
Key Note: Glen Scheyd, Division of Social and Behavioral Sciences – “The Misanthrope's Love Song: Notes from an Inside Observer”

Undergraduate Student Symposium 2010: Research Abstracts

A Dream of Flying, A Dream of Death.....	9
Daniel King Faculty Advisor: Dr. Suzanne Ferriss	
Adhesion of Protein Transferrin on FDA Group II Omafalcon Contact Lenses.....	10
Sophia Cuprill Nilson, Brooke Liberman and Darshan Solanki Faculty Advisors: Dr. Andrea Janoff and Dr. Edward Keith	
An Alaskan Adventure: The Search for its Fauna and Microorganisms.....	11
Renato Balducci Faculty Advisors: Dr. Paul Arena and Dr. Julie Torruellas Garcia	
Attack and Intrusion Analysis across the Public Internet.....	12
David Perez and Robert Rizzi Faculty Advisor: Dr. Saeed Rajput	
Bandages.....	13
Michael McGregor Faculty Advisors: Dr. Chetachi Egwu and Dr. Weylin Sternglanz	
Boaters and Beach Goers Survey for John U. Lloyd State Park.....	14
Kaitlin De'Aeth, Jennifer Anders and Amy Elliott Faculty Advisor: Dr. Edward Keith	
Boxed In: Examining Faulkner’s Linguistic Silhouette of Addie’s Interment.....	15
Amanda Thompson Faculty Advisor: Dr. Christine Jackson	
Bromelain-Induced Apoptosis in the GI-101A Breast Cancer Cell Line.....	16
Honey Diaz Perez Faculty Advisors: Dr. Mark Jaffe and Dr. Appu Rathinavelu	

Cement Gives a Concrete Solution to Nuclear Waste Disposal.....	17
Inna Dumova, Catalina Rodriguez, Constantina Rando, Brittany Lape and Sazedul Khan Faculty Advisor: Dr. Dimitrios Giarikos	
Changes in Coral Cover (<i>Diaseris distorta</i> and <i>Porites sverdrupi</i>) at Isla Catalana, Gulf of California, Mexico	18
Mary Crider Faculty Advisor: Dr. Joshua Feingold	
Chemical Composition of Atmospheric Aerosols in South Florida: From African Dust to Red Tides	19
Crystal Ming Faculty Advisor: Dr. Song Gao	
Common Foot Disorders in Health Fair Participants.....	20
Kimberly Giordano Faculty Advisor: Dr. Mark Jaffe	
Comparison of Methods to Extract Total RNA from Diverse Marine Sponges..... for the “Porifera Tree of Life” project	21
Crystal Romero Faculty Advisor: Dr. Jose V. Lopez	
Computer Simulation of a Chaotic Chua Circuit.....	22
Bryan Candela Faculty Advisor: Dr. Victor Castro	
Confirming 18S rDNA Polymorphism among Helicosporidium Isolates using Restriction Fragment Length Polymorphism (RFLP) Analysis	23
Stephanie Liu Faculty Advisor: Dr. Aurelien Tartar	
Correlation of Molecular Mechanics to the Red Shift in the Optical..... Absorption of Phenylsubstituted Porphyrins	24
Kristen Franchy, Juliana Ospina and Walter Castro Faculty Advisor: Dr. Maria Ballester	

Cyber-Security in Public Places: Secure Practices for using an Email Client.....	25
Lucas Arregui Faculty Advisor: Dr. Saeed Rajput	
Electrophoretic Karyotyping of Lagenidium giganteum.....	26
Stephanie Giordano Faculty Advisor: Dr. Aurelien Tartar	
Emerson and Whitman: Ignited by Nature, Driven by Individual Expression.....	27
Amanda Thompson Faculty Advisor: Dr. Lynn Wolf	
Emotionally Negative Pictures Increase Attention to Subsequent Stimuli.....	28
Kristen deAlemeida Faculty Advisor: Dr. Jaime Tartar	
Evaluating the Role of Vimentin in Establishment of HIV-1 Infection in Macrophages.....	29
Adrian Diaz Faculty Advisor: Dr. Joshua Loomis	
Examination Stress Differentially Influences Memory Performance in Males and Females	30
Randy Denis Faculty Advisor: Dr. Jaime Tartar	
Exploratory Research of Synergistic Pharmacokinetics of Artemisinin and Chloroquine in Equine Erythrocytes by High Pressure Liquid Chromatography (HPLC) with Ultraviolet and Fluorescence Detection	31
Sachin Patel and Micheline D. Moini Faculty Advisor: Dr. Terence M. McCaffrey	
Folklore: Medicines around the World.....	32
Jason Conseugra, Alyssa Baet and Tram Nguyen Faculty Advisor: Dr. Venkatesh Shanbhag	
From Trash to Treasure: Conversion of Excess Biomass into Reusable Fuels and Animal Feed	33
Stephanie Chery, Melanie Campbell, Alana Crews and Stacy Ann Smith Faculty Advisor: Dr. Dimitri Giarikos	

Genetic Diversity in Helicosporidium Using β-Tubulin as a Marker.....	34
Amy Van Faculty Advisor: Dr. Aurelien Tartar	
Green Energy: Biodiesel from Waste.....	35
Rahila Dholakia and Saamia Shaikh Faculty Advisor: Dr. Venkatesh Shanbhag	
Green Energy: Is Solar better than Wind in South Florida?	36
Adenji Baker Faculty Advisor: Dr. Saeed Rajput	
HeArt Work: Taking a Stand for Good.....	37
NerissaStreet Faculty Advisors: Dr. Weylin Sternglanz and Dr. Chetachi Egwu	
How Profound: No Difference in the Compound.....	38
Lara Kachachi and Mike Darwin Faculty Advisors: Dr. Reza Razeghifard and Dr. Deanne Roopnarine	
How to Tell the Future.....	39
Christopher Bergbauer and Adam Walters Faculty Advisors: Dr. Chetachi Egwu and Dr. Weylin Sternglanz	
Immortalization of Retinal Capillary Endothelial Cells and.....	40
Involvement in the Intraocular Inflammatory Response Norberto Mancera Faculty Advisor: Dr. Michael Giese	
Impact of African Dust on the Climate and Ecology in	41
Florida and Neighboring Regions Michael Wiernicki and Shahjahan Shareef Faculty Advisor: Dr. Song Gao	
Investigating Pentamethycyclopentadienyl Rhenium(I) Reactivity	42
With Cycloalkane: Synthetic Strategies toward Crystalline Metal-Alkane Complexes Florin Cicortas and Adailys Trincado Faculty Advisor: Dr. Jeremy M. Perotti	

Investigating Potential Changes in Gene Expression for Yeast Cells Exposed to Pediatric Flu Vaccine with and without Thimerosal	43
Christie Rubio Faculty Advisor: Dr. Emily Schmitt	
Is a Couple's Attractiveness Equal to the Sum of its Parts?	44
Tammy Saenz Faculty Advisor: Dr. Glenn Scheyd Jr.	
Is Green Really "Green?"	45
Saamia Shaikh and Rahila Dholakia Faculty Advisor: Dr. Venkatesh Shanbhag	
Is the Normal Heartbeat Chaotic or Homeostatic.	46
Carlos Haderspock, Christopher Balaban and Gan Golshteyn Faculty Advisor: Dr. Victor Castro	
Kazal Serine Protease Inhibitors and their Role in Prototheca wickerhamii Pathogenicity	47
Norberto Mancera Faculty Advisor: Dr. Aurelien Tartar	
Life Unmentioned.	48
Kelsey Cortez Faculty Advisors: Dr. Chetachi Egwu and Dr. Weylin Sternglanz	
Linguistics Out Loud: The Uses of Jargon in Online Communities.	49
Brittany Eisenhart Faculty Advisor: Dr. Eric Mason	
Local Bank's Protection against Money Laundering.	50
Amy Ajodha Faculty Advisor: Dr. Judith Harris	
Medicinal Plants and their Diverse Therapeutic Applications.	51
Jason Conseugra, Sachin Patel, Daniele Malicki and Sose Tokatlian Faculty Advisor: Dr. Venkatesh Shanbhag	

MicroCT as a Viable Option for Histological Analysis of Ocular Tissue.....	52
Christian Vidalon	
Faculty Advisor: Dr. Michael Giese	
Nanotechnology Solutions to a Big Water Problem.....	53
Jessica Bradbury, Adero Francis, Sameed Ashfaq and Catalina Breton	
Faculty Advisor: Dr. Dimitri Giarikos	
New Materials for Modification of Metallic Gold Nanoparticles.....	54
Lesley Hagan	
Faculty Advisor: Dr. Donald Baird	
NSU's Top Models: Zombie Attack Heartbeats.....	55
Sophia Cuprillnilson, Kodi Stevens, Rajeshwari Murugan, Larcrima Nemulescu, Adenjeni Baker and Amy Van	
Faculty Advisor: Dr. Evan Haskell	
Phylogenetic Analysis using Human Mitochondrial DNA.....	56
Stephanie Cirillo	
Faculty Advisor: Dr. Joshua Loomis	
Preliminary Examination of Gill Vasculature in the Grey Snapper.....	57
(Lutjanus griseus) using Vascular Corrosion Casting	
Ana Delgado	
Faculty Advisor: Dr. Robin Sherman	
Psychological Stress Improves Hippocampal-Dependent Memory.....	58
Christine Klopp	
Faculty Advisors: Dr. Jaime Tartar and Dr. Allan Schulman	
Psychopathy: The Unholy Trinity.....	59
Alyssa Mineo	
Faculty Advisors: Dr. Jamie Tartar and Dr. Tom Fagan	
South Florida Coastal System: Ecosystems and Organisms.....	60
Jennifer Anders, John Wayne Hazell, Betsy Gonzales and Jillian Barbosa	
Faculty Advisor: Dr. Paul Arena	

Synthesis and Incorporation of Photoactive Chlorin-Heme Dimers into Proteins.....	61
Sarah Silverstein	
Faculty Advisors: Dr. Dimitrios Giarikos and Dr. Reza Razeghifard	
Synthesis of Porous Organic Materials as Gas Storage Media.....	62
Reena Parikh	
Faculty Advisor: Dr. Donald Baird	
The Effect of Water Temperature on Florida Manatee (<i>Trichechus manatus latirostris</i>) Abundance in Port Everglades, Florida	63
Brittany Lape and Shannon Twist	
Faculty Advisor: Dr. Edward O. Keith	
The Performative Nature of Gender in Orlando Furioso	64
Jessica Furth	
Faculty Advisor: Dr. Suzanne Ferriss	
The Role of Social Media in the Development of	65
Interpersonal Communication Skills	
Annarely Rodriguez, Nichelle Farrington, Chelsea Seignious, Vittoria Santini	
Faculty Advisor: Dr. Megan Fitzgerald	
The Role of Tumor Suppressor Genes PTEN and VHL	66
on the Expression of HIF-1α under Hypoxic Condition	
Jhanelle Dawes and Svitlana Shvank	
Faculty Advisors: Dr. Appu Rathinavelu and Dr. Praneetha Muthumani	
The Study of Keeping Secrets Secret by Means of Cryptography.....	67
Amy Van	
Faculty Advisors: Dr. Ricardo Carrera and Dr. Saeed Rajput	
Transcriptome Analysis of the Entomopathogen <i>Lagenidium giganteum</i>	68
Lauren Douma	
Faculty Advisor: Dr. Aurelien Tartar	
Type II Diabetes Prevention.....	69
Emlynn Chazhikat	
Faculty Advisor: Dr. Edward Keith	

