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Undergraduate Student Symposium 2008: Research Abstracts

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A Cost-Benefit Analysis of Possible Alternatives for the Chemical Triclosan.

Besty Jacob

H. Wayne Huizenga School of Business

Faculty Advisor: **Charles Harrington**

Abstract

The chemical Triclosan is currently being used in a variety of household products. Soap, shampoo, dishwashing solution, detergents, cosmetics and lotions all utilize this product. These and other similar products market Triclosan as a bactericide. However Triclosan may not be as effective at killing bacteria when combined with these commercial products as advertised. There may potentially be safer and more effective alternatives. A potential problem with the overuse of Triclosan, is current and potential bacterial resistance. For instance, some strains of *MRSA (Methicillin-Resistant Staphylococcus Auereus)* have already developed resistance to this chemical. On the other hand, there are circumstances where Triclosan may be beneficial and its use is not questioned. In hospital settings Triclosan is useful for cleaning and disinfecting. However the widespread use of this product in a number of different household products is questionable without further review. This review will explore other possible alternatives to this product and will review the costs and benefits associated with such.

A Dream

Amy Harvey

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Christine Jackson**

Abstract

Written by Amy Harvey in 1999, the poem was inspired by the concept of the author's image of an angel. The author's hope is that it evokes interest in the ongoing question: "Do angels exist?"

A Political Analysis of *The Jungle*

Michael Bergbauer

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Suzanne Ferriss**

Abstract

One may surmise that Upton Sinclair's *The Jungle* is a political text disguised as a novel. Its anti-capitalist agenda is not hidden and appears at every opportunity in the text. However, it does an effective job of accomplishing its goals through its stark realism in its portrayal of the downfall of one immigrant family. Sinclair's book *The Jungle* confirms Marxist political critical theory: capitalism is a morally and economically flawed system, which is better replaced with socialism. However, although *The Jungle* enacted a lot of change for its time, a re-read in the present would not spark any new change. It is a text of its time and cannot be applied to current standards of government and society.

Amber's Crush

Afroza Khan, Titina Gist, Elizabeth Gist

Division of Humanities
Farquhar College of Arts and Sciences

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

Abstract

"Amber's Crush" is a comedic short film about a girl who has a condition called dyspraxia. At the mere age of seven Amber was in a traumatic accident resulting in a fatal injury to her head. Due to the traumatic head injury, Amber was diagnosed with a condition known as Dyspraxia. Dyspraxia is the inability to perform coordinated movements. After years of therapy and home schooling, Amber decides to return to real world and start college. But her past comes back to haunt her when she realizes that she can't hide from her true self.

Anatomy Cat Dissection Software: Developing a Study Resource CD-ROM for Physiology Students

Nick Rocco

The Pre-Medical Society
Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Paul Arena**

Abstract

The purpose of this research project is to develop an interactive CD-ROM study tool, specifically designed for cat dissections. A team of NSU Pre-Medical Students will be performing dissections on triple injected cats as well as gathering data to study the effectiveness of the program on student's lab performance. The students will be taking still pictures along with interactive video to demonstrate various dissection procedures in addition to viewing anatomical structures. Dr. Paul Arena will be the advising professor along with Dr. Robin Sherman who will be assisting in the dissection process and providing her expertise in mammalian dissections. The pictures will be placed on an interactive CD-ROM, which will be a useful study tool for future Anatomy and Physiology students. There will also be helpful lecture review material and interactive games and activities. The CD-ROM will consist of several modules that can be accessed from the main page which is designed as a creative laboratory setting. The various sections that can be accessed will include: muscles, skeletal structures, as well as the histology portion of the Anatomy and Physiology lab. This should be an extremely valuable research tool for NSU undergraduates, which we hope will increase academic performance in their Anatomy and Physiology courses.

Antimicrobial Properties of a Recently Patented Formulation

Nick Rocco and Richard Wheeler

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

Faculty Advisor: **Dr. Jason A. Rosenzweig**

Abstract

The threat posed by bacteria to human health is more unique today than ever. Multiple drug resistant strains of bacterial pathogens are quite common and lurk in a plethora of environments. To prevent transmission of these microbes, numerous hand gels, primarily alcohol based, have been designed to kill transient flora acquired through fomites. Because of the need for a more rapid and sustained microbial killing of certain exposed surfaces, an antimicrobial formulation has been developed that relies on short chain surfactants. We sought to evaluate the antimicrobial activity of this formulation on known surrogates of clinical significance. Bacteria or *B. subtilis* spores, were suspended in either phosphate buffered saline or Third Stream Bioscience (TSB) antimicrobial at a 1X or 2X concentration. In vitro antimicrobial activity was evaluated by the Kirby Bauer disk diffusion assay and the microbroth dilution technique at several time points. All microbroth test bacteria were reduced by at least four logs after a 2 minute exposure to the formulation. The mycobacteriocidal activity of this novel product will have significant public health benefits in the control of Mycobacterial diseases. Preliminary assays showed that the tested formulation is non-sporicidal. Subsequent studies will guide the formulation of sporicidal versions of the product and determine their mechanisms of action. Ultimately, the TSB antimicrobial was shown to be a highly effective antibacterial agent.

Association of Synesthesia and Creativity amongst a General Population

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Jaime L. Tartar**

Abstract

Synesthesia occurs when a single stimulus triggers two or more sensations simultaneously in different modalities. Ramachandran and Hubbard (2001) have identified two types of grapheme(alphanumeric)-color synesthetes. The first, known as ‘*lower synesthetes*’ or ‘*projectors*’ report actually *seeing* the colors when visually encountering letters or numbers. The second type, known as ‘*higher synesthetes*’, report only experiencing the colors “in the mind’s eye”, which indicates the color is evoked simply by numerical concept, as opposed to visual appearance alone. Creativity’s relationship to synesthesia has been the subject of interest of many experts in the field. Here, we evaluated the frequency of synesthesia amongst a general population. In contrast to the available research, the sample did not consist of self-reported synesthetes. Additionally, both synesthetes and non-synesthetes were compared in regards to their creative abilities. It was hypothesized that synesthetes would score higher on measures of creativity and that there would be a higher incidence of synesthesia than previously reported. Our findings indicate that 5% of the sample demonstrated “lower” synesthetic ability and independently, 5% demonstrated “higher” synesthetic ability. No participants demonstrated both high and low synesthetic abilities. In addition, there was a significant positive correlation between lower (but not higher) synesthetes and creativity as measured by the Alternate Uses Test ($p < .05$), which supports the link between synesthesia and creativity.

Austen's Male Subordinates: Equality by Imbalance

Ryan Frabizio

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Suzanne Ferriss**

Abstract

In Jane Austen's novels, the female characters are often the focus of critical study. This essay instead examines several minor male characters in her novels, such as Henry Crawford, Mr. Woodhouse, and Sir Walter Elliot, who deviate from conventional ideas of men in early eighteenth-century English society. The male characters studied lack independence or personal strength, and even lack dominance over female characters. However, they are still significant characters because they serve integral roles in the plot, and serve as vehicles for Austen's ideas. The imbalances of power between Austen's characters, even to the point of bringing male characters into subordinate and subservient roles, is a key factor in her reputation as a champion for women's equality.

