha scale where a grade of "A" indicates the maximum amount of risk and an "F" indicates the lowest possible level of risk, it was concluded that Turkey earned an overall letter grade of "A-" indicating a high degree of political risk in Turkey due to its high level of terrorism and problems caused by its location bordering the Syrian civil war.

The Political Risk of Haiti: A good or bad investment?

Samuel Getman

Dr. Nathaniel Richmond, Faculty Advisor

Haiti is a Caribbean country in which businesses and governments may consider investing. In order to assess the risk associated with investing in Haiti, one first needs to identify the variables that affect the country's degree of political risk, and then perform an analysis of these variables.

It was found that two variables applied to Haiti: economy and geopolitics, and each had various sub-variables, for example, weak government, unstable relations with the Dominican Republic, weak economy, poor environmental conditions, as well as the Haitian population. After identifying the variables and sub-variables, an analysis of each was undertaken. Using an alpha scale where a grade of "A" showed little to no risk and an "F" indicated a high level of risk, it was concluded that Haiti earned an overall letter grade of "C" indicating moderate risk to businesses and governments contemplating investing in Haiti.

Pakistan and Political Risk Variables

Brandon O'Connor

Dr. Nathaniel Richmond, Faculty Advisor

Pakistan is a country that needs to be extensively assessed before making any foreign business decisions. It's obvious that a company or a business can't predict everything that might happen, although, there are factors that could help predict if they might happen. This is where political risk analysis comes in. In the case of Pakistan, the political risk variables are security, political instability, geo-political, and economic issues. All are very significant to political risk. My analysis will explain each variable in depth and give each variable a grade based on a scale of A-F with A indicating lowest risk and F indicating highest risk. Overall, after analyzing all of the variables and sub-variables, I conclude that Pakistan is, without a doubt, a huge political risk for any international business.

SESSION C: Gordon 262

Moderator: Dr. Sara Scanga, Assistant Professor of Biology

Effects of 17- β Estradiol on the Growth of *Lemna minor*, a Common Aquatic Plant

Yulia Vabishchevich, Nives Vujanic, Kate Zeigler, and Meghan Matan
Dr. Sara Scanga, Faculty Advisor

Estrogen, a mammalian sex hormone, is a crucial signaling molecule vital in development, maturation, behavior, and reproduction in mammals. Although estrogen biosynthesis and receptors are particularly prevalent in mammals, estrogen-like receptors have been detected in invertebrates and plants as well. The steroidal nature of this hormone readily allows passive cell membrane diffusion and nuclear receptor binding. Estrogen is characterized as an endocrine disrupting chemical (EDC), due to its high potency and gene-regulating properties. Unfortunately, considerable amounts of EDCs, particularly estrogen, are released into the environment via sewers and wastes, resulting in multifaceted effects on surrounding environments and habitats. Duckweed (*Lemna minor*) a common aquatic plant, is a source of nutrients for species such as snails, organisms known to be adversely affected by unnatural estrogen uptake. In this study, we grew the duckweed in five environmentally-relevant concentrations of the estrogen 17- β estradiol (0.0, 1.0, 5.0, 25, and 75 mg/L 17- β estradiol) and measured plant growth via dry weight (biomass). In general, concentrations of 17- β estradiol greater than 5.0 mg/L resulted in increased duckweed biomass. Thus, 17- β estradiol increases the growth of *Lemna minor*. Future research may include exploring molecular regulation, uptake, and synthesis of estrogen in these plant cells, in addition to possible affects on invertebrates, including snails, that feed on this plant.

The Effects of Silver Nanoparticles on Tobacco Growth

Radhika Thakkar
Dr. Sara Scanga, Faculty Advisor

Nanoparticles (NPs) are becoming increasingly popular in agricultural pesticides. Current research is concentrated on synthesizing solutions of NPs of specific sizes and concentrations in order to maximize plant productivity, while minimizing both the need for multiple applications and ecotoxicity. The anti-microbial properties of silver NPs, specifically, strengthen plants against bacterial and fungal infections, allowing plants to grow more quickly and to achieve greater biomass. We are studying the effects of silver NPs of two different sizes applied at different frequencies on the above-ground and below-ground biomass of tobacco. Plants (n = 72) are separated into three treatment groups: control (sodium citrate buffer), 20nm NPs, and 40nm NPs. The plants will grow for 10 weeks before we apply the NP treatment either one single time, once per week, or not at all. I predict that

plant biomass will be greatest when larger NPs are applied more frequently. By helping to determine the ideal size and application frequency of silver NPs, this research can inform best practices in agriculture.