Using Genealogical Records and Genetic Markers of the Y-chromosome, X-chromosome, and Mitochondrial DNA to Create a Personal Family History Narrative	70
Lauren Douma Faculty Advisors: Dr. Emily Schmitt and Dr. Joshua Loomis	
Using Genetic Testing and Historical Records to Document Ancestral Heritage	71
Hannah Bromberg Faculty Advisors: Dr. Emily Schmitt and Dr. Joshua Loomis	
Video Analysis and Determination of Eusocial Behavior in Commensal Marine Crustaceans	72
Sharein El-Tourky Faculty Advisor: Dr. James Darwin Thomas	
Water Quality at John U. Lloyd Beach State Park	73
Angelica Garcia and Betsy Gonzales Faculty Advisor: Dr. Edward O. Keith	
When Natural Isn't Good Enough	74
Dana Dunham Faculty Advisor: Dr. Allison Brimmer	
Where to Shop for Electronics	75
Valeska Dubon and Stephanie Castorani Faculty Advisor: Dr. Bashar Zogheib	
Working Memory in Bilingual and Monolingual Children with ADHD	76
Tara Bertone, Alicia Harnisch, and Daniela Padron Vera Faculty Advisor: Dr. Mercedes Fernandez	

A Dream of Flying, a Dream of Death

Daniel King

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Suzanne Ferriss**

Abstract

In my analysis of W.B. Yeats's 1919 poem An Irish Airman Foresees His Death I find a pure expression of the "Death Instinct" postulated by Sigmund Freud in his 1920 book Beyond the Pleasure Principle. Both works had been inspired by the recent calamity of World War One. Indeed, the trauma Freud witnessed in veterans of the war drove him to question the assumption on which he had based his entire career: that all human psychology derived from a single pleasure-seeking, libido-fueled "Life Instinct." Freud theorized that there also existed a "Death Instinct" which operated in opposition to the "Life Instinct." There exists no better explanation for the nameless Irish Airman's whimsical discarding of his own life than this mysterious drive. Though most scholars accept that Yeats's direct inspiration for the poem came from the death of his friend Major Robert Gregory, the connection is revealed to be superficial upon a close reading of the poem. The Irish Airman is a solemn figure who after careful consideration chooses to follow a "lonely impulse of delight" which he knows will lead to his death. Every rational justification for his suicidal decision is ruled out, one by one, in the lines of the poem. Ultimately, the Irish Airman seems to be acting solely out of a deep, destructive instinct that overrides his will to live.

Adhesion of Protein Transferrin on FDA Group II Omafilcon Contact Lenses

Sophia Cuprillnilson, Brooke Liberman and Darshan Solanki

Division of Math Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Edward O. Keith and Dr. Andrea Janoff**

Abstract

Out of the estimated 200 proteins in tear fluid, which promote the health of ocular surface, 60 proteins have been identified. Bacterial infections of the ocular surface are associated with higher concentrations of tear proteins adhering to contact lenses. The adhesion of the tear protein transferrin to Omafilcon contact lenses, manufactured from a biomimetic material, was investigated. Tear proteins are known to have a charge character that is dependent on pH levels. This charge interaction between tear proteins and the matrix of the contact lens, which also has a charge, increases tear protein adhesion and compromises lens wearing comfort. Never worn Omafilcon contact lenses were incubated from one to five days in human transferrin in borosilicate glass vials. Bicinchoninic acid colorimetry was performed daily to determine transferrin concentration in the vials and protein adhesion to lenses. Variation in tear protein adhesion to contact lenses was evident over the five day period. The adhesion of transferrin to the Omafilcon lenses was similar to the adhesion of transferrin to Hilafilcon lenses (both classified as FDA Group II: nonionic high water), but the adhesion of transferrin to the Omafilcon lenses was different from the adhesion of lysozyme to the same lenses. Future analysis involves investigating levels of albumin adherence to Omafilcon contact lenses.

Supported by a NSU President's Faculty Scholarship Award, the NSU Health Professions Division, and the Farquhar College of Arts and Sciences at NSU

An Alaskan Adventure: The Search for its Fauna and Microorganisms

Renato Balducci

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Paul Arena and Julie Torruellas Garcia**

Abstract

Dr. Arena's Biodiversity of Alaskan Ecosystems course inspired me to get a closer look at the diverse assemblage of organisms, which inhabit one of America's and the World's most pristine and wild places. I was able to enroll in the "Tracking Wild Life" course offered by the Alaska Geographic Institute in Denali National Park, AK. I learned techniques utilized by hunters to track and harvest wild animals, to identify local fauna and determine their activity around Teklanika River in Denali National Park. Track width, length and shape were recorded, as well as whether claw marks, pads and toe tracks were visible.

Additionally, I took water samples from the Kenai Fjords glaciers in the city of Seward, AK and brought them back to NSU for isolation and identification of the microorganisms present. Marine agar, M9 minimal salts and nutrient broth were used to grow and isolate the bacteria from the samples. 16s rDNA sequencing will be used to identify the species of bacteria present in the samples. The final results and details of my observations will be presented.

Attack and Intrusion Analysis across the Public Internet

Robert Rizzi and David Perez

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Saeed Rajput**

Abstract

Secure Shell (SSH) Servers are routinely used to allow network administrators to obtain remote secure access to the systems they manage. Due to level access they provide into systems, they are prime targets for hackers. This research provides an in-depth analysis of how Secure Shell Daemons (SSH Servers) are being attacked across the Internet using geographical information determined from the address of the attacker. Data was collected from multiple hosts over a thirty-day period connected to several different Internet Service Providers. This data was analyzed using software designed specifically for this project. Conclusions regarding patterns are included in the project. To our surprise, we discovered that the attackers are using a list of established IP addresses of SSH Server daemons exposed to the Internet to significantly reduce the time it takes to find potential target systems.

Bandages

Michael McGregor
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Chetachi Egwu and Dr. Weylin Sternglanz**

Abstract

“Bandages” is a story about a young man’s struggle to find peace within himself after the death of his father. Years later, he still has trouble drowning out the screams of his father, and he turns to drugs to numb his pain. It isn’t until a letter from his father appears that the young man’s life begins to unwind, and he tries to commit suicide. This film brings awareness to drug abuse, suicide, and domestic abuse. I hope to shine light on the subject that no matter how bad things may get, there is always good to be found. The film is directed by Michael McGregor. Crew members and actors include Serena Mann, Mike McGregor, Rachel Abdool and Abi Cuffia.

Boater Survey at John U. Lloyd Beach State Park

Jennifer Anders, Kaitlin De'Aeth and Amy Elliott

Division of Math Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Edward Keith**

Abstract

John U. Lloyd Beach State Park is an important, diverse coastal system in Broward County that faces many management issues dealing with coastal environmental resources. Lying parallel to the intercoastal waterway and adjacent to Port Everglades, boaters frequent the park to gain access to these main waterways. Effective coastal planning in the park requires the availability of information concerning the on-water activities of boaters. As part of the John U. Lloyd Beach State Park field study class at Nova Southeastern University a questionnaire was created to survey the boaters who visit the park. A survey of approximately 100 boaters at the boat ramp in the park will be randomly asked to participate in the short questionnaire. The purpose of the questionnaire is to provide baseline information for John U. Lloyd State Park and to create a general profile of boaters and their vessels who visit the park, along with a description of their common activities, such as fishing. There are two parts to the questions, the first discusses demographical information on the boaters, including age and boating experience, and how frequently they visit the park. The second part of the questions examine the vessel type and where and what activities are taking place, in addition asking about any concerns that are directly affecting boaters. The goal of the information is to use it for proactive waterway management and to clarify the value of boating in John U. Lloyd Beach State Park.

Boxed In: Examining Faulkner's Linguistic Silhouette of Addie's Interment

Amanda Allen Thompson
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Christine Jackson**

Abstract

Known for his immensely multifunctional use of the English language, William Faulkner's *As I Lay Dying* is a novel of fractionalized perspectives and boundless dialectal imagery. This story is constructed around the death of Addie Bundren. Its chapters are stories, memories, and ruminations of the people surrounding her—both in life and the days after. Yet only one chapter is dedicated to her own words, her own account, her own voice. It is her chapter on which this paper focuses. By dissecting the few pages allotted for her, and by examining Faulkner's own linguistic and psychological construction, we may better understand the composite woman lying within her emblematic coffin.

Bromelain-Induced Apoptosis in the GI-101A Breast Cancer Cell Line

Honey Diaz Perez

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Mark Jaffe, Dr. Appu Rathinavelu**

Abstract

Bromelain, an enzyme extracted from pineapples, has been shown to possess anti-inflammatory, anti-edematous, and anti-thrombotic properties. Although research has pointed to bromelain's possible anti-cancer activity, little is understood of bromelain's role in inducing apoptosis. In this study, breast cancer cells were treated with varying concentrations of bromelain to determine the enzyme's effect on their growth and the induction of apoptosis. GI-101A breast cancer cells were subjected to a dose response experiment using a range of bromelain concentrations. Bromelain-treated cells, in addition to control cells, were stained with DAPI to assess the extent of apoptosis. DAPI binds to the minor groove of A-T regions of double-stranded DNA and causes them to fluoresce blue when exposed to 350-450 nm light. Apoptotic cells are identified by their condensed chromatin, nuclear fragmentation, or membrane blebbing. The M30-Apoptosense ELISA immunoassay was used to determine apoptosis by detecting levels of CK18 fragments in both control and bromelain-treated cells. As cells undergo apoptosis, they cleave the protein CK18 containing the CK18Asp396 neo-epitope. The M30 antibody recognizes the neo-epitope and allows for the determination of apoptosis. Results of the dose response showed that as bromelain concentrations increased, the number of viable cells decreased. When stained with DAPI, the bromelain-treated samples demonstrated significant chromatin condensation in comparison to the control group. Results of the M30-Apoptosense ELISA immunoassay show that compared to the control group, as the concentration of bromelain was increased, the absorbance of CK18 containing the CK19Asp396 neo-epitope also increased. These results indicate that in addition to negatively affecting the growth of GI-101A breast cancer cells, bromelain can also induce apoptosis.

Supported by the Grant from Royal Dames Inc. of Ft. Lauderdale at the Rumbaugh Goodwin Institute for Cancer Research.

Cement Gives a Concrete Solution to Nuclear Waste Disposal

Constantina Rando, Brittany Lape, Catalina Rodriguez, Inna Dumova and Sazedul Khan

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Dimitri Giarikos**

Abstract

The United States Environmental Protection Agency defines hazardous waste as material harmful to human health and the environment, because it contaminates the air, water, and soil. Some of the methods used to eliminate the hazardous effects include incineration, landfills, underground injection wells, and solidification of radioactive materials in cement. Out of the above methods, the solidification of radioactive material in cement was analyzed to be the greenest method to prevent hazardous waste from harming the environment. The solidification of radioactive material in cement reduces the ability of waste from leaching out into the environment by stabilizing the liquid cement using an alkaline activator. The stabilized cement can then be stored in landfills and used for construction purposes without harming the environment.