The texts of Austen's novels constitute the entirety of the sources. At least one male character in each novel has been identified so that a theme of equality by imbalance can be established as a continuity in Austen's work. Comparisons are made between the characters primarily addressed and other characters, male and female, to illustrate the nuances that make those secondary characters as intriguing and as significant as any of Austen's protagonists. She did not merely waste textual space by inserting the characters studied in this essay, but used them because she believed equality between the sexes existed in the potential for a woman to hold equal, or even greater power than a man, as fluctuations in character and situation may allow

Biodegradation and Partitioning of Triclosan from a model Municipal Waste Water Treatment Plant

Besty Jacob

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

Faculty Advisor: **Dr. Robert Pomeroy**

Abstract

Triclosan is the commercial name of 5-chloro-2-(2,4-dichlorophenoxy)phenol, an antibacterial and antifungal compound used in a variety of household products. Even at low levels, 0.03 to 0.15% by weight, Triclosan is effective at killing bacteria. Products include soaps, toothpaste, shampoos, tissue paper, and cosmetics. There is a growing trend among manufacturers of diverse products to add the antimicrobial as a marketing edge regardless of its utility. Recent studies indicate triclosan is more persistent in the environment than initially reported. In order to study the effectiveness of wastewater treatment on the degradation of triclosan, a small scale water treatment process was duplicated. The biodegradation and partitioning of the triclosan remaining between the aqueous phase and the solid phase sludge was determined by GC/MS. 2.0 ± 0.3 % of the original triclosan remained in the aqueous phase however, $74.9 + 11.4\%$ partitioned to the solid (sludge) phase. Overall, the treatment process only degraded $23.1 + 6.2\%$ of the triclosan initially present. A common practice is to use the sludge from wastewater treatment as an agricultural fertilizer. A potential ramification of the biocide is the impact the triclosan will have on the soil microbes and the potential development of resistant to the pesticide when the sludge is used in this manner.

Characterization of Polynucleotide Phosphorylase (PNPase) and the Virulence of *Streptococcus pyogenes*

Jessica Blanco and Nick Rocco

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

Faculty Advisor: **Dr. Jason Rosenzweig**

Abstract

Polynucleotide phosphorylase (PNPase) is a 3'-5' exoribonuclease that phosphorylytically degrades mRNA molecules in bacteria and in eukaryotic organelles. *Streptococcus pyogenes* (a group A streptococcus [GAS]) is a Gram-positive human pathogen responsible for a plethora of syndromes ranging from the less-invasive pharyngitis (a.k.a strep throat) to severely invasive cases such as necrotizing fasciitis and streptococcal toxic shock syndrome. Recently, PNPase was shown to be required for the decay of 2 *S. pyogenes* transcripts during late exponential growth: *sagA* and *sda*. The aforementioned transcripts were found to be stabilized (more abundant) in a *pnpA* mutant strain. Furthermore, the *pnpA* transcript was found to be up-regulated 3.5-fold in *S. mutans* after exposure to a low pH acid-shock. In this work, two cell culture infection assays were employed to further characterize the *S. pyogene pnpA* mutant strain. Interestingly, in a cell proliferation assay using RAW cells (murine macrophage-like cells), the *pnpA* mutant demonstrated a 3.5-fold reduced proliferation over the course of a 7-hour infection relative to its isogenic wild type strain. More importantly, complementation of the *pnpA* gene expressed on a plasmid restored wild-type-like levels of proliferation. In a separate cell cytotoxicity assay that evaluates bacteria mediated host-cell death and rounding, HeLa cells, Shed (dental pulp) cells, and Periodontal stem cells are being used in *S. pyogenes* infections. Preliminary data is inconclusive, and additional experiments are underway in efforts of determining whether the *pnpA* mutant is diminished in its ability to induce host-cell rounding and death.

Comparison of the Assignment Testing Capabilities of the Population Structure Programs BAPS and STRUCTURE Using Microsatellite Data from Tiger Sharks

Justin Chambers

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

Faculty Advisor: **Dr. Evan Haskell**

Abstract

Although the practice of shark finning has been banned in multiple oceans worldwide, the practice continues to proliferate, with as many as 73 million sharks being killed each year for their fins. Since the legality of shark finning varies from ocean to ocean, methods to accurately determine not only the species of shark, but also the origin, need to be developed to help curtail this practice. This problem can be addressed through assignment testing—statistical methods that utilize genetic information to determine the population origin of individuals. Various software programs have been developed for population structure analysis. The goal of this study is to compare the methods and assignment accuracy of two popular programs, STRUCTURE and BAPS, by analyzing microsatellite data collected from Tiger sharks worldwide. We thank Andrea Bernard of the Nova Southeastern University Oceanographic Center for providing the genetic data and advisement on the usage of the software packages.

Consensual Sadomasochism

Briana O'Dowd

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Michael D. Reiter**

Abstract

Sadism, the desire to inflict pain, and masochism, the craving for pain, can be categorized as formal mental disorders, as per the DSMIV-TR, but only to the extent to which normal functioning is impaired by the acts and fantasies associated with them. Consensual sadomasochism carries with it a particular consideration as both participants desire to become the other's erotic fantasy and indeed enjoy being in that role. Sadomasochism spans across nearly all demographics and time periods, having its origin around the emergence of philosophy, economics, and politics. Sadomasochism has been continuously looked down upon due to misunderstandings about the physiological and psychological aspects. Sadomasochism can involve other behaviors and relationships that are considered inappropriate, such as homosexuality. Today's mainstream culture, in the various media, reflect some sadomasochistic qualities, however, this sexual deviation is still viewed as such and has been deemed inappropriate. This paper will review the current literature on consensual sadomasochism and determine which out of three levels of inappropriate relationships they constitute.

Conservation of Porbeagle Sharks (*Lamna nasus*) Worldwide by Species and Population DNA Forensic Testing

Lara Murphy

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

Faculty Advisors: **Dr. Mahmood Shivji and Christine Testerman**

Abstract

The porbeagle shark (*Lamna nasus*) is an oceanic species inhabiting the temperate North Atlantic and most of the southern oceans. The high commercial value of its fins has led to severe population depletion in the North Atlantic from overfishing. The population status of southern hemisphere porbeagles, however, is unknown due to lack of fisheries monitoring. Due to mounting concerns about fishing impacts, this shark was placed on the IUCN Red List of Threatened Species in 2007. However, an international petition to get porbeagle sharks listed on CITES (Convention on International Trade in Endangered Species) to require worldwide monitoring of trade in its body parts was denied, partly due to lack of information on the status of its southern populations. Given that the shark fin market is supplied from worldwide sources, a DNA test that can identify porbeagle body parts and also distinguish between northern and southern hemisphere porbeagles is necessary to assess the level of trade in and fishing pressure on its populations. In my study, I have investigated the global diagnostic applicability of a species-specific, nuclear locus-based PCR primer developed earlier in Dr. Shivji's laboratory by testing it on a worldwide set of porbeagles (100 southern and 100 northern hemisphere animals). Additionally, I am investigating the optimal PCR conditions to achieve reproducible discrimination of northern and southern hemisphere populations based on mitochondrial DNA, hemisphere-specific primers. Finally, I have sequenced the DNA of the nuclear ITS2 locus to determine if genetic signatures discriminating populations within each hemisphere are present.

Construction and Configuration of MPI Cluster

Dimitri Tyryshkin, Brett C. Stephen, Carolina Usbeck, Mubashir Hassan

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

Faculty Advisors: **Dr. Saeed Rajput and Dr. Victor Castro**

Abstract

A computer cluster consists of a number of computers that are coupled to solve complex problems in parallel. They provide a single front-end so that they can be managed and used from a single user interface. The cluster not only provides an excellent cost-performance trade-off compared to a super computer but it also provides the flexibility of using less power when the computational load is lower. Its performance is about the same as a super computer having computational power equal to combined computational capacity of all the computers in the cluster, but at a much lower cost.

This project provides a proof of concept in our capability to build a cluster using open source Message Passing Interface (MPI) at the NSU's Network, Security and Communications laboratory. We have implemented a cluster using old machines, and verified the correct operation of the cluster by running a complex nonlinear dynamics problem. If faster machines are available, this team is ready to implement a powerful cluster that could be used to handle complex computational problems in areas such as prediction, data mining, physics, cryptography, number theory, and protein folding.