Reproductive Success in Hermaphroditic Snails *Helisoma trivolvis* Exposed to Methanol

Stephanie Calenzo and Courtney Healy
Dr. Terri Provost, Faculty Advisor

The organophosphate pesticide Chlorpyrifos is used extensively in agriculture and causes adverse effects on the nervous system, reproduction and growth. This chemical frequently appears in farm run-off, a common habitat for the aquatic snail *Helisoma trivolvis*. Previously we exposed *H. trivolvis* to concentrations of Chlorpyrifos, dissolved in methanol as a vehicle, commonly found in natural habitats to investigate reproductive success. In this study estrogen was significantly depressed in vehicle control (methanol) and all Chlorpyrifos treatments in a dose dependent manner when compared with controls, while testosterone and corticosterone were unaffected. These data suggest that methanol and/or chlorpyrifos may have negatively affected reproductive success. We designed the current experiment to test the impact that varying concentrations of methanol have on snail reproduction to determine a safe dose. We exposed forty pairs of snails to one of four methanol concentrations (0.1%, 0.3%, 0.5%, or 1.0%) or control (aged water) for 28 days. Reproductive physiology was determined by estrogen concentration and corticosterone concentration as an indicator of stress. Reproductive success was determined by egg masses per snail. Estrogen concentrations were significantly elevated in snails treated with 0.5% methanol ($p=0.039$). These animals also produced 14% more egg masses per snail than control animals. Corticosterone was significantly depressed ($p=0.047$) and egg mass production the least (0.32 per snails versus 0.611 per control snail) in 0.3% treated animals. It appears that methanol has an impact on egg mass production and stress induced reproductive changes at concentrations greater than 0.1%.

The Effects of Vibratory Stimuli During Seed Germination on the Growth of *Raphanus sativus*

Farah Hamati and Julio DeJesus
Dr. Sara Scanga, Faculty Advisor

Mechanical vibrations, such as those created by noise pollution, have been implicated in plant cellular changes including increased cell division and plant metabolism. They have also been linked to increased germination rates in the seeds of the common model plant *Arabidopsis thaliana*. We examined the effects of mechanical vibrations on *Raphanus sativus* (radish) plant growth. We hypothesized that increased frequency of vibratory stimuli would lead to increased plant biomass in both shoots and roots. We exposed radish seeds to no vibratory stimuli (control) or to vibratory stimuli of 40 Hz or 120 Hz for 16 h/d for a 4-day

period that coincided with the timing of seed germination. We then continued to grow the plants for an additional 26 days with no further vibratory stimuli. Both root and shoot biomasses were significantly greater in the 120 Hz group than in the control group. In contrast, root and shoot biomasses were no different in the 40 Hz group and the control group. Thus, short-term mechanical vibrations during seed germination seem to have longer-term positive effects on plant growth at the higher frequency of 120 Hz.

The Effects of Environmentally Relevant Concentrations of the Herbicide Atrazine on the Growth of Duckweed (*Lemna minor*)

Andrea Blowers, Erica Ciko, Infra Walayat, and Ksenia Perfilieva
Dr. Sara Scanga, Faculty Advisor

Atrazine is the one of the most commonly used herbicides because it inhibits the photosynthesis and growth of a wide array of plants. Inevitably, herbicides reach aquatic ecosystems and groundwater by runoff or leaching after application. Atrazine is one of the most frequently detected groundwater contaminants in the U.S. due to its widespread use. Although it has become one of the most prevalent groundwater contaminants, there is little information about its potential impact on plants in aquatic ecosystems. In this study, we test the effect of three environmentally realistic concentrations of atrazine on the growth of a common aquatic plant, duckweed (*Lemna minor*). Samples of duckweed were exposed to 0, 5, 20 or 40 ug/L of atrazine over the course of two weeks, then dried and weighed to measure biomass. The mean biomass of plants in the control group (0ug/L atrazine) was significantly greater than the mean biomass in each of the treatment groups. These data indicate that environmentally relevant concentrations of atrazine over a short exposure time decrease the growth of common duckweed. This information can be used in assessing the impact of herbicides on aquatic plants, which are a vital component of aquatic ecosystems.