**Changes in Coral Cover (*Diaseris distorta* and *Porites sverdrupi*)
at Isla Catalana, Gulf of California, Mexico**

Mary Crider

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Joshua Feingold**

Abstract

Diaseris distorta is a free-living, solitary fungiid coral that occupies sand and mud habitats throughout the tropical waters of the Red Sea, Indian and Pacific Oceans. However, there is little data on their biology and ecology, particularly in the widely scattered and small Eastern Pacific populations. Information about the status of these coral populations will help determine if protection is warranted for this important resource. On two dates (June 2008, November 2009), population density, mean size, and total live tissue surface area were documented off the coast of Isla Catalana in the Gulf of California, which is the northern-most limit for this coral in the Eastern Pacific. For each survey, 30 randomly located 0.25m² photo quadrats (7.5m² total area) were analyzed using CPCe software. Data were compared for differences using paired sample, two tailed T-tests, and all results were significant. The mean number of individuals increased from 15.2 – 27.3 corals per m² ($p < 0.001$), and live tissue cover increased from 0.010 – 0.013% ($p < 0.001$). However, their mean size decreased from 1.63 – 1.16cm ($p = 0.025$). A possible explanation is favorable conditions allowed larger individuals to reproduce asexually through fragmentation, increasing their numbers but decreasing their average size. In addition, the rare, endemic branching coral *Porites sverdrupi* was observed, with 3 colonies found in 2008 and 2 in 2009 (mean surface area of 3.8cm² and 2.3cm², respectively). Further research on these corals will help clarify the factors that cause population changes providing important information for resource managers.

**Chemical Composition of Atmospheric Aerosols in South Florida:
From African Dust to Red Tides**

Crystal S Ming

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Song Gao**

Abstract

This study aims to better understand the chemical composition of atmospheric aerosols and their impact on the climate and human health in South Florida. Aerosols are believed to partially counteract the greenhouse warming effects; yet their exact climatic effects are still poorly known. A key reason is the lack of understanding of their chemical composition.

A detailed literature review is being conducted on the current knowledge of aerosol composition, with a focus on the organic components. In Miami, organic components including n-alkanes, fatty acids, bacterial acids, and PAHs have been found in aerosols, yet they only comprise a small fraction of the total organic aerosol mass. Latest studies show that other classes of organic components may exist in aerosols, such as organosulfates and oligomeric species. However, whether these species are abundant, stable aerosol components remains uncertain. A fascinating observation is that African dust aerosols get transported to South Florida and neighboring regions frequently. These aerosols have been suggested to have adverse effects on humans. In particular, African dust has been found to provide certain nutrients to initiate red tides in Florida coastal waters, which in turn can emit aerosols that are toxic to humans, particularly those with asthma. However, the long-term health effects need to be fully investigated.

This literature review sets the stage for future research in the field and the laboratory to fully understand atmospheric aerosols in South Florida and their potential health consequences.

Common Foot Disorders among Health Fair Participants

Kimberly Giordano

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Mark Jaffe**

Abstract

Patients across the United States visit their Podiatrist regarding the diagnosis and treatment of their foot ailments. The most prevalent of these disorders include bunions, digiti flexus, or hammer toe, and bacterial and fungal infections. A portion of these patients, including those that do not visit a physician, are participants in local health fairs across the country. These health fairs, many of which include foot screenings, generally shed light onto the pervasiveness of diseases and disorders seen in many underserved populations. Implementing an evaluation, which includes a thorough patient history, provides important information regarding a patient's congenital or acquired foot conditions. Additionally, screening the patient through palpation, observation of gait, and inspection of footwear will provide answers and information for treatment and prevention of injury. The purpose of these observations at local health fairs around Broward County is to determine the commonness of foot conditions in these participants and to analyze whether these results match the national statistics.

Comparison of Methods to Extract Total RNA from Diverse Marine Sponges for the “Porifera Tree of Life” Project

Crystal Romero

Nova Southeastern University Oceanographic Center
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Jose Lopez**

Abstract

According to phylogenetic and paleontological evidence, sponges and their fossils represent the earliest living branch of the multi-cellular animal evolution. Therefore, more in depth laboratory studies of sponges and their phylogeny can provide information on the origin of multi-cellular animals, survival techniques, and medicinal treatments. As part of the NSF-funded “Porifera Tree of Life Project, also known as PorToL (www.portol.org), researchers in the Lopez laboratory, have been generating molecular sequences from a select group of nuclear genes to refine the sponge phylogeny. My goals were to compare and analyze the best preservation methods for total RNA extraction. Total RNA from a variety of sponge samples, which had been preserved in either a) ethanol, b) -20 °C freezing, or c) Trizol reagent, was extracted. Subsequently, final yield and purity of each total RNA sample were recorded. Essentially, the purpose of these analyses was to develop a standardized and reliable protocol. Some of the species that were analyzed are part of the 127 target sponge families. Using data collected from more than twenty different sponge samples, Nanodrop purity readings ranged from 1.6 to 2.0 with a pure reading for RNA around 2.0. Additionally, it has been experimentally determined that total RNA extracted from sponges preserved in Trizol reagent were generally higher than sponges preserved in ethanol, with a range between 100 ng/μL to over 2,000 ng/μL. In conclusion, Trizol is a better preservation method for most sponge samples; however, Hexactinellid species generally yielded less total RNA probably due to low tissue mass.

Computer Simulation of a Chaotic Chua Circuit

Bryan Candela

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Victor Castro**

Abstract

Nonlinear Dynamical systems are common in many scientific disciplines. A particularly interesting problem is the phase synchronization of a chaotic signal with various types of external signals. This type of analysis has applications in a wide range of areas, from secure communication and encryption, to electronic filters. The main goal of our project is to study this situation using computer models. In this first part, we simulate a chaotic signal from a very simple electronic circuit that exhibits a chaotic behavior called *Chua's circuit*. We wrote a computer program that allows us to visualize the real time response of the system to the variation of the parameter values. In the future, we will include the ability to study, in real time, the phase synchronization of the chaotic signal with a range of external signals.

Confirming 18S rDNA Polymorphism among *Helicosporidium* Isolates using Restriction Fragment Length Polymorphism (RFLP) Analysis

Stephanie Liu

Division of Math Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

The non-photosynthetic pathogenic algae *Helicosporidium* show promising potential as a form of biological control against mosquito larvae. By studying the life cycle and modes of transmission of *Helicosporidium*, more can be determined about their potential effectiveness as a natural pest control agent. Isolates of *Helicosporidium* DNA collected from different invertebrate hosts (black fly, weevil, bark beetle, mosquito, and collembola) were predicted to have unique phlotypes. To confirm these differences, *Helicosporidium* 18S rDNA genes were amplified via Polymerase Chain Reaction (PCR) and purified using the QIAGEN PCR purification kit. The DNA fragments were digested using the restriction enzyme FokI, and a restriction fragment length polymorphism (RFLP) analysis was conducted using gel electrophoresis. The results show that the *Helicosporidium* isolates found in different host insects do exhibit 18S rDNA polymorphism. This technique helps to visualize and confirm the newly discovered polymorphism among *Helicosporidium*.

Correlation of Molecular Mechanics to the Red Shift in the Optical Absorption of Phenyl Substituted Porphyrins

Kristen Franchy, Walter Castro, and Juliana Ospina

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Maria Ballester**

Abstract

According to the results in experimental data, there was reason to believe that the red shift in the Soret through protonation correlated with conformational changes as substituents were added on to the phenyl groups of the meso-tetra-phenyl porphyrin (TPP). The shift in wavelengths for the added substituents of carboxyphenyl and trimethylanilium on the TPP had minor changes on wavelength(s) shift. However, when analyzing the meso-tetra (p-hydroxyphenyl) porphyrin there seemed to be a strong correlation as to there not only being conformational changes in the porphyrin, but also high electronic contributions. This was observed by greater shifts of the Soret and by recognizing that the hydroxyl group takes part in strongly activating the porphyrin core donating its electrons. In the meso-tetra (m-hydroxyphenyl) porphyrin the electronic effect was still a contributing factor, but conformational changes were dominating because of steric interactions between the hydroxyl group and the porphyrin core. According to the MM+ model, the conformational changes were viewed as the more accurate contribution towards the meso-tetra (m-hydroxyphenyl) porphyrin. However, when the substituent groups in the para positions of the phenyl group are not strongly activating or deactivating groups, then there was no doubt to assume that the conformational changes in the para phenyl substituted porphyrins are strictly adhered to the porphyrin protonation.

Cyber-Security in Public Places: Secure Practices for using an Email Client

Lucas Arregui

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Saeed Rajput**

Abstract

This research investigates into how a hacker could lure wireless users to connect to his wireless access point (WAP) in public places where public Wi-Fi services are expected to be available. We first show how the unsuspecting users can be made to believe that they are connecting to a particular institution's WAP. It then shows how the hacker can route all email traffic to his/her own mail server. In the process of trying to download e-mails for their owners, e-mail clients send out authentication credentials such as username and password. This research shows how this credential information is exposed to the fake email server setup by the hacker. The project then shows how users can protect against such attacks.

Electrophoretic Karyotyping of *Lagenidium giganteum*

Stephanie Giordano

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

Lagenidium giganteum is a water mold, known to be a parasite to the larval stage of mosquitoes. This organism is of interest because it can essentially infect and kill mosquito larvae, which means it could possibly be used as a potential alternative to chemical insecticides. Before *Lagenidium giganteum* can be used as an insecticide, an understanding of how the organism infects and kills mosquitoes research is currently conducted at the molecular level. To complement a large-scale sequencing project, an electrophoretic karyotype was performed on *Lagenidium giganteum* to determine the number of chromosomes the organism has. The electrophoretic karyotype of *Lagenidium giganteum* was produced by contour-clamped homogenous electric field (CHEF) gel electrophoresis. The chromosomal bands of *Lagenidium giganteum* were separated. The sizes of these bands were estimated based on migration relative to those of chromosomal DNA of *Hansenula wingei*. The genome size was determined.

Emerson and Whitman: Ignited by Nature, Driven by Individual Expression

Amanda Allen Thompson
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Lynn Wolf**

Abstract

By examining a collection of such works as Walt Whitman's "Song of Myself" and Ralph Waldo Emerson's "Nature," we are given a better appreciation for the Transcendentalist view of creativity. For these two iconic American theorists, inspiration is found in the natural realm—where life is at its purest—and is expressed most truly by each individual being who experiences Nature's wonder. In a symbiotic communion with Nature, one may better absorb the brilliance of the Divine in all beings and thereby discover Truth. This paper will explore the ways in which Emerson and Whitman view creativity and creation by examining their philosophies on the inter-relatedness of all things, the beauty of simplicity, and the irrefutable link between Man, Nature, and Divinity.