Dehumanization Results in Atrocities

Raquel Sanchez and Marina Dunn
Division of Social and Behavioral Sciences
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Jason Piccone**

Abstract

This study attempts to explain how dehumanization is the main factor in the acceptance of atrocities towards stigmatized groups in American society today, by implementing Daniel Goldhagen's Theory in our research design. The premise of Daniel Goldhagen's theory is about the dehumanization of Jewish people during the Holocaust in which ordinary Germans became Hitler's aids. This study will measure the acceptance of atrocities towards African Americans and Arabs from the undergraduate student body at Nova Southeastern University. Based on Stanley Milgram's famous obedience study, this study will use a video reenactment in combination with a follow-up questionnaire to measure the participants' acceptance of atrocities. In the video that will be watched, the two experimental and one control group differ only in the sense that the learner's race changed; actions are the same for experimenter, teacher, and learner. This study hopes to raise awareness on the ceaseless issue of dehumanization as the basis for atrocities against various ethnic groups in American society today.

Determining the Impact of Mineral Carbonation on Decreasing the Harmful Effects of Global Warming

Myra Rafi, Sarah Silverstein and Nergess Taheri

Division of Math, Science and Technology

Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Dimitrios Giarikos**

Abstract

Global warming is a major dilemma that our environment is currently facing. This research presents mineral carbonation as one innovative solution in alleviating this issue. The purpose of mineral carbonation is to lessen the harmful effects of global warming. This is done by combining carbon dioxide with magnesium or calcium silicate minerals through a chemical reaction. This process converts carbon dioxide gas into a solid carbonate compound. The reactions aim is to decrease the amount of carbon dioxide in the atmosphere in turn lessening its negative effects. Mineral carbonation appears to be an effective method to decrease the harmful effects of global warming. However, when the cost of this process was calculated it was found that currently it is not economically feasible. Storing carbon dioxide in underground aquifers was also investigated as an alternative method.

Don't Look At Me

Iva Christina Marc
Division of Humanities
Farquhar College of Arts and Science

Faculty Advisors: **Dr. Andrea Shaw**

Abstract

The name of my poem is Don't Look at Me. The theme of Don't Look at Me is dark and insecure. The purpose of this poem is to explore the negative emotion when self love is not present.

Drowned

Amy Carol Harvey
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Christine Jackson**

Abstract

Written by Amy Harvey in 2007, this poem offers more than meets the eye. The poem is actually an allegory. Its allegorical meaning is based on the true experiences of the author. Here the experience is given a different location, which aids indirectly to the poem's explanation. This poem was created for personal reflection and healing. In sharing it with others, it is the author's hope that those suffering from sexual abuse will find their voice and demand to be heard.

Easy To Love

BeNita Williams

Division of Humanities
Farquhar College of Arts and Science

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

Abstract

Easy To Love is a short film about two graduate students who are engaged to be married. The couple comes to a crossroads when they decide to get blood tests, which may show that one of them has HIV. The film is directed by BeNita Williams. Other crew members include Cheryl White, Adam Walters, and Manuel Cedeno. James Frei is the starring actor.

Effectiveness Analysis of Email Marketing Campaigns

Kiyo Walker

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

Faculty Advisors: **Dr. Saeed Rajput and Dr. Ahmed Albatineh**

Abstract

Businesses usually spend significant time, effort and money on e-mail marketing campaigns. They are interested in evaluating the effectiveness of their campaigns, so that future campaigns can be optimized. In this project, we analyze e-mail based advertisement campaign on a specific business. We investigate the relationship between the number of links and the number of clicks in each e-mail campaign using the Pearson and Spearman statistical tests. We show that adding more links in a given e-mail campaign does not increase the user's interest. We also calculate summary statistics for the number of links and clicks.

Effects of Beach Renourishment on Inshore Macroinfauna off John U. Lloyd Beach State Park, Broward County, FL

Jessica Boyd

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

Faculty Advisor: **Dr. Charles Messing**

Abstract

The marine benthic macrofauna at John U. Lloyd Beach State Park (Broward Co., FL) has been surveyed at intervals since 1987 to examine effects of periodic beach renourishments. The current study followed the most recent renourishment, which ran from May 2005 to February 2006. A total of 20 quantitative sediment core samples (926.667 cm³) were taken from four sites (5 replicates per site), ~100 m offshore at depths of 2-5 m in May 2007. Samples were fixed in 10% seawater formalin with Rose Bengal stain, and subsequently passed through a 0.5-mm-mesh sieve and transferred to 70% ethanol in advance of sorting and identification under light microscopy. The dominant organisms were polychaetes (chiefly *Paraonis fulgens*), amphipods (e.g., *Metharpinia floridana*, haustoriids) and the bivalve *Tivela floridana*. Organism densities were lower than those recorded during previous renourishment surveys of the same area, but species richness appeared greater than in most previous samples. The current study was carried out a little over a year following the renourishment. Previous work also recorded decreases in organism abundances following renourishment. Further monitoring will be needed to assure that such effects are resolved with time for acceptable organism recovery.

Effects of Colored Words on Memory Retention

Adriana Gutierrez

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

Faculty Advisor: **Dr. Mindy Ma**

Abstract

Color seems to have an impact in our everyday lives. Memory color is a phenomenon in which an object's characteristic color enhances our memory retention. The objective of the present study is to examine which color can best facilitate memory retention. A sample of 30 participants (15 males and 15 females) were recruited from Nova Southeastern University. The participants were tested on their ability to recall a list of 20 words in the colors blue, green, orange, and red. Participants were also tested to determine what color they would be able to best recall. The list of 20 words included 5 words in each color. Participants were shown the list of words for 45 seconds and asked to write down as many words as they could recall within a minute. Results revealed that participants recalled significantly more words in the color orange compared to the other three colors. The color orange can be used in printed material to facilitate memory retention for students and individuals in other professions where high memory retention is critical for success.

Emotional Influences on Cognitive Processing in HIV-Infected Women

Kristen DeAlmeida, Lara Murphy

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

Faculty Advisor: **Dr. Jaime L. Tartar**

Abstract

Although emotional impairment and cognitive decline are both commonly observed in HIV positive individuals, it is currently unclear how these two states influence each other. Poor performance on a cognitive task is often attributed to cognitive deficits when the root problem lies in emotional disturbances, particularly for HIV-infected women. Here, we propose to begin to untangle this complex relationship by assessing cognitive functioning while we simultaneously manipulate emotional state through the use of emotionally negative or neutral pictures. We will use electroencephalographic (EEG) event related brain potentials (ERPs) as the primary index of the influence of emotional processing on cognitive functioning. We will also compare EEG/ERP assessments to standard neuropsychological tests of depression, cognition, and quality of daily living. The results of this study will help to clarify in HIV infected women-the extent to which their level of cognitive performance is influenced by related emotional processing. Moreover, we hope to demonstrate that differences in emotional and cognitive processing in HIV are related to differences in patients' self reports of quality of life and success in meeting the daily challenges of life.

Expression and Purification of His-Tag Thioredoxin Protein

Charlene Bernard, Viral Patel

Division of Math, Science and Technology

Faculty Advisor: **Dr. Reza Razeghifard**

Abstract

The molecular biology techniques can be used for making proteins in bacteria. In this study, we have used *E. coli* expression system to make a His-tag thioredoxin protein. Making use of His-tag, thioredoxin was purified from bacterial proteins using affinity chromatography. SDS-PAGE was applied to develop a purification protocol. The MW of purified protein was estimated by comparing its mobility on the gel with those standard proteins. The purified protein was pure as shown by the appearance of a single band on the gel. To further identify the purified protein, western blot technique was employed using a His-tag antibody. The protocol presented here provides us a tool to make proteins in *E. coli* by co-expressing it with thioredoxin. The expressed protein can then be cleaved from thioredoxin by a site-specific protease for biochemical studies.