The Effect of Artificial Night Lighting (Light Pollution) on Levels of the Thyroid Hormone, Thyroxine, in Developing Tadpoles of *Xenopus laevis*

Praise Njoku Austin
Bryant Buchanan, Terri Provost, and Sharon Wise, Faculty Advisors

Light pollution (artificial night lighting) from buildings and street lamps is increasingly encroaching into natural habitats. Artificial light at night can influence growth and development, because many physiological functions are modulated by melatonin and other hormones that exhibit photoperiodic diel rhythms. In the African Clawed Frog *Xenopus laevis*, thyroxine (T_4 ; a thyroid hormone) production is increased at night; T_4 concentrations are higher before, but drop just prior to metamorphosis. We studied the effect of increased nocturnal illuminations on T_4 levels in frogs approaching metamorphosis. We predicted that artificial night lighting would alter T_4 levels in tadpoles compared to those maintained at normal dark light levels and that those reared at the brightest illuminations would show the greatest difference in T_4 levels. To test this hypothesis, tadpoles were maintained under a

12L:12D photoperiod with daylight levels of 100 lx in all treatments and night illuminations of 0.0001, 0.01, 1, or 100 lx. After 37 d, tadpoles were euthanized during the night and frozen at -78C until T₄ assays were conducted using tube-coated solid phase RIA on whole body homogenates. We found that tadpoles exposed to nocturnal illuminations of 100 lx showed significantly higher levels of T₄ than tadpoles exposed to darker illuminations. Those exposed to intermediate light levels exhibited the lowest concentrations of T₄. Because T₄ is important during development, artificial night lighting has the ability to alter T₄ levels that in turn may alter the timing of metamorphosis in tadpoles.

The Effect of Light Pollution on Nocturnal Activity in Developing *Xenopus laevis* Larvae

Joshua Visalli

Dr. Bryant Buchanan and Dr. Sharon Wise, Faculty Advisors

Light pollution, artificial light at night, is a stressor that can have multiple physiological effects on amphibians living in light polluted environments, including potential developmental consequences; such consequences have only been superficially explored. Anurans frequently breed and oviposit in sites that are affected by light pollution (e.g., street lamps illuminating roadside ditches). Prior research in our lab has demonstrated that even small amounts of light at night can slow development and speed growth in larvae of the African Clawed Frog *Xenopus laevis*. It is possible that differences in growth and development are the result of light-mediated differences in feeding activity or locomotion. We are currently studying growth, development, and nocturnal activity of larvae exposed to different levels of night lighting. Forty-eight developing tadpoles have been exposed to 12h of daylight (100 lx) and four different levels of night lighting (100, 1, 0.01, and 0.0001 lux) for 12 h each night. Each lighting treatment is replicated across four lighting chambers with four tadpoles developing in each chamber. We are monitoring growth and development using digital photography and measurement software. We will observe nocturnal activity of tadpoles using infrared videography and motion analysis software. To measure variation in levels of activity and compare among treatments, we will measure duration of movement and distance moved during the 2h at the beginning of scotophase (night) in each lighting treatment.

SESSION D: Gordon 272

Moderator: Dr. Joseph Ribando, Assistant Professor of Physics

Hide and Seek: Archaeology of Play and Imagination at a Hypothetical Playground in Central New York.

Brian Twomey, Joshua Farro, Marrika Flowers-Dorsey, Wilbert Fernandez-Gonzalez, Maybeline Klepadlo, Allison Kollar, Paul Ukena

Dr. Helen Blouet, Faculty Advisor

This presentation documents research conducted by the current ANT 267: Introduction to Archaeology class. Class members excavated a portion of a mock-archaeological site designed by Professor Helen Blouet of the Sociology and Anthropology department. The purpose of this presentation is to explain how the students performed excavation, site analysis, and artifact identification in order to draw preliminary conclusions about a hypothetical archaeological site that was once a playground where boys and girls amused themselves with many toys and spent time with family members. Overall, this project presents the utility of a variety of archaeological and analytical methods in the reconstruction and interpretation of human behaviors at a hypothetical and historic playground site.

Temperature Dependence of the Coefficient of Static Friction

William Darman and Armin Rosic
Dr. Lawrence Day, Faculty Advisor

The coefficient of static friction is the ratio of the friction force needed to keep an object in equilibrium and the normal force exerted on that object by the surface. This coefficient is thought to be a constant in most circumstances, but the theoretical basis for the coefficient of static friction is not well understood. The current theory about static friction is that there is slight bonding between the two surfaces. If this theory is correct, there then should be circumstances that result in the coefficient of static friction changing value. In other words, there should be ways to disrupt or increase the bonding process.

We will heat different materials and measure the coefficients of static friction. To collect this data, we will use a metal plate on an incline and place different materials on this metal surface. By heating the metal plate, we will in turn heat the object placed on it. The incline is pinned on one end and is allowed to rotate around the pin. We measure the angle of sliding at room temperature and in temperature increments of ten degrees Celsius. If the angle of sliding changes, the coefficient of static friction changes as well. From this data we create a graph of the coefficient of static friction as a function of temperature. We should be able to gain insight on the force of friction and how it behaves in various materials.

Is the Salary Cap an Effective Promoter of Competitiveness in the NBA?