**Emotionally Negative Pictures Increase Attention to Subsequent Stimuli:
An EEG Event Related Potentials Study**

Kristen deAlmeida

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Jaime Tartar**

Abstract

Although emotion and attention are well researched topics, it is currently unclear how an emotional state can influence attention. In particular, compared to pleasant stimuli, emotionally negative stimuli typically produce stronger emotional responses, making emotionally negative stimuli good candidates for attention modulation. Here, we assess the role of negative emotion in modulating attention by influencing an emotional state through the use of emotionally negative or neutral pictures selected from the International Affective Picture System (IAPS). To this end, we have designed and employed a novel dual modality EEG Event Related Potentials (ERPs) paradigm. Specifically, auditory ERPs are elicited by tones after participants view the IAPS pictures. Each picture is presented 600 ms before the tone, in an auditory oddball scenario wherein there are two tones presented to the participant- the oddball (rare) and the standard (frequent). The participants used a computer keyboard to identify the tone-picture combination. Results show a larger late positive potential (LPP) in the negative picture trials compared to the neutral picture trials, indicating that the negative pictures enhanced encoding processing for the emotionally negative stimuli. Here, we further demonstrate that negative pictures, but not neutral pictures, result in processing negativity to the subsequent rare tone, suggesting increased selective attention to the auditory stimulus. Combined, the results reveal that the LPP to the negative pictures serves as an ERP counterpart of the early stages of selective attention (as measured by the processing negativity)- implying that a novel or threatening stimulus results in further automatic stimulus evaluation.

Evaluating the role of Vimentin in Establishment of HIV-1 Infection in Macrophages

Adrian Diaz

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Joshua Loomis**

Abstract

The study conducted is aimed at determining the interaction between the cytoskeleton of macrophages and the human immunodeficiency virus (HIV-1). Monocytes/macrophages have been identified as one of the major HIV-1 reservoirs harboring and disseminating the virus during the course of infection. Vimentin is an intermediate filament abundantly expressed in most human cell, including monocytes. Simialr to other intermediate filaments, vimentin is important for maintained of cell architecture. However, animals with knocked down vimentin have had remarkably normal phenotype. Since vimentin is cleaved by HIV-1 encoded proteases, it has been suggested that vimentin may play a role in HIV infection. Preliminary data has shown that treatment with anti-vimentin antibody inhibits production of the virus by macrophages. To further develop and strengthen these observations we will investigate the steps of viral life cycle at which association of HIV-1 with vimentin is required for the establishment of infection in macrophages. Using primary macrophage cultures, immunoprecipitation, and Western blotting we will attempt to identify the viral protein that interacts with vimentin. The study is expected to establish the role of vimentin in HIV-1 infection of macrophages and provide data that can be exploited for a new treatment strategy targeting HIV-1 reservoirs in macrophages.

Examination Stress Differentially Influences Memory Performance in Males and Females

Randy Denis

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Jaime Tartar**

Abstract

Previous research on emotional arousal and memory performance has demonstrated that acute stressors work to enhance memory consolidation while chronic stress usually negatively impacts memory. Both of these alterations in memory performance are thought to be mediated by the stress hormones cortisol. Since males are most commonly used in stress research, it is currently unclear if there are gender differences in the influence of stress on memory performance in humans. Although physical and psychological stress is mediated through unique neurological and endocrine pathways, they are *not* typically differentiated from each other in the literature. Here, we sought to use an academic examination as an ethologically-relevant and natural stressor. To that end, we tested participants in two sessions, the first took place three weeks prior to their examination and the second took place 15-minutes prior to their exam. Overall, there was a significant increase in cortisol from baseline to examination. As expected, compared to the baseline testing session, salivary cortisol levels significantly increased during the examination testing session with a concomitant significant increase in short term memory and non-significant increase in long-term memory. Gender differences were found in the potential influence of stress on memory performance. These results show that for females, but not males, increases in cortisol are associated with *decreased* memory performance. For males, there was a non-significant trend for improved short- and long-term memory performance independent of cortisol levels during the examination session compared to baseline testing session

Exploratory Research of Synergistic Pharmacokinetics of Artemisinin and Chloroquine in Equine Erythrocytes by High Pressure Liquid Chromatography (HPLC) with Ultraviolet and Fluorescence Detection

Sachin R. Patel and Micheline D. Moini
Division of Math, Science & Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Terence McCaffrey**

Abstract

Artemisinins form the most important class of antimalarial available, particularly because they have higher efficacy rate, act more rapidly, act on a broader base and act on resistant malaria by inhibiting major metabolic processes such as glycolysis, nucleic acid, and protein synthesis. Currently available artemisinin-based combination therapies (ACTs) for malaria are inadequate. There remains an enormous unmet need for alternate Artemisinin-based combination therapies. One of the fastest methods to identify promising Artemisinin-based combination therapies is to look for synergistic or additive antimalarial interactions between the endoperoxide artemisinin (a ses-qui-terpenoid lactone peroxide) and alternate drugs such as Chloroquine (quinoline). They are directed against *P. falciparum in vitro* in equine erythrocytes. The project design was seeking to elucidate any possible interplay at the molecular level of erythrocytes between these classes of drugs. Previous publications in scientific literature show different mechanisms of action of the quinoline family and ACTs via RSA11 protein transporter and D10 protein exchange. Results showed a strong indication of Chloroquine in HPLC Automated Analysis at 13.2 minutes and further comparison of the Patient C CQ and ART Trials with the Patient C Negative Control points to a possible artemisinin derivative peak between 8.3-8.6 minutes. Percent significance produced $\alpha=.01$ and standard deviation showed a 1.2% deviation upon Patient C trials.

Folklore: Medicines around the World

Jason Conseugra, Alyssa Baet and Tram Nguyen

Division of Math, Science, and Technology

Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Venkatesh Shanbhag**

Abstract

Over centuries, cultures around the world have learned how to use plants for health and healing. These time-tested and culturally significant traditional medicines form the basis of a primary health care system around the world. Modern medicines have often been derived from medicinal species that offer scientific and commercial value.

Each civilization has a unique folklore medicine. Some of the herbal medicines seem to have been chemically analyzed to a greater extent while others seem to have never been scientifically explored. This study compares the ethnic roots of participants and related folklore from around the world. Despite modern pharmaceuticals, herbal medicines maintain a strong reputation worldwide.

**From Trash to Treasure: Conversion of Excess Biomass into
Reusable Fuels and Animal Feed**

Melanie Campbell, Stephanie Chery, Alana Crews, Stacy-Ann Smith

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Dimitrios Giarikos**

Abstract

According to the principles of green chemistry, altering the remains of waste biomass into fuel for animal feed by means of gasification, ethanol conversion, and lime treatment can greatly benefit the planet's population and environment. The process of gasification (converting biomass to fuel) entails feeding the biomass into a gasifier, which produces mainly CO(g) and H₂(g). The distillation process involves two or three distillation columns using heat to break down waste components, creating bio-alcohol. The process of converting waste into digestible animal feed consists of waste going through a treatment plant to add moisture using an exothermic reaction, which produces a hydrated lime-dry sludge in which bacteria and pathogens have been inactivated. This process has its skeptics due to safety reasons, but the stabilized sludge has no risk of pathogen regrowth, no odor, low investment costs, and the ability to convert into a biosolid product available for use as animal feed or fuel. These green chemistry processes will be analyzed to determine if they can make a difference to the environment and the global economy.

Genetic Diversity in *Helicosporidium* Using β -Tubulin as a Marker

Amy Van

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

The *Helicosporidium* is a unique pathogen that can infect the larvae of mosquito. Recently, *Helicosporidium* have been extracted from different invertebrates (black fly, weevil, bark beetle, mosquito and collembola). Observation of nucleic acid sequences will provide insight into the genetic diversity or similarity between the specimens. Analysis of the amino acid make-up will further details of the phylogenetic relationships between all five specimens. Observation and analysis was done by Polymerase Chain Reaction (PCR), gel electrophoresis, and PCR purification. PCR was used by applying known primers to a sample that will specifically bind to the nucleotides encoding for tubulin. These segments were then loaded into an agarose gel, which separated 3 visible bands. These products were then again amplified and purified in order to extract pure tubulin DNA. The newly amplified DNA was again processed by gel electrophoresis and those bands present were then sequenced. Results indicated that the tubulin gene sequences of *Helicosporidium* found in weevil (*Cyrtobagus salviniae*), beetle (*Dendroctonus micans*), and mosquito (*Culex nigripalpus*) are genetically similar. Comparison of nucleotide sequences showed some variance, while alignment of their corresponding amino acids showed no variance.

Green Energy: Biodiesel from Waste

Rahila Dholakia and Saamia Shaikh
Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Venkatesh Shanbhag**

Abstract

World energy need/crisis has initiated an unusual interest in developing alternative energy resources. The purpose of this study is the conversion of waste oil into biodiesel and the extraction of usable oil from yard waste. More specifically, used cooking oil is converted to biodiesel by basic ethanolic hydrolysis. The Soxhlet extraction procedure was used to evaluate extractable oil content in a variety of pine nuts. Methodology and efficacy of these procedures will be discussed and a partial evaluation of the "green" aspects will be presented.

Green Energy: Is Solar Better than Wind in South Florida?

Adenji Baker

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Saeed Rajput**

Abstract

In this research we first establish the typical energy consumption for a family home, and compare the cost of satisfying that need through solar and wind power generation. When considering solar energy, we assume that all of the energy is generated using Photo-Voltaic Cells (PVC). When using wind power, we assume that wind turbines are used. For solar energy generation, we have made actual measurements of energy generated by a sample PVC, we will also look at the weather profile and available sunlight profile of the region. For wind energy, we will look at the wind profile collected by other researchers and estimate the potential energy generation capacity. We assumed that unlimited surface area was available for both solar and wind turbine installation for as many solar panels or turbines as we might need. These observations and calculations show that due to lack of steady and continuous wind at speeds that can be conducive for power generation, solar power is more feasible option even at current prices of PVCs.

HeArt Work: Taking a Stand for Good

Nerissa Street

Division of Performing and Visual Arts
Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Weylin Sternglanz and Dr. Chetachi Egwu**

Abstract

When there is such an overwhelming amount of sorrow and distress in the world, is it possible for a single person to do any real good? This short documentary (directed by Nerissa Street) follows an artist's creative (and surprisingly tangible) answer to that age-old question.

How Profound: No Difference in the Compound

Mike Darvin and Lara Kachachi

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Reza Razenghifard**

Abstract

The purpose of this study was to compare generic versus brand name formulations of both prescription and over-the-counter (OTC) medications. FDA regulations require a bioequivalence of generic prescription drugs within 20% of the brand name product. OTC drugs are not subjected to the same criteria; the FDA has a list of approximately 800 approved ingredients that are combined in numerous ways to create over 100,000 OTC medications. To assess the level of variation between prescription and OTC generic formulas and their brand name counterparts, drug samples of each category were analyzed using gas chromatography-mass spectrometry (GC-MS). The brand name prescription drug, Darvocet-N, was compared with its generic counterpart; the brand name OTC acetaminophen medication, Tylenol, was compared with two different store brand generic formulations. The resulting GC-MS data indicated greater variance between OTC formulas than the prescription medications sampled.

How to Tell the Future

Christopher Bergbauer and Adam Walters

Division of Humanities

Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Chetachi Egwu & Dr. Weylin Sternglanz**

Abstract

"How to Tell the Future" is a short narrative film that follows a young man as he gains the ability to tell the future. As the man pushes himself to discover the extent of his own capabilities, the lines between good and evil become blurred. In an effort to understand himself, the man creates a series of video diaries describing his newfound powers. The film is directed by Christopher Bergbauer. Crew members and actors include Adam Walters and Malika Kim.