Expression of Multidrug Efflux Pumps in *Porphyromonas gingivalis*

Kristina Christoph

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

Faculty Advisor: **Dr. Joshua Loomis**

Abstract

Periodontal disease is a well known threat to the bones and ligaments that support teeth. Ongoing studies are linking periodontal disease to coronary artery disease, diabetes, and pneumonia. Treatment of the disease involves controlling the bacteria that cause the inflammatory response and tissue destruction. *Porphyromonas gingivalis* is a periodontal pathogen found in sites having greater progression of the disease. *P. gingivalis* grows together with many other bacterial species in a complex community called a biofilm. Growing in the context of a biofilm is known to protect bacteria and make them more resistant to antibiotics and other antimicrobial agents. However, the mechanism by which antimicrobial drug resistance increases during biofilm growth is currently not well understood. Some have suggested that growth within a biofilm increases the production of multidrug efflux pumps that function to expel antibiotics from cells. This research project aims to investigate this question by studying efflux pump gene expression when *P. gingivalis* is grown in a planktonic culture, within a biofilm, and in the presence of antibiotics commonly used in the treatment of periodontal disease. Attempts to extract and view collected RNA samples have been met with difficulties. Various techniques for extracting and conducting gel electrophoresis on RNA samples are currently being tested in hopes of establishing a successful protocol.

Fear of Change: The Salem Witch-Hunt of 1692

Melanie Cucurullo

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: Michelina Carbonara

Abstract

This paper examines the fears that sparked the witchcraft accusations in late-seventeenth century Salem, Massachusetts. Historians writing about the witch-hunt in colonial New England have suggested these “witches” challenged social traditions and orthodox ways of thinking.

Eighty percent of accused “witches” were women, which suggest that gender played an important role in allegations of witchcraft. A close look at historical records shows that the behavior displayed by Bridget Bishop, Sarah Good, and Anne Hutchinson convinced New Englanders that these women were a threat to society. The problem was not just a new way of thinking but rather the way this new wave of information was presented. Colonial New Englanders, therefore, is analyzing the behavior of outspoken women who encouraged a new way of thinking as dangerous. Why did early American society fear these social changes?

The witch hunt did not stop there; there is a modern “witch-hunt” where people are executed or exiled because of an enlightened way of thinking that challenges orthodox beliefs. These “deviants” are feared, put on trial, and tortured, both internally and externally, because they threaten traditional way of life.

Genetic Characterization of the Yersinia Cold Growth Phenomenon

Richard Wheeler and Nick Rocco

Division of Math, Science and Technology

Faculty Advisor: **Dr. Jason Rosenzweig**

Abstract

The yersinia are psychotropic (able to grow at cold temperatures) Gram negative enterobacteriae that include 3 human pathogens: *Yersinia pestis* (the etiological agent of the black-death), *Yersinia enterocolitica* and *Yersinia pseudotuberculosis* (both causing self-limiting gastro-intestinal disorders). *Y. enterocolitica*, in particular, is an emerging food-borne illness and threat in the U.S. Since refrigeration is the dominant method of food preservation, an examination of the genetic basis of the yersinia cold adaptation characteristics could yield considerable benefit. Recently, it has been shown that PNPase, an mRNA degrading exoribonuclease, is required for the yersinia to grow at cold temperatures (~4-10°C). Furthermore, a recent microarray analysis of *E. coli* subjected to cold shock revealed that *ymoA* is upregulated. *ymoA* encodes the gene product YmoA which acts in concert with positively charged histone-like proteins to bind to DNA reducing/regulating transcription of bound genes. In this work, we found a yersinia *ymoA* mutant to be reduced in its cold-growth capability. Furthermore, scanning tetra alanine mutagenesis of the *ymoA* gene was used to generate 17 tetra alanine *ymoA* variants mutated from the amino terminus to the carboxy terminus of the encoded gene product. Preliminary data has suggested that alanine mutations near the amino terminus of YmoA results in cold-growth defects perhaps localizing the cold growth affect to a particular region of the protein.

Gentle Words Say Something Unbeautiful

Chana F. Dukes

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Lorraine Stanchich**

Abstract

Gentle Words Say Something Unbeautiful came about when, in my creative writing class, we were given the assignment of using ugly words to say something pretty or pretty words to say something ugly. It has been through a couple of revisions since that original assignment, but that inspiration led me to create this pretty, melancholy poem which describes something abrupt and harsh; namely, a rape. The use of quatrains and the right alignment of the poem are intended to create the impression of repeated intrusion, wrongness, and grief.

Global Warming - How Fluorescent Lights and Plug-in Hybrid Vehicles Can Make a Difference

Melissa Corrao, Legna Castaneda, Debbie Ali and Alexandra Timis

Division of Math, Science and Technology

Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Dimitrios G. Giarikos**

Abstract

Global warming is a world wide epidemic caused by anthropogenic factors that can be reduced or even eliminated to alleviate the fast paced progression of this harmful phenomenon. Society as a whole can make numerous lifestyle changes, two of which include the use of fluorescent light blubs and plug in hybrid cars. Fluorescent lights as opposed to incandescent, reduce the amount of heat emitted to the environment and the amount of electricity usage, which overall reduces CO₂ emission. Plug-in hybrid vehicles utilize a more fuel efficient battery thus minimizing the amount of harmful gases released into the atmosphere.

How to Create and Publish Your Own Music Videos Digitally

Adielle Silochan

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Farquhar College of Arts and Sciences

Faculty Advisor: **Gerri Sant**

Abstract

This project, completed in the form of an original website coded in HTML and JavaScript, focuses on informing music artists about the basics of creating and publishing their own music videos using digital media. My research covers these four areas: video recording devices, video editing software, music recording devices, and publishing music videos on the Web. Concerning video recording devices, I include information to assist with choosing a digital camcorder to meet one's needs (whether a novice or expert) and tips to help with filming. Concerning video editing software, I suggest software options for novices and experts and provide editing tips. For the subject of music recording devices, I suggest recording media types and recording tips. Lastly, for the discussion of publishing on the Web, I list and describe different file formats used to upload videos on the Web and popular websites where one may upload their videos.

With the knowledge gained from my project, my audience may become more independent in the music video production process; thus, fewer restrictions will be placed on their creative expression which is essential to a flourishing artist.

Increased Vancomycin Resistance Exhibited By *Staphylococcus Aureus* Grown Together With *Candida Albicans* within Mixed Species Biofilms

Fabrice Auguste, Shardul Koppar and John Seymour

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Joshua S. Loomis**

Abstract

Biofilms are multicellular communities of microorganisms that characteristically attach to some surface, produce and encase themselves within a thick polysaccharide matrix, and resist physical insults and treatment with anti-microbial drugs. The studies described here focus on characterizing the physical interactions between a bacterium (*Staphylococcus aureus*) and fungus (*Candida albicans*) in the context of a mixed biofilm. Both of these organisms are common human pathogens that cause a variety of human disease. Previous findings in our lab have suggested that *C. albicans* and *S. aureus* interact with one another and alter the other's ability to attach and grow within a biofilm. Current studies are aimed at determining whether this interaction also affects their ability to resist physical insults or treatment with antibiotics. As a start to this, mixed biofilms and pure biofilms containing *C. albicans* were subjected to strong agitation and the amount of detachment from the surface was measured. The pure biofilms were shown to detach more readily than did mixed biofilms, suggesting that mixed biofilms are structurally more stable than pure biofilms. Similarly, pure *C. albicans* biofilms appear to naturally release very large cellular aggregates during the course of growth when compared to mixed biofilms. Furthermore, *C. albicans* appeared to confer *S. aureus* with increased resistance to the antibiotic vancomycin. In contrast, *S. aureus* did not exhibit increased resistance to a different antibiotic (rifampin) in similar conditions, suggesting that the increased vancomycin resistance may be due to some specific biochemical or genetic modification of *S. aureus* by *C. albicans*.