Richard Paulsen

Dr. Rick Fenner, Faculty Advisor

This research aims to determine the effectiveness of the National Basketball Association's salary cap in promoting competitiveness. The objective of the salary cap is to promote a more even distribution of talent across teams, and therefore increase parity in game outcomes. Using league data from 1946 to 2012, multiple regression analysis attempts to determine if this actually occurred. Competitiveness is measured in two ways. One model examines the relationship between the salary cap and regular season results. Another analyzes the relationship between the cap and the post-season. This study finds very interesting results. When looking at post-season results, the salary cap is found to have increased the level of competitiveness, as expected. Surprisingly, the opposite result was found when looking at the relationship between the salary cap and competitiveness in the regular season. One possible explanation for this finding is that the "Larry Bird exception" to the cap, which allows teams to re-sign their own veteran free agents even if total payroll exceeds the cap, prevents weaker teams from acquiring the best players, while helping the strong teams to keep their better players. This exception may benefit the top tier teams, those making the post-season, while hurting weaker teams, thereby decreasing competitiveness during the season.

Consumer Perceptions of Health Based on Packaging

Vasiliki K. Feggulis and Alexis March

Professor Elizabeth W. Burback, Faculty Advisor

This research study sought to uncover consumer's perception of the overall healthiness of a product based solely on packaging, price and previous knowledge and experience with the brand/product. The researchers sought to gain a better understanding of these perceptions through a paper survey that required participants to give information about their own health, their perceptions of nutrient claims, information regarding the subset being analyzed (granola) and basic demographics. Results of the study showed that the health claims "all natural" and "organic" were indicators of a high level of overall health. Less than ten percent of the sample was able to correctly identify which product was the healthiest.

An Application of the Behavior Conditioning Model to the Case Study of a Residential Facility for Individuals with Developmental Disabilities

Maria DeStefano

Dr. Dana Hart, Faculty Advisor

In the past, individuals with Down syndrome (DS) were institutionalized, had an expected lifespan of 25, or lived in communities where autonomy or independent living was not allowed or promoted. Today, individuals with developmental disabilities, particularly those with DS, have greater opportunities, including access to communities across the country that foster independent living. This foundational study explored perceptions of residents and families served in a Northern residential community for individuals with developmental disabilities (primarily DS) using the Behavior Conditioning Model (BCM) (Hart, 2013). The model emerged from a series of literature analyses conducted to understand the complex variables and interrelatedness of behavior theories and models. One-on-one semi-structured interviews and focus groups were conducted with the four stakeholders (N=128) at the community regarding perceptions of organizational structure, service delivery processes, and support expectations. Data were coded and analyzed with the help of NVivo 10 and the Delphi method. Preliminary findings showed consistent themes and evolving patterns similar to the construct domains of BCM. An organizational inquiry model was developed for the community. Stakeholder experiences and the new model served as a process guide to understand the essence of the community fostering life with meaning for residents. Individual stories of the four stakeholder groups predominantly minimized resident disability and maximized experiences of an integrated community with a shared vision. Future research in interpretation of the construct value can lead to replication of the model and inquiry process in other non-profit organizations.

De Novo Drug Design Disrupting Domain Closure Present During the Auto-Activation of ERK

Romy Bhagat

Dr. Daniel Barr, Faculty Advisor

Extracellular signal-regulated protein kinases (ERK) are important in the ras-raf signaling transduction pathway, crucial in regulating cell division. ERK belongs under the family of mitogen-activated protein kinases (MAPK's), which are important proteins regulating cell proliferation. ERK 2 is the protein kinase we are working with, and it exists in 2 forms: inactive state (Erk1), and the active state (ERK 2), which are the same proteins. Cancer can proliferate when these protein kinases undergo an autoactivation caused by two phosphorylation events, which leads to the N-domain closing over the C-domain, leading to domain closure. Previous studies have worked on introducing drugs to inhibit the auto-activation of ERK2 via different binding sites. The current study examines a new binding site on ERK 2, Q64-D334, which are important in domain closure and first computationally make a drug to be later synthesized, in order to help disrupt domain closure. Visual Molecular Dynamics software will be used to help with mapping out important distances in the protein. Functional group analysis will be conducted post VMD to help

construct the drug of interest to be places in the area where domain closure is occurring. Currently three test molecules have been proposed to disrupt the domain closure activity involved in ERK2. Further research will be conducted to see if the proposed drug molecules can stick together with themselves before trying to have them interact with ERK 2.