Immortalization of Retinal Capillary Endothelial Cells and Involvement in the Intraocular Inflammatory Response

Norberto Mancera

Department of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Michael Giese**

Abstract

Endothelial cells are highly active in many physiologic processes such as: vasomotor tone of blood vessels, modulate inflammation, and the growth of new blood vessels. Endophthalmitis is an inflammatory condition in the intraocular cavities caused by bacterial and/or host responses. Endophthalmitis is known to result in significant vision loss and it is suspected that this damage is due mostly to the host immune response. Retinal endothelial cells are involved in the stimulation of intraocular inflammation. How these cells get activated and the production of inflammatory agents such as interleukin-1 is not clear, but it is suspected that retinal capillary endothelial cells might be involved in the induction phase of the inflammatory response. An immortalized human retinal capillary endothelial cell line will be developed to serve as an in vitro model for studying the molecular mechanisms involved in the inflammatory reactions. These cells will be grown on membranes of 96 tissue culture plates. Standard protocols use apical cell stimulation. Growing cells on membranes allows for basal stimulation of these cells. The purpose of developing an immortalized cell line instead of using a primary cell line is the ability to proliferate indefinitely as opposed to the limited life of the primary cell line. This will allow for significant numbers for analysis.

Impact of African Dust on the Climate and Ecology in Florida and Neighboring Regions

Michael Wiernicki and Shahjahan Shareef

Division of Math, Science, and Technology

Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Song Gao**

Abstract

The purpose of this study is to understand the impact of African dust on the climate and ecology in Florida, starting from a literature review. In the atmosphere, satellite remote sensing can now track the intercontinental transport of airborne particles. African dust has been frequently observed in the Caribbean and Southeast United States during summer months. Dust from the Sahara Desert can have complicated effects on clouds over Florida, for example, by reducing rainfall in low-altitude clouds while enhancing it in high-altitude clouds. However, the coherent links between African dust and Florida clouds, and the underlying physical and chemical mechanisms, need to be better understood by further work. In the soils on the Florida Keys and the islands in the Bahamas, African dust appears to make a major contribution to the soil components. Analysis of trace elements (Sc, Cr, Th and Zr) and rare earth elements helps determine the origin of soils. In the shores of Florida, African dust has been found to initiate the toxic red tides (algal bloom) via the production of the dinoflagellate *Karenia brevis*. Recent research has shown that red tides may cause respiratory and cardiac morbidity in humans and disturb marine ecosystems. Based on the literature review, research plans and methodologies will be proposed.

Investigating Pentamethylcyclopentadienyl Rhenium(I) Reactivity With Cycloalkane: Synthetic Strategies Toward Crystalline Metal-Alkane Complexes

Florin N. Cicortas and Adailys Trincado
Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Jeremy M. Perotti**

Abstract

Ironically, in nearly thirty years since Bergman and Graham first observed organoiridium activate methane in hydrocarbon solutions, there are today *no* productive ways to catalytically convert smaller alkanes to more energetically useful ones, or selectively oxidize them to alcohols for fuel or commodity purposes. This is unfortunate since natural petrol supplies are dwindling while the global demand on them continues to rise. A high-yielding methane to methanol conversion, however, still remains science fiction. One reason for the paucity of productive C–H transformations today, is an unclear understanding of the reaction's initial step; metal-alkane ligation. We describe below our efforts to elucidate C–H activation by investigating model organo-rhenium systems designed to enhance metal-alkane binding energies such that metal-alkane complexes become isolable in the solid state for the first time. Preliminary infrared data collected on a photoinduced reaction involving $(C_5Me_5)ReCO_3$ and methylcyclohexane is presented and discussed within the context of IR spectra reported for putative metal-alkane complexes present in the literature. A semi-empirical molecular orbital study illustrating the allowable overlap an ML_5 fragment undergoes in a pseudo-octahedral ligand environment with an interested sp^3 hybridized C–H bond as a function of both alkane size *and* approach to the metal center, is presented for discussion along with our strategies to increase metal-alkane binding energies based upon the diagrammed energetics.

Investigating Potential Changes in Gene Expression for Yeast Cells Exposed to Pediatric Flu Vaccine with and without Thimerosal

Christie Rubio

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Emily Schmitt**

Abstract

As a control, gene expression in *Saccharomyces cerevisiae* (Baker's yeast) grown in standard YEPD media (normal growth conditions) was assessed using microarray technology and reverse transcriptase polymerase chain reaction (RT-PCR). Subsequently, yeast were grown in a typical dose of pediatric flu vaccine both with and without thimerosal preservative as experimental treatments. RNA from cells in each environment was extracted using the Ambion RiboPure Yeast Kit. RNA quality and quantity was assessed using gel electrophoresis, and UV spectrophotometry. The mRNA within the sample (about 1% of total RNA) was isolated by creating complementary DNA (cDNA). The presence and relative quantity of four genes of interest (SSA2, ECM4, RAS1 and SUA7) and a housekeeping (control) gene (TDH1) were tested for in the cDNA by using specific primers and PCR to amplify them. These segments were then visualized by gel electrophoresis. The genes of interest were selected for their particular cellular function and possible sensitivity to thimerosal. SSA2 is a chaperone – a molecule that assists in folding proteins. ECM4 is involved in glutathione (an antioxidant) transferase activity as part of a metabolic process that breaks down harmful free radicals and chelates heavy metals. RAS1 has an unknown function in yeast, but is believed to contribute to cancer risk in humans by playing a role in cell cycle control. Finally, SUA7 is involved in transcription (making RNA from DNA). TDH1 is involved in metabolism and should always be expressed in functional yeast cells. Subsequently, cDNA from both vaccine treatments were fluorescently labeled and hybridized to yeast microarrays to test for global gene expression over the entire yeast genome (approximately 6,000 genes). Results of RT-PCR and microarrays were compared among all three treatments.

Is a Couple's Attractiveness Equal to the Sum of its Parts?

Tammy Saenz

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Glenn Scheyd Jr.**

Abstract

Men's and female's perceptions of attractiveness depend on their mate value. One's judgments of others' attractiveness are self generated so it is reasonable to infer that the effect of mate value on attractiveness judgments' is mediated through self perceived mate value. Men tend to over infer female interest from very slight clues. The inference of opposite sex interest is likely to play an important role in determination of self perceived mate value, even if this all occurs unconsciously. A couple's level of attraction may also be based off of one or both individual's mate value. Therefore, the main goal of this study is to assess whether people's impressions of others' attractiveness become modified when an attractive person seems interested in them. Secondly, it's hypothesized that ratings of couples' mate values are determined more by female attractiveness than male attractiveness. Lastly, perceived attractiveness of an individual depends upon the attractiveness of the mate or partner. This true experimental design, has the potential to be the first study to show a direct causal link that female attention may have on male's attractiveness perception.

Is Green Really “Green”?

Saamia Shaikh and Rahila Dholakia
Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Venkatesh Shanbhag**

Abstract

Green chemistry is becoming more commonly practiced with each passing day. In this study, an analysis of energy efficiency is evaluated from the standpoint of the total resources invested, risks involved, and total waste produced, for the production of so labeled green energy. Generally, it is understood to have almost 40% loss in efficiency when a primary source of energy (coal, petroleum) is converted to a secondary source of energy (electricity). A case study of energy efficiency of biodiesel production from waste oil and plant waste will be presented in this study.

Is the Normal Heartbeat Chaotic or Homeostatic?

Carlos Haderspock, Christopher Balaban and Gan Golshteyn

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Victor Castro**

Abstract

Chaotic systems are nature variable, which serve as important mechanism for adaptability and flexibility, which is essential for dealing with table unpredictable constraint and environmental changes. This complex variability's have been analyzed in patients that preceded sudden cardiac death. The major dynamic results indicated that the heart rate lost its physiological variability's, minutes to months before the patient's death due to cardiac failure. Some cases revealed that the lost of normal dynamics was represented by an overall reduction in beat-to-beat variability, while other demonstrate high periodic, relatively low frequency (0.01-0.04 Hz) that sometime sustained oscillations patterns of unusual starts and abruptly stops. These non-linear changes are known as bifurcations. Similar patterns such as low frequency oscillations and loss of variability have been encountered in cardiac arrest survivors, high risk patients and fetal distress syndromes.

With this projects would like to further study the chaotic aspects of the heart to help better understand the chaotic implementation involved within it. Further investigation in the chaotic physiological system of the cardiovascular system and some portions of the nervous system could further help prevent and facilitate early detections of such medical conditions as heart attacks. It would be greatly beneficial to be able to collaborate with HPD to obtain further EEG, EKGs and other physiological system monitoring in order to obtain a more accurate correlation with chaos and the human body. Variable theories will be implemented such as the ones mentioned in the report as well as other formulas and theories including graphical analyze graphs

Kazal Serine Protease Inhibitors and their Role in *Prototheca wickerhamii* Pathogenicity

Norberto Mancera

Department of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Aurélien Tartar**

Abstract

Several genes are known to be involved in pathogenic processes. Among these, Kazal serine protease inhibitors (InterPro IPR002350) have been shown to be recurrently used by pathogenic eukaryotes. Kazal serine protease inhibitors are involved in the pathogenicity of *Plasmodium falciparum* by providing protection to parasitic proteins from the host's defenses. Although Kazal protease inhibitors have been associated with the pathogenicity of several eukaryotic microbes, it is unclear if they are involved in *Prototheca wickerhamii* infection. *Prototheca wickerhamii* is an achlorophyllic green alga known to cause infections in humans. Olecranon bursitis, cutaneous, and bilateral choroiditis are three types of clinical infections resulting from this facultative pathogen in immunosuppressed hosts. Over one-third of the reported cases advanced to systemic dissemination, some eventually led to death. The main objective of this study is to sequence Kazal-like protease inhibitor genes from *Prototheca wickerhamii* and estimate the role of this protein in the pathogenic process. *Prototheca wickerhamii* has been successfully cultured and cells collected were used for DNA extraction. Kazal-like protease inhibitor genes were amplified via Polymerase Chain Reaction (PCR) and sequenced. Sequence analysis was performed and both nucleotide and protein sequences were compared to publicly available information. Additional studies will be directed towards the expression of Kazal and its involvement in pathogenicity.

Life Unmentioned

Kelsey Cortez

Division of Humanities
Farquhar College of Arts and Science

Faculty Advisors: **Dr. Chetachi Egwu and Dr. Weylin Sternglanz**

Abstract

“Life Unmentioned” is a short film that provides a brief insight into the lives of a man and a woman, both of whom are connected in a way that has the potential to change the course of their lives. The two characters are portrayed waiting, one in a clinic, and the other backstage at an award ceremony. As the film comes to a climax and their waiting comes to an end, the relationship between the two is revealed. The film is directed by Kelsey Cortez. Crew members and actors include Alexa Hecoeks, Marco Bruno, and several others.