Is There a Gender Difference Regarding Perceived Efficacy of Openly Gay Tutors?

Randy Denis

Social and Behavioral Science Division
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Weylin Sternglanz**

Abstract

Research has shown that many college students have more negative attitudes toward homosexuals than toward other minority groups (Liang and Alimo, 2005), even when they do not openly endorse homophobic attitudes (Nosek, 2007). For example, lectures given by homosexuals were rated as having lower quality than identical lectures given by heterosexuals, possibly demonstrating subtle prejudice (Ewing, Stukas and Sheehan, 2003). In addition, recent findings indicate that heterosexual women tend to have a more favorable perception than heterosexual men of male homosexuality (Herek, 1998). In a between-participants design, forty heterosexual undergraduate students will be exposed to a male tutor with a shirt depicting either the words “Proud to be gay” (gay tutor condition) or “Proud to be at NSU” (control condition). It is predicted that participants will rate the perceived homosexual tutor as less knowledgeable, friendly, and helpful than the tutor in the control condition. Furthermore, heterosexual males are predicted to show higher levels of prejudice than heterosexual females against a perceived homosexual tutor. The findings will have implications about the unconscious prejudiced attitudes affecting homosexual men in an academic context.

Leap of Faith

Chana F. Dukes

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Lorraine Stanchich**

Abstract

Leap of Faith is a retelling of the Sleeping Beauty fairytale and a nod to the original tale, before it was rearranged for the ears of children. I attempted to create a dream-like quality in the poem, using strong imagery and broken up stanzas to convey the impression of the dreaming child who is knocked from her slumber and into a harsh reality by her rape. I also attempted to create a sense of timelessness, because this is a story which occurs not once upon a time in a land far, far away, but all around us and throughout the ages. The title, *Leap of Faith*, is meant to convey trust being broken, which occurs within the poem, and is also an oblique reference to the broken memory of a favorite story upon the reading of the original.

Letters Revealed
A Literary Analysis of Jane Austen's
Pride and Prejudice and Persuasion.

Linnette Dobbs-Fuller
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Suzanne Ferriss**

Abstract

This project is a literary analysis of two of Jane Austen's novels: *Pride and Prejudice* and *Persuasion*. The paper is an attempt to reveal how Austen uses letters to establish and to maintain a link between her readers and her characters. The focus of this analysis is on the use of letters to maintain connections between characters over time and distances, to show growth or change in consciousness, and finally, to reveal the character of the person writing the letter.

Linkage of Restriction Site Polymorphisms at the Minisatellite D1S80 Locus in a Tamil Population from India

Nick Rocco

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

Faculty Advisors: **Dr. Robert Pomeroy, Dr. George Duncan,
Dr. Venkatesh Shanbhag**

Abstract

In this study, we report the distribution of these polymorphisms in a Tamil population from India. SNP analysis was performed by RT-PCR utilizing a TaqMan® SNP Genotyping Assays kit from Applied Biosystems. Data was collected on a Corbett *Rotor-Gene* 3000. For most alleles analyzed, the restriction site haplotype polymorphisms were consistent with the assigned older allele types, allele 18 and 24. Appropriate restriction enzymes were used for restricting the PCR products which confirmed all SNP designations. The interesting finding in this study is that 98.5 % (197/200) of the alleles tested have a linkage of two specific polymorphisms. If an allele is positive for Tsp509I, it is positive for Fnu4HI and if it is negative for Tsp509I, then it is negative for Fnu4HI, which shows a tight linkage between the two polymorphic sequences. In most populations studied there is a trimodel apportionment of alleles (Deka, et. al, Hum Genet (1994) 94:252-258). Further study is under way to characterize the sequence and structure of this locus in these samples. Our intent is to infer the age of this SNP and explore the evolution of this SNP and locus in evolutionary time.

Long Term Investment -Investing for a Better Future

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Huizenga School of Entrepreneurship

Faculty Advisor: **Charles Harrington**

Abstract

Personal financial planning is an important factor in everyday life. Financial planning consists of two main aspects which are budgeting and investing. Budgeting is when an individual balances their expenses according to their earnings. Investing is when an individual uses a part of their earnings to increase their future income. As students we have researched on this subject and found that numerous amounts of students and business professionals lack understand in financial planning. The purpose of this project is to find the cause of lack in financial planning and to derive the solutions to overcome the problem. This will help other individuals benefit from our research. How does an individual overcome their personal financial problem? By understand the limits of their budget and applying this knowledge to better their financial goals.

Magical Math: Debunking a Web-Posed Prestidigitation

Case Warshall

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Fuzhen Zhang**

Abstract

The website *Mystical Ball.com* (<http://www.mysticalball.com/>) presents a compelling and mysterious “magic trick” that appears to read our mind every time we engage in the “trick”: “Choose any two digit number, add together both digits then subtract the total from your original number. When you have the final number look it up on the chart and find the relevant symbol. Concentrate on the symbol and when you have it clearly in your mind click on the crystal ball and it will show you the symbol you are thinking of... .” The trick appears to work every time the user participates. This project, through the use of a poster presentation and a laptop computer so the observer can actually participate in the “trick” online, will debunk the “magic trick” and reveal to the participant exactly how magical math makes the “trick” possible.

Measuring Gender Specific Perceptions of Gender-Neutral Behavior

Bridget Haley, Bianca Basile

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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Mindy Ma**

Abstract

Past research on breaking gender norms, descriptive and prescriptive gender norms, and gender specific sports have all neglected gender-neutral behavior. The objective of the study is to investigate perception of gender-neutral scenarios as gender specific. Forty participants (24 women and 16 men) were recruited in academic lobbies of Nova Southeastern University. In a survey, participants rated the masculinity, femininity, manliness, and gender equity of gender-neutral, sports-related scenarios performed by either a male or female actor. Both men and women rated gender-neutral acts as more masculine if a man was the actor and more feminine if a woman was the actor. An interaction between participant gender and actor gender was found for ratings of masculinity, such that men rated acts performed by male actors as less masculine than acts performed by female actors and women rated acts performed by female actors as less masculine than acts performed by male actors. This implies that people view gender-neutral activities as gender specific based on the gender of the person performing the activity and view their own gender as less masculine in gender-neutral scenarios. These findings may contribute to our understanding of how descriptive and prescriptive gender norms are formed and reinforced.

Minimum Wage/Living Wage: History of

Kenrick Raza, Neeketa Sheth, Aisha Syed

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

Faculty Advisor: **Charlie Harrington**

Abstract

The purpose of this research was to explain the concepts of living wage as well as minimum wage in the State of Florida. The history, purpose, effects, differences and comparisons with the poverty level, as well as pros and cons were discovered in the process. The research shows whether or not the living wage is sufficient to provide for the average American looking into standard living costs and expenses through out one year. The conclusion of the research suggests that the living wage is not sufficient for the average American in Florida, and even more so for the average American responsible for the care of a family. With that said, by increasing the minimum wage, Americans will be able to continue living in coordination with the living wage. By increasing the minimum wage, there is a chance of decrease obesity and reduce healthcare spending.

My Vow

Amy Carol Harvey
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Christine Jackson**

Abstract

This poem's collection of words has been chosen carefully in order to administer to the reader, a strong sense of dedication of love. The words induce the most significant emotions felt by the author on her wedding day. This poem was featured in the wedding program as a gift to the author's husband on the day of their wedding.