SESSION E: Gordon 272

Moderator: Dr. Juan A. Thomas, Associate Professor of Spanish

Family, Society and Catholicism in Mary Doyle Curran's *The Parish and the Hill*, William Kennedy's *Ironweed*, and Frank McCourt's *Angela's Ashes*

Snezana Djuric

Dr. Lisa Orr, Faculty Advisor

Adam Chao and Dan Spencer state in their article *Immigration: The Journey to America* that "Emigrating to the U.S. wasn't the magical solution for most of the immigrants. Peasants arrived without resources, or capital to start farms or businesses. Few of them ever accumulated the resources to make any meaningful choice about their way of life" (Chao and Spencer). What saved many of these families was a great demand for labor to build railroads and tracks connecting the country, which was expanding. Over the course of years, millions of the Irish emigrated to the United States, bringing their families with them and trying to adjust to this new way of life while preserving as much of their cultural background as possible.

The novels *The Parish and the Hill*, *Ironweed*, and *Angela's Ashes* describe the life of the Irish in America, emphasizing the importance of family and certain roles within it through the descriptions of families the reader encounters in the works. Moreover, the works stress the importance of religion, that is to say Catholicism, for the Irish through descriptions of church life and icons and other artifacts the Irish decorated their houses with. Finally, the authors focus on the attitudes among the members of society, both among the Irish themselves and between the Irish and the Americans, as illustrated in the interactions among the characters in the novels.

The paper explores these topics trying to find the cause of the problems as depicted in the works relying on the journal sources as well as other critics of the works in question. Finally, it ends showing that even though the Irish immigrants went through much trouble, today their descendants live immersed into the American culture, contributing to it and enriching it with their cultural background.

Bullfighting in Spain Today

Shauna Dieffenbach

Dr. Juan A Thomas, Faculty Advisor

Bullfighting has changed in popularity throughout Spain, even though many non-Spaniards still consider it to be a monolithic cultural symbol of the entire country. The *corrida* (bullfight) has taken on new meanings since the end of the Spanish dictatorship in 1975. Today, bullfighting in Spain reflects current nationalistic and separatist sentiments, especially considering which of the 17 autonomous communities permit it. They are divided based on whether bullfighting should or should not be banned from their community. Many communities have banned bullfighting because bullfighting is a violation of animal rights or there is a lack of interest within that community. Cataluña, for example has banned bullfighting for identity reasons since the Catalans do not identify themselves as Spanish but as Catalans. Many autonomous communities like Andalucía and Castilla-La Mancha are striving to protect bullfighting due to its ties to Spanish roots and traditions. Cataluña and the Canary Islands have both banned bullfighting from their communities because of animal cruelty concerns yet they continue to practice their own traditions which are just as cruel to animals. The new phenomenon of female *matadores* has also questioned the traditionally male-dominated *corrida* in contemporary Spain. The impact of female *matadores* within the ring has been disputed by spectators and by male *matadores* as well. Many challenge female *matadores* like Christina Sanchez because bullfighting is viewed and believed as being strictly a male sport. Women have their place in society, but in a bullfight they should be spectators and not in the ring fighting the bull.

El Camino de Santiago: Representación literaria y cinematográfica (The Road of St. James: Literary and Cinematographic Representation)

Alexandra Almanzar

Dr. Juan A. Thomas, Faculty Advisor

This research project examines the representation of the road of St. James (*El Camino de Santiago*) in contemporary literature and cinematography. The road of St. James has helped diffuse cultural practices and beliefs since the Middle Ages. It has also been the main inspiration for some of the most acclaimed literary works of today and it is a rising topic for cinematographic works. The road of St. James has been a major part of Spanish and French history as well as a way of perpetuating Catholicism. To explore the role of the road of St. James as an influence in modern literature and cinematography, this dissertation analyzes some contemporary literary publications and movies that depict different ways in which the road of St. James has been represented. Also, this analysis focuses on the symbolism and illustration used by the different authors and directors to convey several aspects of the history of the road, as well as historic insight on how the existence of this road has shaped Christian religion, influenced tourism, been represented with traces of mysticism, and most importantly, to show its major importance for the cultures of Spain and France.

Teaching Vocabulary in the Second Language Classroom

Shaylynn Dewey

Dr. Juan A. Thomas, Faculty Advisor

Learning a second language has become a necessary part of education in the past few decades. More and more immigrants are moving to the United States, most of whom know little to no English, and knowing a second language helps greatly when job searching, meaning that second language classes are becoming more important, and slowly becoming necessary to graduate in high schools and colleges. Research into more effective pedagogical methods will enhance language acquisition. I collected information from several sources and used them to decide on strategies to teach Spanish vocabulary to first semester college students. I taught three lessons of a Spanish 101 class. These lessons were on teaching the number vocabulary; the first lesson being numbers 0-39, the second being numbers 40-200's, and the final lesson was on the numbers 300 into the thousands. I taught 30 minute lessons that mixed total physical response, the cognitive method, and the communicative method. All three lessons had a pretest, followed by a lecture, combined with a PowerPoint presentation, then an activity to practice the vocabulary and a posttest. All three lessons had similar outcomes in the difference between the pretests and posttests, with the majority of the students doing better on their posttests than their pretests. However, the lesson that had the greatest student improvement on the posttest was the final one.