Linguistics Out Loud: The Uses of Jargon in Online Communities

Brittany Eisenhart

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Eric Mason**

Abstract

Jargon is community-specific language that is often criticized for being confusing and exclusionary. But it serves a useful social function as well, enabling easy identification of group members, conveying community values, and streamlining internal communication. Past research on jargon has focused on face-to-face communities, especially on occupational groups such as the military and on spatially concentrated populations such as prison inmates. This paper seeks to understand how online communication has affected the development and distribution of jargon, and how various online communities use jargon. New technologies are a common source of linguistic change. The New Oxford American Dictionary even named “unfriend” (a word associated with online social networking sites like Facebook) as their 2009 Word of the Year. Much of the interaction in social networking sites is explicitly textual; therefore, these communities often develop linguistic resources, including jargon, to facilitate communication among members. This study uses discourse analysis to examine the public circulation of jargon on social networking sites such as Facebook, Twitter, and LinkedIn. Analysis reveals distinct differences in jargon use among these communities based on a sophisticated awareness of audience. These differences emerge from the design of the online sites themselves, from the differences in the composition and purposes of these communities, and from the rhetorical affordances of jargon.

Local Bank's Protection against Money Laundering

Amy Ajodha

H. Wayne Huizenga School of Business and Entrepreneurship

Faculty Advisor: **Judith Harris**

Abstract

Money laundering is the process of making money obtained from illegitimate means appear to have been obtained from lawful sources; in other words it is the process of making dirty money appear clean. There are several illicit activities that are associated with money laundering such as drug trafficking and terrorism. The roots of money laundering can be found during the Prohibition Era and was popularized by mobsters like Al Capone and Meyer Lansky, and infamous instances such as the Watergate Scandal. Today, due to increased occurrences of money laundering and the devastating effects that may follow, money laundering has become more significant in political, economic, and legal fields. Therefore money laundering is a worldwide growing concern for financial institutions and people who are associated with fiscal organizations, from managers to everyday customers. In order to understand how money laundering affects financial institutions, it is important to fully comprehend the history, meaning, process, and consequences of money laundering. A thorough analysis of money laundering and its effects have been constructed by examining how a local Amstrust Bank branch protects itself against money laundering.

Medicinal Plants and their Diverse Therapeutic Applications

Jason Conseugra, Sachin Patel, Danielle Malicki and Sose Tokatlian

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Venkatesh Shanbhag**

Abstract

Natural way of healing has been part of all civilizations. Particularly, medicinal plants have been exploited throughout the world for maintaining good health, nutritional balance, and curing ailments. Same plant may display ubiquity in its use based on the geographic location. Climate conditions naturally select plant species, therefore same condition may be treated by a different plant species based on availability. This project evaluates a host of medicinal plants and their varied applications based on culture.

MicroCT as a Viable Option for Histological Analysis of Ocular Tissue

Christian Vidalon

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Michael Giese**

Abstract

Three-dimensional imaging of ocular tissue enhances understanding of the molecular mechanisms of disease. Stereology is currently the gold standard for producing such images. However, the labor-intensive nature of stereology makes it less than ideal. Other current high-resolution three-dimensional modalities e.g., CT and MRI, are not able to generate histologically equivalent images. This necessitates the adoption of a novel technique. Microcomputed tomography (MicroCT) has the potential to produce the desired images at high-resolutions. Due to the novelty of MicroCT as it applies to imaging ocular structures, protocols do not exist. The pilot data gathered in this study will explicate an appropriate protocol for the histologic imaging of ocular tissue in a Norwegian Brown rat (*Rattus norvegicus*) model. Additionally, the general parameters for operating the MicroCT unit will be determined. This study aims to establish MicroCT as a viable option for histological analysis of ocular tissue. Areas open to future investigation include the quantitative analyses of (1) vascular changes around the optic nerve in a rat model of glaucoma and of (2) bacterial populations in the induction of the intraocular inflammatory response in a rat model of infection.

Nanotechnology Solutions to a Big Water Problem

Catalina Breton, Adero Francis, Sameed Ashfaq, Jessica Bradbury

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Dimitrios Giarikos**

Abstract

With an average of 3.6 million people dying each year from contaminated drinking water while another 65 million at risk, it looks like fresh water is becoming the oil problem of the 21st century: scarce, expensive, and fought over. There is growing interest in the development of green nanotechnology for water purification as an ecologically safe and cost-efficient approach. Nanosponges are a combination of glass and nanoparticles structurally capable of trapping pesticides and other hazardous organic matter. Nanorust particles have been observed to reduce arsenic and certain diseases in water by binding to its target and then being magnetically removed. Finally, nanomesh watersticks have become an efficient and economical means for filtering water due to the portability of the technology and efficacy of the nanotubules at work. The biggest setback for these technologies, however, is what to do with these contaminants once removed from the water. The primary goal of this project is to describe these nanotechnology methods and discuss the advantages and disadvantages of using these newly developed methods.

New Materials for Modification of Metallic Gold Nanoparticles

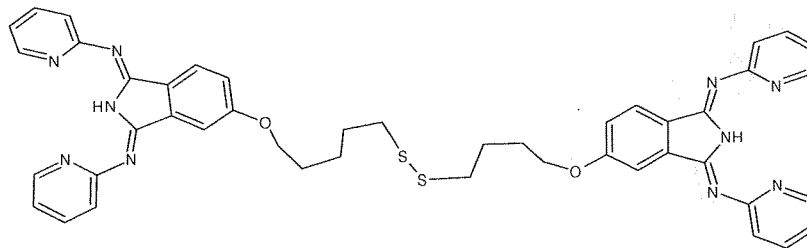
Lesley Hagan

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Donald Baird**

Abstract

Nanotechnology is a field of science that deals with the studying and controlling of matter on an atomic and molecular level. It generally consists of processes such as separation, consolidation and deformation of materials by one atom or molecule to achieve a specific product with certain desirable properties. When gold nanoparticles are coated with metal complexes, it enhances its uses and applications. Gold nanoparticles are very good at absorbing and scattering light and hence have great optical properties. Various research studies conducted on gold nanoparticles have shown that these particles can successfully be used to detect cancer cells. One of these studies reported that, gold nanoparticles have a 600 percent affinity for cancerous cells. These particles are also used as catalyst in many



Compound A (Disulfide)

chemical reactions such as in the making of plastics. Great interest has been shown in the study and development of these particles and how they can be used to improve science and medicine.

In our ongoing research, our approach has been to bind metal chelating organic molecules to the gold surfaces to chemically alter the behavior of the particles. Synthesis of compound A is our initial target because the disulfide bond can be broken to form Au-S which will give it desirable characteristics in many applications such as breast cancer research. Upon completion of the synthesis of compound A, an attempt would be made to bind it to the surface of gold nanoparticles.

NSU's Top Models: Zombie Attack Heartbeats

**Sophia Cuprillnilson, Rajeswari Murugan, Lacrima Nemulescu,
Kodi Stevens, Amy Van and Adenji Baker**

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Evan Haskell**

Abstract

Models have a wide array of real life applications ranging from engineering to economics. In biological science, it is a biologist's aim to give verifiable predictions. This is where they use Mathematics as a technique to aid their discoveries. This study observes two Mathematical models that will give a representation of some aspect of real world phenomena. In effect, these models are simplified versions of systems that are well known. In order to create a Mathematical model, the assumptions on which the model will be based must be stated. These assumptions will describe the relationships among the quantities to be studied. The assumptions previously made will be formulated to derive equations relating to the described quantities. These equations will be analyzed to make predictions about the described quantities. This study will utilize two Mathematical models that follow these criteria: one from epidemiology and one from cardio-physiology. The group will focus on applying the modified SIR model from epidemiology to zombie proliferation and on Zeeman non-linear oscillator model of the cardiac cycle. The modified SIR model can be used to predict different scenarios of zombie outbreaks. The Zeeman non-linear oscillator model can be used to predict effects of high blood pressure and adrenaline.

Phylogenetic Analysis using Human Mitochondrial DNA

Stephanie Cirillo

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty advisor: **Dr. Joshua Loomis**

Abstract

DNA, which is found in nearly every cell in our body, is often used to identify members of a population because it is unique to each person. In addition, these differences can be used to identify aspects about a person's lineage and determine what geographical region they originate from. DNA is compared with others in the population by using specific markers that are representative of various regions. To compare the genetic markers within my immediate family, genomic DNA was isolated and amplified using the technique of PCR. The obtained products were then sequenced and studied to determine what genetic markers they contain. The markers that are being studied are found within mitochondrial DNA, which can only be maternally inherited. Studying these sequences will help to determine if my family truly did originate from Italy as has been suggested from historical records. The sequences are currently being compared through phylogenetic software and literature research is also being done to decipher the markers in our sequences.

**Preliminary Examination of Gill Vasculature in the Grey Snapper
(*Lutjanus griseus*) using Vascular Corrosion Casting**

Ana Paula Delgado

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Robin Sherman**

Abstract

While much research has been done on the gross structure and function of gills in bony fish, little work has been done to examine the blood spaces enclosed by the gill structure. The objective of this research project is to compare and contrast the blood spaces in the Grey Snapper (*Lutjanus griseus*) in relation to overall gill structure and the respiratory vasculature in particular. A single fish was caught using hook and line. The specimen was humanely euthanized using an excess of anesthesia (MS-222, tricane methansulphonate) in seawater. The gills were cleared of blood by perfusion with saline solution followed by perfusion with a liquid polymer (Mercox[®], methylmethacrylate). To remove the soft tissue around the cast, a 3 molar solution of sodium hydroxide was used. The resulting cast was examined using light microscopy and photographed to characterize the blood spaces in comparison with published diagrams and descriptions of gill structures of bony fishes. The structures observed include the afferent branchial arteries, afferent filament arteries, filament central sinus, and lamellae. The afferent branchial arteries and filament arteries transport deoxygenated blood to the lamellae which are the specific places where gas exchange takes place. In addition to gas exchange, the lamellae are also the site of ion transfer and pH stabilization. Although it is believed that most bony fish share this overall structure, few fishes have been examined at this level. This is, therefore, an area of research that offers many new opportunities for study.

Psychological Stress Improves Hippocampal-Dependent Memory

Christine Klopp and Carlos Garcia
Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisors: **Drs. Jaime Tartar and Dr. Allan Schulman**

Abstract

A large and growing body of research shows that acute stress improves memory performance while chronic stress impairs memory performance. However, the majority of the work in this area has relied on testing various correlates of memory performance after acute or chronic stress protocols in rodents. A particularly robust finding is that acute exposure to a stressor enhances hippocampal-dependent memory performance in the Morris Water Maze test of spatial navigation in rodents. Importantly though, the extent to which acute stress can improve hippocampal-dependent memory in humans remains unclear. One previous study using a Virtual Morris Water Maze (VMWM) test demonstrated that acute exposure to physical (cold) stress also improves hippocampal-dependent memory performance in humans. However, given that humans typically suffer from psychological (as opposed to physical) stress, the role of ethologically relevant (i.e. psychological) stress in human memory performance remains undetermined. We predicted that acute psychological stress in humans will also result in an improvement in hippocampal-dependent memory performance in the VMWM test. To that end, we employed a validated protocol for inducing psychological stress in humans, the Trier Social Stress Test (TSST) along with a placebo version of this protocol. Additional dependent measures included heart rate, biochemical correlates of stress (cortisol and alpha-amylase) as well as neuropsychological assessments of stress and anxiety. As predicted, and consistent with previous findings, preliminary analyses show that compared to participants in the placebo group, participants who experienced social stress (TSST) performed better on the VMWM test of spatial navigation.