Os Trigonum Syndrome in a High School Football Lineman

Tena Blackman

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

Faculty Advisor: **Mr. Steven Patterson and Dr. Patricia McGinn**

Abstract

During pre-season football practice a 15 year old, freshman, football lineman (mass 95.5kg, height 172.7cm) reported to the athletic training room complaining of right ankle/lower leg pain. Upon evaluation, the athlete reported generalized pain over the distal tibia and fibula, with isolated symptoms over the posterior calcaneous. The athlete reported insidious onset of pain, which was a 7/10 at rest and 9/10 during activity. No swelling/edema, deformity, tenderness, ecchymosis or crepitus was evident and soft tissue and bony palpation was unremarkable. Fracture and ligamentous stress tests were normal; athlete presented with functional pes planus. Athlete was referred for X-rays and MRI, which indicated the presence of a fracture of Steida's process and evidence of a calcaneal bone contusion. The athlete opted for a non-operative rehabilitation approach to resolve the symptoms. Prior to formal rehabilitation the patient was immobilized for 10 weeks. Presently, the athlete is undergoing rehabilitation focusing on pain, strength, proprioception, neuromuscular control, and function to return to sports. Typically, Steida's process fuses to the talus one year after it appears, resulting in only few Os Trigonum fractures. Additionally, Os Trigonum fractures occur in 7% of the adolescent population, manifesting around the ages of 8-13. However, this athlete is chronologically two years past the normal age range for development of this pathology. Although this athlete chronologically exceeded the normal age of Os Trigonum development, the use of growth hormones may have contributed to the delay in fusing of Steida's process

Points of Consciousness

Iva Christina Marc
Division of Humanities
Farquhar College of Arts and Science

Faculty Advisors: **Dr. Andrea Shaw**

Abstract

The name of my poem is Points of Consciousness. The theme of Points of Consciousness is self love. The purpose of this poem is to celebrate the inner self and positive emotions when self love is present.

Positive Thinking: The Impact of Positive Messages on Mood, Attitudes, Anxiety, Depression, and Self-esteem

Denise Da Rosa

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

Faculty Advisor: **Dr. Jason E. Piccone**

Abstract

The purpose of this study is to explore the relationship between positive thinking and mood, attitudes, anxiety, depression, and self-esteem. The study will analyze the effect of positive messages sent via cell phone text messaging to participants. Twenty students will receive positive messages for three days such as “wonderful things will happen to me today.” The other twenty participants will not receive any type of messages. At the end of the study, the researcher hopes to find that participants receiving positive messages will show an improvement in their mood, attitudes, and self-esteem. They will also show a lower level of anxiety and depression when compared to the control group. The implications of this study could help people understand the importance of positive thinking in their lives.

Purification of Photosystem Proteins from Spinach Leaves

Anisa Andoni, Hai Pham and Priya Somnaran

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

Faculty Advisor: **Dr. Reza Razeghifard**

Abstract

Photosystems are protein-pigment complexes responsible for the conversion of light energy into an electron flow in plants. There are two photosystems called photosystem I and photosystem II. Photosystem II is responsible for splitting water molecules into protons and oxygen. In this work, we have used a biochemical protocol to purify photosystems from spinach leaves by detergent solubilization and centrifugation. The photosystem II activity was measured using a Clarke-type oxygen electrode as an indicator for its intactness and purity. This protocol provides us a tool to compare the photosystem protein from spinach with other species.

Rapid Polymerase Chain Reaction Based Assay for the Identification of the Highly Endangered Small Tooth Sawfish (*Pristis pectinata*)

Hayley Oligane and Vince Richards
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Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. Mahmood Shivji**

Abstract

Globally, populations of sawfish (family: Pristidae) have become highly endangered to the point of extinction, and have suffered a decline greater than 90% over the last century. The principal threat to sawfish is fishing and habitat degradation. In the United States most Pristidae species have become completely exasperated. Previously, only two species were reported in US waters (*Pristis pectinata* and *Pristis perotteti*), and it's now believed that *Pristis perotteti* is virtually extinct. Furthermore, the range of *Pristis Pectinata* has now been reduced to South Florida and has declined to 5 percent of its original population size. In 2007, CITES delegates approved legislation on the ban of international commercial trade for six of the world's seven sawfish species. However, Pristidae populations continue to decline due to lax law enforcement. Sawfish products are commonly found as raw meat, fins, or ground medicine. Since most of these products are unidentifiable, the lack of substantial evidence makes it difficult to prosecute fisherman and traders. The primary purpose of this research is to generate a genetic test that will provide U.S. law enforcement with an effective means to monitor illegal catch and trade of *Pristis pectinata*. The test is a polymerase chain reaction based assay, which amplifies the second internally transcribed spacer (ITS2) region of nuclear DNA. Due to the unique size of the ITS2 locus, *Pristis pectinata* DNA is easily distinguished from other sharks and rays using agarose gel electrophoresis.

Reducing Carbon Dioxide Levels through Carbon Sequestration

Mari Holderby, Hira Hussain, Sebastian Jofre and Aurea Mendez

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

Faculty Advisor: **Dr. Dimitrios Giarikos**

Abstract

There has been a growing interest as to what is identified as global warming over the past five years. Studies have demonstrated that the earth's atmosphere has become warmer thanks to the increasing levels of carbon dioxide, which trap heat that would normally exit into outer space. Much focus has additionally been placed on the causes of this phenomenon, such as the burning of fossil fuels, using coal-fired power plants, and deforestation. The purpose of this research is to discuss how carbon dioxide emissions can be reduced by the use of carbon sequestration. The significant challenge being addressed by this effort is to identify an industrially and environmentally viable carbonation route that will allow a decrease in the amounts of carbon dioxide in the atmosphere, thus, reducing global warming.

Self Image: Juxtapose

Iva Christina Marc
Division of Humanities
Farquhar College of Arts and Science

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

Abstract

The name of my film is Self Image: Juxtapose. The theme of the film explores the emotions of negative and positive self image. This is an Avant Garde film. The purpose of this film is about moving toward self love. My principle cast member is Iva Marc. My crewmembers are Katrina Jackson and Nerissa Street.

Shipping Out: The Effects of Outsourcing

Kristen Franchy, Morgan McWhorter, Caroling Lugg and Vanessa Palacios

H. Wayne Huizenga School of Business and Entrepreneurship
Farquhar College of Arts and Sciences

Faculty Advisor: **Charles Harrington**

Abstract

The purpose of this research was to define and explain the process of outsourcing by providing examples and focusing on the pros and cons as well as the short and long term effects. Possible solutions and the role of outsourcing in the future were also discussed. Outsourcing is when a company would rather hire workers from an external source to perform certain tasks in order to achieve full benefit of their capital. Businesses that outsource save money by hiring workers that will work for lower pay. These new workers may be less skilled and are able to perform the simpler jobs so that the skilled employees are able to focus on the core activities. Outsourcing benefits a company by saving money and freeing up labor but outsourcing causes problems for workers as well. One example of outsourcing is how the business process of manufacturing products and handling customer service calls for the Microsoft Company is outsourced to other businesses. Many other examples of outsourcing were discussed.

***Streptococcus Pyogenes*: A Versatile Human Pathogen**

Maria E. Cevallos

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

Faculty Advisor: **Dr. Jason A. Rosenzweig**

Abstract

Streptococcus pyogenes is one of the most medically relevant genera of Gram positive bacteria. *S. pyogenes* belongs to group A streptococcus (GAS), the most pathogenic streptococci. *S. pyogenes* is exclusively a notorious human pathogen that is known for its ability to cause a wide array of infections ranging from superficial pharyngitis and impetigo to evasive and life threatening conditions including septicemia, necrotizing fasciitis, and streptococcal toxic shock syndrome. The dissemination of *S. pyogenes* within a human host is dependent upon virulence factors aimed at host immune system evasion leading to infection. More specifically, *S. pyogenes*' virulence factors are required for bacterial dissemination, adherence, colonization and host-cell entry. Other virulence factors enable the evasion of phagocytosis and the survival within the phagocyte as well as in human blood. The plethora of virulence factors explains the variety of *S. pyogenes* infections and its recent epidemiological resurgence world-wide. Uncovering the molecular mechanisms of *S. pyogenes* pathogenesis is crucial in helping scientists develop new therapies for this human health threat.