Risk Management in Mexican Agriculture

Joseph A Buschor

Dr. Juan A. Thomas, Faculty Advisor

The objective of my research is to show the clear relation between agricultural and social-economic stability in Mexico during the past 100 years. Agriculture has always been a staple sector in the Mexican economy and provides almost 25% of the country's employment. The Mexican government has tried to protect this industry from risk throughout the past 70 years. Their aggressive tactics of risk management, with programs such as CONASUPO, protected the agricultural sector from many of the risks it faced. Due to the changing politics and demographics in Mexico, it has had to change its tactics to accommodate the new or altered risks. The most drastic risk it faced was the liberation of its markets in 1994, which made some of its previous risk management methods (e.g. price control) obsolete. The new programs would reflect the demographics of the society and put commercial growers in a more favorable position. The new market has also eliminated the monopoly the government had over the crop insurance market and has allowed for the formation of mutual insurers and also the entrance of large private insurers. Their entrance into the market has helped with efficiencies and with greater protection to the producer.

A Psychoanalytic Study of *Hamlet*

Brandy Miller

Dr. Jason Denman, Faculty Advisor

For my research project, I decided to examine Shakespeare's *Hamlet* through a psychoanalytic lens—I analyzed both textual and film interpretations of the play to accomplish this goal. It is not a recent proposition that within an individual, there is a dissonance between body and soul. This tension stems from the fact that while the corporeal self is fallible to the temptations of society, the ethereal being is drawn to the fulfillment of idealistic virtues. Therefore, if one is to achieve ultimate purity, they must separate themselves from the body and live only in terms of the soul. This notion is prevalent in Shakespeare's tragedy and is evident in the film by director Michael Almereyda starring Ethan Hawke as Hamlet. The film employs a variety of techniques such as special camera angling, a repetition of reflective surfaces, and psychological undertones to shed light on this thematic notion. For Hamlet, there is an obvious discord between his ideals and the realities of his life. The only way he can cope with these "mighty opposites" is to become a man completely rooted in his psyche-- an individual who, in denouncing the worth of the body, becomes separate from the vices of the flesh. My research has shown that Hawke's careful performance coupled with the artistic endeavors of the producers consistently highlight this specific interpretation of the text. Time and again, the film sheds light on this psychoanalytic theme, attributing dominance to Hamlet's ethereal self above all else.

POSTERS

Located in Gordon 271

Synthesis and Characterization of alpha-Helical Mimetics for Protein Binding Studies

Shaquille Barnes

Dr. Daniel Barr and Dr. Michelle Boucher, Faculty Advisors

Peptide drugs are becoming increasingly desirable due to their specific binding ability which results in significantly reduced side effects. However, peptide drugs must be delivered intravenously in order to avoid hydrolysis in the stomach. Consequently, the molecules that mimic the structure of peptides but employ a different scaffold have great potential as drug candidates. Such molecules will serve to elucidate the chemical interactions that govern protein-DNA binding as well as providing templates for the development of new pharmaceutical therapies.

Our goal for this project was to synthesize and characterize a series of cyclic ketone compounds to be studied for their effectiveness as a mimetic of protein alpha-helical

secondary structure. A known compound, methyl-substituted 1-indanone, has been identified as a scaffold with potential as a mimetic due in part to the ketone's ability to act as a hydrogen-bond acceptor but not as a donor. This compound is synthesized in two steps: formation of the amide from 3-(4-methylphenyl)propionic acid followed by an internal Friedel-Crafts acylation to form the cyclic. Further reactions focused on synthesizing new derivatives through bromination of the methyl substituent and subsequent substitution of the bromine. These derivatives retain the general scaffold, including the hydrogen-bonding active ketone group, while increasing the polarity at the methyl substituent.

The eventual goal is to keep the scaffold intact while introducing a wide variety of functional groups on the methyl, including groups with hydrogen-bonding capability. After synthesis and characterization, these compounds will be studied for their DNA-binding ability through gel shift mobility assays.