Psychopaths: The Unholy Trinity

Alyssa Mineo

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Drs. Jaime Tartar and Dr. Tom Fagan**

Abstract

Psychopathy is characterized as the inability to feel typical human emotions. Psychopaths are often remorseless and lack empathy and guilt. Psychopaths can be classified into one of three types: violent, non-violent and "pseudo" psychopaths. Regardless of classification, all psychopaths are identified according to Psychopathy Checklist Revised (PCL-R). This neurometric assessment is considered the gold standard for the diagnosis of psychopathy. However, according to recent neuroanatomical investigations, the etiology and brain activity in these three types of psychopathy appears to be divergent. For example, while an underactive amygdala appears to be involved in both violent and non-violent psychopaths, involvement of the orbitofrontal cortex, anterior cortices, bilateral lesions, and left inferior frontal gyrus is only shown in violent psychopathic offenders. In non-violent offenders, the damage to prefrontal structures was less severe and only possessed lesions on one hemisphere. While "pseudo" psychopaths possess many of the behavioral characteristics of psychopathy, it is associated with dysfunction of the frontal cortex caused by maturational underdevelopment or traumatic brain injury. Accordingly, I will argue that in light of recent neuroimaging findings, the three types of psychopathy should be considered, and classified as, distinct disease processes.

South Florida's Coastal Environment: Habitats and Organisms

Jennifer Anders, Jillian Barbosa, Betsy Gonzales, John-Wayne Hazell

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Paul Arena**

Abstract

Florida's coasts are extremely valuable, environmentally and recreationally. In south Florida, where urbanization continually threatens this ecosystem, educational outreach has to be a crucial part of conserving these coastal habitats. In collaboration with the University of Florida's Master Naturalist Program, Nova Southeastern University undergraduates have been given the opportunity to, not only learn about Florida's coastal systems and become certified master naturalists, but also encouraged to pass on the information we learn and educate the local community in Broward County about these areas. This project began as a way to teach the public about Florida's coastal environment, which is divided into three major habitats: marine, estuarine, and coastal uplands. For each habitat, fun facts will be presented to capture the interest of the public and make them aware of the various threats to these natural areas. The poster will also be presented to the public at an Earth Day event on NSU's main campus. The goal of this project is to attract attention to our local natural areas and promote environmental education by highlighting the unique and diverse assemblage of flora and fauna in our local coastal habitats. These coastal areas are some of the most productive in the world. By arming the local community with appropriate knowledge they can begin to experience the environment first hand, advocate for the protection and enhancement of this environment and the plants and animals that inhabit them.

Synthesis and Incorporation of Photoactive Chlorin-Heme Dimers into Proteins

Sarah Silverstein

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Dimitri Giarikos and Dr. Reza Razeghifard**

Abstract

Inspired by natural photoactive proteins, chlorin-heme dimers were synthesized starting from a new chlorin e6 derivative. The most abundant photoactive proteins are chlorophyll-containing proteins that form bacterial reaction center or photosystem proteins in plants. These proteins are capable of converting the energy of light into an electron flow using their special chlorophyll molecules capable of photo-oxidation. We have used the chlorin pigment in these dimers, which is a stable chlorophyll analogue, to introduce photoactivity into proteins while the heme acts as the electron acceptor/donor. To better understand the effect of protein environment on the photoactivity, two different systems were constructed: a peptide carrying a chlorin-heme dimer for a totally synthetic system, and myoglobin with its heme replaced with a chlorin-heme dimer as the semi-artificial system. Here we are presenting our data showing that the chlorin pigment can reduce and oxidize the heme by changing its oxidation state.

Synthesis of Porous Organic Materials for Gas Storage Media

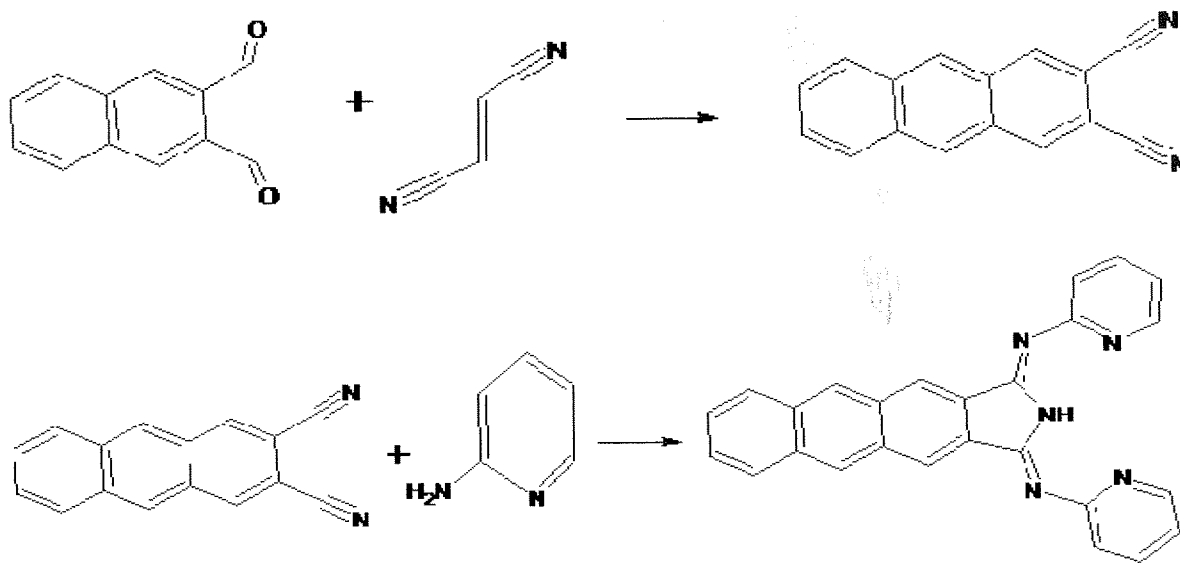
Reena Parikh

Division of Math Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Donald Baird**

Abstract

The purpose of this research is to help synthesize porous organic materials as possible gas storage media. Moreover, experimentation and chemical reactions will assist in finding and producing products that will be porous. Their porous nature will enable them to hold a certain volume of gas, which is useful in science for drug delivery. Earlier experimentation for this same purpose has been discontinued, due to an inability to acquire the proper starting material. This earlier research involved a reaction to place an extra ring on the compound NBAHICuOAc. This molecule has two benzene rings, of which have shown to hold a trace amount of methane gas after DMF and H₂O have been removed from it. It has been hypothesized that the porous molecule is unable to hold large amounts of gaseous substances because the removal of DMF and H₂O cause the holes of this structure to collapse. Therefore, further study of this molecule is required to perfect it. Synthesizing this molecule with an extra benzene ring, for a total of three rings, may enable it to hold a greater volume of gas. Placing an extra ring on the molecule requires the use of 2, 3 naphthalene dicarboxylic aldehyde, fumonitrile, and triethylphosphine. The final product is a Wittig reagent. In creation of this final product, advancements will be made towards the completion of synthesizing a molecule for drug delivery. The reaction to create a three membered ring is shown below:



**The Effect of Water Temperature on Florida Manatee
(*Trichechus manatus latirostris*) Abundance in Port Everglades, Florida**

Shannon Twist and Brittany Lape

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Edward O. Keith**

Abstract

Port Everglades, located near Nova Southeastern University's Oceanographic Center, is a wintering area for the Florida manatee (*Trichechus manatus latirostris*), because it is a warm-water habitat. This study used data collected in the past, as well as data we collected on trips through the Port, which was then examined with the following criteria for comparison: past water temperature versus current water temperature, past surveyed manatee numbers versus current manatees surveyed, and water temperature versus manatees surveyed. These comparisons were reviewed to illustrate any climate change trends that have occurred, as well as how those have affected the manatees in Port Everglades. Recent reports show a statewide increase in manatee deaths associated with the cold-stress syndrome, which is caused by water temperatures lower than 68°F. The first null hypothesis for this study was that there has been no change in the water temperature in Port Everglades, and the second null hypothesis was that there has been no change in the number of manatees present. However, the data demonstrate a trend of rising manatee population in Port Everglades between the years of 2008 – 2010, allowing us to reject the second null hypothesis.

The Performative Nature of Gender in Orlando Furioso

Jessica Furth

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Suzanne Ferriss**

Abstract

Gender identities have been defined by a Western society that states that men are strong, tough and firm, while women should be fragile, passive and flexible. Many argue that this is not true; for example, literary critic Judith Butler claims, "Gender is in no way a stable identity or locus of agency from which various acts proceed; rather, it is an identity tenuously constructed in time" (900). She claims that gender is a performative act and is in no way an accurate method of labeling or identifying someone. There are countless examples of literary works that either adapt or reject society's normative views of gender and sexuality, including Ludovico Ariosto's Renaissance epic *Orlando Furioso*, which toys with the performative nature of gender but ultimately upholds a normative definition of heterosexuality.

The Role of Social Media on the Development of Interpersonal Communication

Annarely Rodriguez, Nichelle Farrington, Chelsea Seignious and Vittoria Santini

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Megan Fitzgerald**

Abstract

Social networking sites, such as Facebook, MySpace, and Twitter, are popular among young adults (defined as 18-29 year-olds), with 72% of individuals in this age group maintaining at least one profile (Lenhart, Purcell, Smith, and Zickuhr 2010). While a great deal of research has been conducted on the psychological effects of Internet interaction, little previous quantitative research has been conducted to determine how online socialization affects normative face-to-face interactions. This study aims to discover if social media influences the way college students interact and communicate interpersonally. The project will also investigate how this growing method of communication plays a role in students' daily lives, relating to distribution of time and use of language. In addition, gender will be examined to see if any significant differences arise from the data.

The Role of Tumor Suppressor Genes PTEN and VHL on the Expression of HIF-1 α under Hypoxic Condition

Jhanelle Dawes and Svitlana Shvank
Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisors: Dr. Appu Rathinavelu and Dr. Praneetha Muthumani

Abstract

The objective of this study was to determine the effect of hypoxic conditions on the expression of HIF-1 α in LNCaP and LNCaP-MST cell lines containing tumor suppressor genes, such as PTEN and VHL. The degradation of HIF-1 α is oxygen dependent and is facilitated by von hippel-lindau (VHL) protein. Under normoxic conditions, VHL gene recognizes HIF-1 α and promotes its ubiquitination and lysosomal degradation. Under hypoxic conditions, the VHL is unable to bind to HIF-1 α and therefore, the degradation is minimal. The phosphoinositide 3-kinase (PI3K) - Akt pathway regulates HIF 1 activity. Under normoxic conditions, PTEN decreases the effects of the PI3K pathway. Therefore, loss of PTEN increases the expression of HIF-1 α and consequently tumor angiogenesis. LNCaP and LNCaP-MST cells were grown in RPMI medium at 37°C. After treatment, the total RNA was extracted and quantification was performed to determine the total yield. In order to compare, RT-PCR was carried out using Promega's Access Quick RT-PCR kit. Amplified cDNA was separated in a 1% agarose gel and then the band intensities were determined by densitometry scanning. Treatment of cells with hypoxia was found to increase the expression of HIF-1 α in LNCaP and LNCaP-MST cells. The increase appears to be as a result of the stabilization of HIF-1 α . Under the hypoxic conditions, both PTEN and VHL levels were also increased which did not seem to affect the levels of HIF-1 α . Under hypoxic condition, the expression of HIF-1 α increased although, both VHL and PTEN levels were elevated in our experimental conditions. This may be because under hypoxic conditions, VHL may not be able to recognize HIF-1 α and cause degradation. The reason for PTEN elevation under hypoxic condition is yet to be determined.