Synthesis of a New Porphyrin Dendrimer and its Potential Use as a Gadolinium MRI Agent

Karoline Korah

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

Faculty Advisor: **Dr. Dimitrios Giarikos**

Abstract

A new porphyrin dendrimer was synthesized and characterized by reacting 4,4',4'',4'''-(Porphine-5,10,15,20-tetrayl)tetrakis(benzoic acid) with a generation two (G2) dendrimer. Its coordination with lanthanides and gadolinium were investigated for its potential use as an MRI agent or as a new dendrimer-metalloporphyrin complex.

Synthesis of new Ruthenium (II) Complex, $[\text{Ru}(\text{bpyCN})_2]^{2+}$ and its Interactions with DNA

Terry-Ann Dawes

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

Faculty Sponsor: **Dr. Dimitrios Giarikos**

Abstract

A new Ru(II) complex, $[\text{Ru}(\text{bpyCN})_2]^{2+}$ (where bpyCN is 4,4'-Bis(cyanomethyl)-2,2'-bipyridine), was synthesized and characterized, and the effect on the emission spectra of the complex was studied. The interaction of the complex with DNA was investigated by UV-visible and emission spectroscopy.

The Development of United States Special Forces In Response to the Perceived Cold War Threat

Michael E. Rosenzweig
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Advisor: **Dr. David Kilroy**

Abstract

In the early period of the Cold War, the United States felt compelled to develop a Special Warfare capability in response to a perceived Soviet aggression. This “Special Warfare” capability was combined with psychological, unconventional and guerrilla tactics to foment social, economic and political unrest in the Soviet Union and its satellite states. The battle for the third world influence and prevention of the domino principle was primary forum for these clandestine units to operate to spread American ideals across the world. My symposium is designed to address three specific topics. The first is to address the perception of the United States and their response to the myths or realities of perceived Soviet aggression. Secondly, to address what is Special Warfare and to determine whether it was successful in promoting not only U.S. interests abroad, but stopping the spread of communism. The last point of my presentation is to verify if Special Warfare capabilities contributed to the goal of promoting a safer society during and after the Cold War.

The Effect of Thimerosal on Gene Expression in *Saccharomyces cerevisiae*: An Application of Microarray Technology

Christie Rubio

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

Faculty Advisor: **Dr. Emily Schmitt**

Abstract

Thimerosal is a preservative and anti-fungal used in many vaccines which is metabolized to ethylmercury (about 50% by weight) and thiosalicylate (used as an analgesic agent). In 1999, thimerosal was removed from vaccines (or left only in trace amounts) as a public health precaution. In 2007, the average human will receive a concentration of 0.01% thimerosal per vaccine. This is equivalent to 50 μ g thimerosal per 0.5mL dose. According to the Food and Drug Administration (FDA), the maximum amount of thimerosal that a two-year old, fully-vaccinated child could possibly receive is 106.4 μ g, which is equivalent to 53.2 μ g of mercury. This reflects a decrease of approximately 77% from the average 237 μ g of mercury that a similar child would have received in 2001. The purpose of this study is to examine the effects of thimerosal exposure on gene expression using *Saccharomyces cerevisiae* (Baker's yeast) as a model organism. This species of yeast shares about 31% of its genome with humans and is easy to manipulate. Microarray technology will be used in order to assess changes in gene expression of yeast exposed to a 0.01% concentration of thimerosal. Changes in gene expression will be described as induced or repressed from the control condition. Analysis of the microarray slides and changes in gene expression will be assessed using MAGICTool, a program developed by the Genome Consortium for Active Teaching (GCAT). The potential effect of thimerosal on a few select genes will be verified independently through reverse transcriptase polymerase chain reaction (RT-PCR) and gel electrophoresis.

The Effects of Laughter on Attention

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Abstract

Laughter is a cardinal part of human behavior: it is rooted within personality, functions within social dynamics, and is mediated through a species physiological form. Numerous studies have depicted the benefits of laughter (Martin, 2002; Kimata, 2007), but none have thoroughly analyzed its role within cognition. Cognition is required to incite laughter in the instances where humor appreciation must be delineated. Accordingly, in instances where a cognitive task occurs concurrently with humorous stimuli, there is potentially a competition for attentional resources, thereby reducing cognitive abilities during humor processing. The primary goal of the current proposal is to utilize brain electroencephalographic (EEG) event related potentials (ERPs) in order to measure cognitive processing during concomitant humorous exposure or non humorous exposure. Here, we hypothesize that the P300 ERP measure will have a smaller amplitude and longer latency in participants in the humorous stimuli condition compared to participants in the non-humorous condition. The outcomes of this study will provide insight into the physiological aspects of human laughter and the processing capabilities of humans during humorous experiences.

The Effects of the Herbal Enzyme Bromelain against Breast Cancer Cell Line GI101A

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Abstract

Bromelain is a proteinase derived from the stem of pineapple and has been studied for its anti-inflammatory, antithrombotic, and antimetastatic properties. Bromelain has also been known to significantly reduce local tumor growth and to raise the impaired cytotoxicity of monocytes in the immune system against tumor cells. The goal of this project is to advance the mechanistic knowledge of herbal remedies and to confirm the already known antimetastatic properties of Bromelain. Standardization of MTS assay to check the cell viability is in progress. To test the cytotoxic effects of Bromelain, GI101A breast cancer cells cultured to the required confluency of about 60% in 96 well plates were treated with different concentrations of Bromelain. The MTS assay method was used 24 hours after Bromelain treatment to detect the absorbance at 490nm in relation to cell death. Cells with no Bromelain treatment served as the positive control and RPMI 1640 media without cells served as the negative control. The absorbance at 490nm wavelength is directly proportional to the number of living cells in culture. The preliminary data illustrates that as the concentration of Bromelain was increased beyond the 1 μ M concentration, the cytotoxicity potential also increased. Further confirmation of the cytotoxicity will be achieved by using the ATPase assays and DAPI staining technique that will indicate apoptotic cell death.

The Effects of Zinc on Gene Expression in *Saccharomyces cerevisiae*

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Abstract

Zinc (Zn) is one of the principle trace elements required in biological systems, with structural or enzymatical roles in hundreds of proteins. In humans, zinc deficiency has gradually come to be recognized as a clinically significant and common form of malnutrition, particularly in chronically ill patients. The clinical manifestations of zinc deficiency are diverse with effects on the immune system, appetite, and embryonic development. The regulation of zinc distribution remains a critical, unanswered question. The manner in which zinc is released from its tight binding sites in proteins and its transfer from one site to another are also unknown. In this study, microarray technology was used to examine the potential effects of Zn exposure (0 μ M, 1 μ M, 50 μ M, 1mM Zn solutions for 24 hours) on gene expression in *Saccharomyces cerevisiae* (yeast), a model organism that shares roughly 31% of its genome with humans. However, due to technical complications, the microarray images were inconclusive due to inadequate signal binding. As an alternative approach, the expression of four genes was examined using reverse transcriptase-polymerase chain reaction (RT-PCR). The genes selected were IZH1, IZH4, VEL1 and TDH1. IZH4 was expected to be induced in high zinc conditions. IZH1 was expected to be repressed in low zinc conditions. TDH1 is a gene directly involved in metabolism and was expected to be expressed in all zinc conditions. VEL1, on the other hand, is a gene of unknown function, thought to be involved in velum formation and was expected to be expressed in low zinc conditions.