Design and Synthesis of Bioxazoline N-Heterocyclic Carbene Palladium/Nickel catalysts and their Application in Sonogashira Cross Coupling Polymerization Reaction

**Andrew C. Dziekan, Daniel R. Wolfanger, Robert Heath
Dr. Catherine N. Malele, Faculty Advisor**

Palladium-catalyzed coupling reactions have been recognized as extremely useful tools in organic synthesis for the formation of carbon-carbon or carbon-heteroatom bonds. The Heck reaction is among the most important due to its high tolerance of functional groups and general applicability in organic synthesis. This reaction generally proceeds in the presence of palladium catalysts associated with phosphine ligands which could stabilize the active palladium intermediates. However, the synthetic procedure involves the use of an expensive moisture and air sensitive palladium-phosphine catalyst that requires careful storage and manipulation in moisture-air free conditions. It is therefore not surprising that interest in the development of new catalytic systems for this process continues. In our research, we have been developing air/moisture stable catalytic systems based on N-heterocyclic bioxazoline ligands from simple, inexpensive amino acids such as *L*-phenylalanine, *L*-valine, *L*-histidine, *L*-proline and *L*-tryptophan. The bioxazolines ligands have been synthesized and characterized by NMR spectroscopy.

Design, Synthesis, Characterization and photophysical studies of Molybdenum-Riboflavin RF-Mo Complex.

**Nichole C. Johnson
Dr. Catherine N. Malele, Faculty Advisor**

Riboflavin (RF) a water soluble vitamin (B₂), its several derivatives and in general flavins are the subject of interest in different fields. The photophysical studies of RF are vastly investigated along with limited reports on its interaction with metals in solution phase but

those detailed photophysical studies of a synthesized metal complex of RF are not available till to date to the best of our knowledge. The RF-Mo complex can be used as a model to envisage an *in vitro* interaction where Mo(V), necessary for the function of some important enzymes in human body is bound to the isoalloxazine moiety of RF, an essential nutrient. This article is relating to spectroscopic investigation for the aqueous solution of RF-Mo, a Mo (V) complex of RF, synthesized and characterized by IR analysis recently in our lab. Fluorescence emission quenching in the presence of indole and pyrrole will be carried out and the data will be subjected to Stern-Volmer analysis.

Isolation and Analysis of Mutants of a Novel *Pseudomonas* Species That Are Defective in Production of Antifungal Compounds

Christopher Kibanda

Dr. Lawrence Aaronson, Faculty Advisor

Female red-backed salamanders (*Plethodon cinereus*) lay their eggs on the floor of northern forests and are often destroyed by molds in the soil. Female salamanders have evolved a distinctive nesting behavior in which they make frequent bodily contact with the nests, thus preventing destruction of the eggs by fungi. It has been hypothesized that the salamanders secrete antifungal compounds in their skin that rub off on the eggs to prevent fungal overgrowth, but no such compounds have yet been discovered. However, our lab has isolated several species of bacteria from the cutaneous microbial flora of the salamanders that secrete potent antifungal compounds. One of these, *Pseudomonas* sp. UC17F4 appears to be a novel species. Attempts to isolate and identify the antifungal secretions from this bacterium have been difficult, so we have chosen to take a molecular biology approach to the problem. Transposon-mediated mutagenesis has been employed to isolate mutant strains of UC17F4 that are deficient in the production of antifungal compounds. Transposon-containing, kanamycin-resistant strains were screened for their inability to inhibit the growth of the pathogenic yeast *Candida albicans* and filamentous mold *Neurospora crassa* in agar plate bioassays. Genomic DNA was isolated from these strains and PCR was used to amplify the DNA sequences flanking the transposon in the disrupted genes. The DNA sequence of PCR amplicons is being analyzed to identify genes involved in the production of antifungal compounds in *Pseudomonas* sp. UC17F4.

Sequence-Specific DNA-Binding Behavior of GCN4

Danielle McHarris

Dr. Daniel Barr, Faculty Advisor

Gcn4 is a basic leucine zipper (bZIP) protein and is the main regulator of the transcriptional response to amino acid starvation in yeast. When bound to DNA, a “chopstick-shape” is formed and an antagonistic folding occurs. By performing computer simulations on the 100ns timescale, we are able to understand how GCN4 recognizes these

DNA sequences. To understand the interactions responsible for sequence-specific binding, we are analyzing: hydrogen bonds, electrostatic interactions, RMSF, RMSD, and patterns in atomic fluctuations.

Fieldwork Experience and Physical Therapy: Assessment and Treatment at a Senior Center

Madalana Pegues

Dr. Ashraf Elazzazi and Dr. Michelle Boucher, Faculty Advisors

Fieldwork is a vital part of the program of study in the Physical Therapy program at Utica College. One of the fieldwork sites is a Wellness and Prevention Program at a Senior Center where students can participate in the client care process from initial assessment through treatment and outcome. Seniors receive health and wellness screening and preventive interaction with a student, under direct supervision of faculty members and clinicians.

After assignments of students to mentors and clients have been made, the process begins with an initial evaluation of the client. This involves taking a client history and administering an exam which includes testing such as sensation, manual muscle tests, and other tests based on need. The data gathered in the history and tests allows the team to make a prognosis, and if the prognosis is within an area treatable by the team, to formulate a treatment plan.