The Study of Keeping Secrets Secret By Means of Cryptography

Amy Van

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Ricardo Carrera and Dr. Saeed Rajput**

Abstract

Humans have always wanted to keep secrets. This work investigates the history of “keeping secrets”, starting as far back as 4,000 years ago, and briefly covers the most important developments in the art of keeping secrets and cryptography. In this information age, cryptography (which is based on advanced mathematics) plays a fundamental role in on-line commerce, protects us from identity theft, and enhances the security of our personal electronic devices. These secrets are at an even greater risk to exposure than before because of technology. The Internet has allowed over 1,700,000,000 people all over the world to do endless amounts of communication and purchasing. However, some of these messages are not meant for everyone’s knowledge such as your credit card information that shouldn’t be shared with anyone else besides the seller. We investigate how math helps us keep our secrets. We also investigate how the exponential growth in computation power and communications has increased the need, and impacted the nature of secrecy.

Transcriptome Analysis of the Entomopathogen *Lagenidium giganteum*

Lauren Douma

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Aurelien Tartar**

Abstract

Lagenidium giganteum is an entomopathogenic oomycete which means that it parasitic towards insects. It is known to infect and kill mosquito larvae, meaning that *L. giganteum* could possibly be used in place of chemical insecticides. Mosquitoes can carry very deadly diseases which can be transmitted to dogs, birds, horses, and humans. Thus, it is important to control mosquito populations. In the past, mosquito populations have been controlled by chemical insecticides. Due to environmental issues caused by these insecticides and the fact that the mosquitoes have built up resistance, alternative insecticides, like using *L. giganteum* are being explored. In order to optimize the mosquito killing properties of this organism as an insecticide, an understanding of how it infects and kills mosquitoes is needed. This research project was conducted to find the pathogenic genes of *L. giganteum*. To find these genes, the transcriptome of the organism needed to be sequenced. Multiple samples of the organism *L. giganteum* were cultured in lab and used to extract RNA. Then the mRNA was isolated and transformed into cDNA. Expressed sequence tags were produced, allowing a gene to be found within a portion of DNA. These expressed sequence tags were screened for genes that had to do with the pathogenic properties of the organism *L. giganteum*. The idea behind discovering these specific genes is that with the knowledge of how these genes work, an alternative insecticide for mosquitoes can be discovered.

Type II Diabetes Prevention

Emlynn Chazhikat

Department of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Edward Keith**

Abstract

If the Center for Disease Control's (CDC) predictions are accurate then by the year 2050 40-50 million U.S. residents will have the debilitating disease known as type II Diabetes. Type II diabetes is the most common form of diabetes. Type II diabetes occurs when the body itself cannot generate enough insulin. Insulin is highly important for our bodies to function because it is needed for the body to be able to use sugar, which is the basic fuel for the cells in the body. Insulin causes the cells to absorb sugar. With diabetes, your body has trouble using a sugar called glucose for energy. As a result, the sugar level in your blood becomes too high. There are some underlying factors such as family and age that predispose one to contracting type II diabetes. This does not mean that certain actions cannot be taken to prevent or live a healthy fulfilling life with diabetes. Moderate exercise and eating healthy are two lifestyle changes that greatly impact conquering this epidemic.

Using Genealogical Records and Genetic Markers of the Y-chromosome, X-chromosome, and Mitochondrial DNA to Create a Personal Family History Narrative

Lauren Douma

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisors: **Dr. Emily Schmitt** and **Dr. Joshua Loomis**

Abstract

The Human Genographic Project has created a map-based hypothesis of how *Homo sapiens* moved out of Africa populating the World. Created after the Human Genome Project, the Human Genographic Project combines the scientific research of genetics and the historical aspects of genealogy. Gaining inspiration from this large-scale and highly publicized project, the purpose of this study was to use genealogical records as well as genetics tools to discover more information about my own lineage. Using historical genealogical records, I have located many of my ancestors back into the late 19th century, with ancestors having migrated from Hungary and the Netherlands to the United States. The genetics tools used in this project involved commercially available DNA tests that searched for DNA markers located on the Y-chromosome, X-chromosome, and mitochondrial DNA. These markers are DNA mutations that occurred as humans migrated across the globe. The mutations are heritable and act as maps that make it easier for geneticists to track populations over time. The commercial tests placed my maternal side in the mtDNA haplogroup K and the Y-chromosome haplogroup I1. My paternal side was placed in the mtDNA haplogroup U* and the Y-chromosome haplogroup R1b1b2. Within the haplogroups there are more specific genetic markers that have been studied by other researchers but are not used by the commercial testing facilities. In order to answer more questions left unanswered by the commercial testing, the hypervariable region of my mitochondrial DNA was investigated for single nucleotide polymorphisms that correspond to very specific cultural groups.

Using Genetic Testing and Historical Records to Document Ancestral Heritage

Hannah Bromberg

Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Emily Schmitt**

Abstract

Genetic testing to find specific changes in DNA (molecular markers) can be performed in order to determine the geographical location of one's ancestral heritage. Maternal lineage can be traced through mitochondrial DNA (mtDNA) passed from mothers to children, while paternal lineages can be traced through Y-chromosomal DNA passed from fathers to sons. These molecular markers have been analyzed to recreate migration patterns that humans embarked upon when leaving Africa approximately 50,000 years ago.

For this project, DNA was collected from a cheek swab sample in order to carry out mt DNA tests as well as Y-chromosomal tests. Since the author of this project is female, she was only able to test for mitochondrial DNA and therefore her father provided a cheek swab sample to be used for Y-chromosomal DNA analysis. Samples were sent to *National Geographic's Genographic Project* for analysis (www.genographic.nationalgeographic.com). DNA was categorized into haplogroups defined by specific genetic markers that allowed the author to trace her ancestors migrational pattern as they left Africa.

In order to create an original family tree and family history narrative based on more recent historical documents, the author used census reports from 1900-1930. These reports provided information including occupations and years of immigration to the United States. Draft cards, naturalization papers and obituaries supplied additional facts that offered further insights into the lives of the author's ancestors.

Video Analysis and Documentation of Eusocial Behavior in Commensal Amphipod Crustaceans

Sharein El-Tourky

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. James Thomas**

Abstract

Eusociality is a term used in reference to the highest level of social organization in a hierarchical classification of populations and is typically associated with terrestrial invertebrates such as ants and bees. A species is typically deemed to have eusocial organization when it exhibits several complex social behaviors including cooperative care of young, nest guarding, and reproductive division of labor. Recently, scientists such as Emmet Duffy have documented eusociality in marine crustaceans like the snapping shrimp, *Synalpheus filidigitus*. It is known that Gammeridian Amphipods have a social structure, but a determination as to whether or not their behavior is eusocial, *sensu-stricto*, remains to be determined.

Specimens of Gammeridian Amphipods residing commensally within transparent tunicates, *Ecteinascidia turbinata*, were collected *in situ* from the Florida Keys. The amphipods were filmed within the tunicates in microaquaria by special video cameras to record and document all behaviors, interactions, and any recognizable fixed actions responses for later analysis and classification. The resulting behavior profile revealed that the commensal amphipod under study, *Anamixis cavitura* Thomas, 1997, exhibits several complex behaviors and fixed action responses as well as recognition of "kin". The documented behavior profiles provide a strong basis for further investigation into possible mechanisms of eusocial structure in these amphipods.

Water Quality Testing at John U. Lloyd Beach State Park

Angelica Garcia and Betsy Gonzalez
Division of Math, Science and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Edward O. Keith**

Abstract

The purpose of this experiment is to test the water quality of four different sites in John U. Lloyd State Park. Sites to be tested will be the boat launch, Whiskey Creek at two different locations, and the ocean. The water will be tested for dissolved oxygen, salinity/conductivity, Nitrates and Nitrites, and turbidity at the boat launch and Whiskey Creek with a Secchi disk. Testing will take place once a week, for 3 hours, with the goal to observe differences in water quality as the day progresses. The information will be analyzed using graphs and charts showing the tests on a weekly basis. This information can give insight into how healthy the water is for organisms to live in and how much Port Everglades has affected the quality of the water. The hypothesis proposed for this experiment is that the salinity in Whiskey Creek will be lower than that of the ocean and the dissolved oxygen at the boat launch will be much lower, showing that the boat launch has affected the health of the water.

When Natural isn't Good Enough

Dana Dunham

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Allison Brimmer**

Abstract

In the late 1800s, Madame C.J. Walker invented hair straightening products for African American women. Her products allowed women of color to fit the standardized notion of beauty (i.e., have long straight hair). In the early 21st century we continue to see women of color straighten their hair and engage in other beauty rituals in order to mirror their white-skinned counterparts. The U.S. film industry has always focused on beauty. Image has been the key role in casting female characters. Is she tall enough? Is she thin enough? Is her hair long and straight enough? Is she light enough? These are the questions that impact women of color today in mainstream media, most often in a negative way. This work traces the images of African American women in film from the 1940s onward and connects the impact of those images to everyday women of color, revealing the internalized racism that compels them to conform.

Where to Shop For Electronics

Stephanie Castorani and Valeska Dubon

Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Bashar Zogheib**

Abstract

Technology has become an essential part of life today. People are, literally, surrounded by technology every minute of every day. Advances in technology has sped up life, made certain aspects of life easier, and has made the world a smaller place. However, the affordability of electronic devices has changed due to the economic troubles that have been seen in recent years. This project uses statistical analysis, specifically analysis of variance, to compare the mean price of a variety of electronic devices at four different stores: Wal-Mart, Target, Best Buy, and RadioShack. This is of interest because with technology advancing at such great speed and with the economy being how it is, people are looking for ways to save money but still be up-to-date on the latest electronic devices in the market. The result of this project will provide information as to which stores provide electronic devices at lower, more affordable, prices.

Working Memory in Bilingual and Monolingual Children with ADHD

Tara Bertone, Alicia Harnisch, and Daniela Padron

Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Mercedes Fernandez**

Abstract

The *Weschler Intelligence Scale for Children-Fourth Editon* (WISC-IV) is an evaluative tool used in the clinical setting to assess the intellectual functioning of children. The WISC-IV can be used to provide a generalized intelligence score or to assess specific cognitive areas, including working memory. Working memory, also defined as short term memory, is the ability to maintain conscious awareness of information for the purpose of manipulating it to produce a result. Research has shown a direct correlation between working memory and the cognitive processes related to achievement and learning such as fluid reasoning. Children who are diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) often exhibit a deficiency in working memory function, which may be most noticeable as inconsistencies in learning and achievement when compared with their peers. The frontal lobe is the area of the brain most associated with working memory. This area of the brain is also correlated with language ability. Research has evidenced that bilinguals, individuals who are able to fluently speak two languages, have improved frontal lobe functioning. Archival data were obtained from a local clinic providing services to families from an underserved area. The data collected will be analyzed to determine whether bilingual children diagnosed with ADHD exhibit a bilingual advantage compared to monolingual children based on the relationship established between working memory, bilingualism, and ADHD.