The Meaningless of Life

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Abstract

Humankind has traditionally, throughout the ages, attempted to apply a meaning to its existence and believed that existence in and of itself, is a beautiful thing. In the spirit of Modernism, Beckett breaks with this tradition by asserting that existence is a bleak and squalid thing that has no meaning through his plays *Waiting for Godot* and *Endgame*. An analysis of these two plays reveals that life is inherently meaningless, but value in life is created by man by affirming it and practicing it. The reason the characters in Beckett's plays are so miserable is because they take no action. Because meaning is different for everyone, life is actually richer for it because of the diversity. In this light, Beckett has made life richer through tragedy – a truly Modernist concept.

The *Real* Antagonist in Jane Austen's *Northanger Abbey*

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Abstract

Northanger Abbey is so loaded with irony that its main antagonist is someone we would never suspect. This hidden adversary maneuvers Catherine Morland into a conflict. The conflict seems a creation of the protagonist's overactive imagination. However, the novel drops enough clues to indicate Henry Tilney willfully manipulates Catherine to produce the conflict. Finally, several hints in the novel suggest this same person also narrates it, thus sealing the novel's irony.

The Real World: Differential Equations

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Abstract

Mathematics can be used, and is used, to describe the physical phenomena of the world we live in. Differential equations are an application of the ideas of calculus to our everyday lives. In differential equations we seek to model real-life situations in Mathematical terms. Thus, differential equations are used for scientific modeling to describe the dynamics of diverse state variables, such as daily temperature, proportion of a population infected by influenza, chemical concentration in a tank, or stock prices by observing real-time data. Once the model is created it is used as a representation of the real-world system and predictions about future states and both observable and unobservable behaviors can be made. The tools of modeling and utilization of analytic, qualitative, and numerical techniques for solving differential equations allow for an unlocking of the world's mysteries. We utilize the techniques of differential equations to study problems in immunology and the famous 1940 collapse of the Tacoma Narrows bridge.

**The Relationship between the Maze Coral (*Meandrina meandrites*)
Autumnal Bleaching Cycle and Seawater Temperature, Gulf Stream
Reef, Boynton Beach, Florida**

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Abstract

Seasonal coral bleaching has been observed and studied in tropical waters around the world. These studies have demonstrated that there is a strong correlation between anomalously elevated sea water temperature and coral bleaching events, however few studies have been performed on healthy corals during periods of normal sea water temperature fluctuation. Visible changes of pigmentation were used as a proxy measure of dinoflagellate densities in the maze coral *Meandrina meandrites* inhabiting the Gulfstream reef off Boynton Beach, Florida on 15 observations from mid-August 2007 to mid-January 2008. Unlike previous studies at this location, submersible temperature recorders were deployed, which provided continuous seawater temperature data. Highest seawater temperatures were observed in August and September (28-30°C), with a decrease to 22-24°C observed in January 2008. Coral tissue pigmentation level changes were recorded via digital photography. Total colony surface areas were compared with visibly bleached surface areas. Bleached coral tissue ranged from 0-3.7% with a decrease in pigmentation from mid-August through mid-November, and then pigmentation recovery through the end of the study in January. This pattern is consistent with previous observations by other researchers, though greater amounts of bleached tissue (0-28.7%) were reported in 2003.

The Truth about Deception

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Abstract

Deception is a prevalent form of communication. This paper explores, based on research taken from deception theorists, the many different types of deception, the strategies and motives in mind used by individuals while performing deception, and the positive and negative consequences of deception. Understanding why individuals rely on personal relationships is crucial to understanding the types of closeness they can develop with others and why deception takes place in these types of relationships. The paper then applies these factors by utilizing a television episode of *King of Queens* as an illustration of deception in a married couple's life.

The Use of Cardiac Stem Cells for Myocardial Regeneration

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Abstract

Cardiovascular disease is one of the leading killers in the western world. Because of its prevalence in society and the human heart's questionable ability to repair itself, thousands of researchers have begun the lengthy process of myocardial research. They are analyzing different types of stem cells for their benefits and side effects, while trying to determine if the human heart is capable of regenerating itself. For the purposes of this literature review, several recent clinical and experimental trials will be analyzed to ascertain the feasibility of using cardiac stem cells in clinical practice. The harmful side effects of each main category of stem cells will also be analyzed to determine if these hurdles can be overcome. Current research strongly confirms that the use of stem cells holds promising results for the thousands who are impacted by cardiovascular disease.

The Wonderful World of Mathematica

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Abstract

Mathematica is computer software that can be used to perform a variety of functions. These functions include: mathematics and algorithms, system interface and deployment, visualization and graphics, dynamic interactivity, and several other functions. The initial idea came from a man by the name of Stephen Wolfram. It was further developed by a team of mathematicians, and first released in 1988. This computer software was originally developed for the fields of math and science. Mathematica has been used in many disciplines which include physical science, engineering, financial modeling, accounting, research, and many more. However, this software has been transformed and is now being used in several other disciplines.

Mathematica is know now as, “the world’s most powerful global computation system.” It allows users to compute anything from simple calculator operations to solving complex statistics. It can also be beneficial for graphing, solving equations, finding limits, and integrating functions. Mathematica, “spans all continents, encompasses ages from below 10 and up, and includes artists, composers, linguists, and lawyers, as well as hobbyists from all walks of life.” Today, Mathematica is used by students from the high school to graduate level, Fortune 50 companies, and the U.S. government. The purpose of this project is to highlight the importance of mathematica and explain how it can be a useful tool for many purposes.

What You Can't See Can Hurt You! Bacterial Invasion at NSU

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Abstract

College campuses are typically areas where large numbers of students from diverse geographical areas converge. Close contact in public places such as classrooms, restrooms, and computer labs is common. Illnesses quickly spread through a college campuses population. Many germs are spread via respiratory droplets which can survive on surfaces for hours and even days. I sampled 14 separate locations at NSU to see which surfaces harbored the most bacteria. Bacterial samples were collected using sterile Q-tips which were swabbed over a one square inch area for approximately 10 seconds. The Q-tips were then used to transfer any bacteria present to an agar plate with growth medium and incubated for twenty-four hours. This entire procedure was conducted three times. The first two trials were performed at noon before sanitation crews arrived to clean bathrooms and the third trial was conducted at 2 pm, briefly after the bathrooms were cleaned. The top three spots for bacteria were the men's room paper towel dispenser, ladies room paper towel dispenser, men's room toilet flusher. Surprisingly, the results showed that the highest number of bacterial colonies was found on the men's paper towel dispenser after the bathroom had been cleaned. This result indicates the sanitation crews did not clean the paper towel dispenser. The results also demonstrated that plastic structures harbored more bacteria than other surfaces, such as metal or ceramic. This study provides support for the installation of new paper towel dispensers on campus to increase public health and reduce illnesses among NSU's population.

***Yersinia* Virulence Factors: Type III Secretion System**

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Abstract

Several Gram-negative pathogenic bacteria have evolved a complex protein secretion system termed the Type Three Secretion System (TTSS) to deliver bacterial effector proteins into host cells that then modulate host cellular functions. These bacterial devices are evolutionarily related to the flagellar apparatus. Although the TTSSs are substantially conserved among different species, the effector molecules they deliver are species unique. There exist three human pathogenic *Yersinia*. *Yersinia enterocolitica* and *Yersinia pseudotuberculosis* cause self-limiting gastro-enteric diseases and infect mesenteric lymph nodes, while *Yersinia pestis* is transmitted by fleas and can be aerosolized, causing the lethal disease known as plague (also know as Black Death). The TTSS is composed of over 20 proteins making up the injectisome (inserted directly into the host-cell), in addition to translocator, regulator, and modulator proteins, as well as chaperones for several effector proteins. Today, plague is still a health concern due to the ability of *Y. pestis* to be aerosolized. No effective vaccines are currently available to the public. However, research is currently being conducted to create a vaccine that can be widely used.