In this poster, a case study of one student/mentor/client interaction will be presented and discussed. Outcomes of the client and personal reflections of the student will be used in the discussion and assessment of the experience.

Petrography, Field Relations and Geochemical Analysis of Ordovician Metamorphosed Mafic Igneous Rocks of the Caucomgomoc Lake Inlier, Northern Maine

Daniel R. Plows

Dr. Adam Schoonmaker, Faculty Advisor

The Hurd Mountain Formation occurs in the Caucomgomoc Lake region of northwestern Maine, part of the Cambro-Ordovician Caucomgomoc Lake inlier. It is primarily a mélange of probable Ordovician age consisting of deformed slates, phyllites, metasediments and metawackes that contains knockers of metagabbros and metabasalts. The knockers exhibit lower greenschist grade metamorphism (chlorite, actinolite, calcite, opaques and epidote). Remnant, partially metamorphosed pyroxenes and plagioclases are present in some samples and display igneous fabrics.

Whole rock geochemical analyses (XRF and ICP-MS) were made of the metabasalt and metagabbro knockers for trace and rare earth element concentrations. A relatively flat pattern on the chondrite-normalized spidergram suggests a depleted mantle source for the knockers. The MORB-normalized spidergram shows a slight negative slope and Th and Ce

are slightly enriched between 1 and 10 times N-MORB with a distinctive Ta-Nb negative anomaly suggesting a volcanic arc tectonic setting. On some tectonic discrimination plots (Zr-Ti-Y, Th-Hf-Nb, Zr-Y-Nb), samples plot in both MORB and arc overlap fields, or plot across the MORB and arc field boundary. On the Th/Yb-Ta/Yb diagram samples plot exclusively in the arc fields, but in contrast, plot entirely outside of the arc field on the Ti-V diagram with a V/Ti ratio of greater than 20. On some diagrams (Zr-Ti-Y, Ti-V, Zr-Nb-Y) samples also plot in fields that overlap with within-plate continental tholeiites. However, this is not consistent with observed field relations. Overall, these data are transdiscriminant, displaying characteristics of both MORB and volcanic arc tectonic settings.

The geochemical data obtained from the Hurd Mountain Formation show a strong similarity with the data from the Chesuncook Dome area (Bean Brook Gabbro and Dry Way Volcanics), interpreted to be the result of ridge subduction. A similar conclusion applied to the knockers of the Hurd Mountain Formation is consistent with both their field relations and geochemical signature.

Characterization of Noble Metal Nanoparticles: Study of pH Effects

Sai Han Myo Tun

Dr. Alyssa Thomas, Faculty Advisor

A nanometer is one billionth of a meter (10^{-9} m) and represents the collection of few molecules or atoms. At this scale (1-100 nm), the properties of materials become dependent on their size and shape compared to the bulk state. The physical and optical properties have very unique features due to electron confinement and high surface to volume ratios. Among these are noble metal (copper - Cu, gold - Au and silver - Ag) nanoparticles (NPs) that to the naked eye will appear colored in solution from pale red to black, depending on the NPs size and distribution. These colors are due to surface plasmon resonances which are sensitive to small changes in the particle size. This work will analyze the relationship between size and size distribution of synthesized Au NPs and initial concentration of reagents as well as the stability of the synthesized Au NPs in various pH environments.

The Impact of Agriculture Industries in the Caribbean

Christopher Urena

Dr. Linda Zee, Faculty Advisor

This paper reports on an ongoing research on the impact of agriculture industries in the Caribbean. In this paper, I will be discussing my experience in a new venture of owning a green house in the Dominican Republic and describing the steps to get into the agriculture industries and know the business itself like land, water systems, nutrients for you plants, and etc. This paper analyzes and focuses on dealing with the hazards, economy, wages, innovation and being profitable in this industry.

Ethical Guidelines

Institutional Review Board (IRB)

The research projects presented at this forum that involve human subject participation were reviewed and approved by Utica College's Institutional Review Board. The IRB's purpose is to assure that appropriate steps are taken to protect the rights and welfare of humans participating as subjects in a research study. IRB works to ensure that student research projects with human participants maintain ethical standards, use appropriate research methods, fully promote informed and voluntary participation, and create protocols to protect the safety of its participants.

Institutional Animal Care and Use Committee (IACUC)

If research presented by students at this forum involved the use of non-human vertebrates (and octopuses), the proposals were reviewed and approved by the Institutional Animal Care and Use Committee (IACUC). The function of the IACUC is to assure that procedures used to test these animals are appropriate and that the well-being of these animals are considered in the design and implementation of experiments.

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