

FARQUHAR COLLEGE OF ARTS AND SCIENCES

11th Annual Undergraduate Student Symposium



Friday, April 13, 2012

Alvin Sherman Library, Research, and Information Technology Center



Undergraduate Student Symposium 2012

The Undergraduate Student Symposium, sponsored by the Farquhar College of Arts and Sciences, presents student projects through presentations, papers, and poster displays. The event serves as a “showcase” demonstrating the outstanding scholarship of undergraduate students at NSU. The Symposium is open to undergraduate students from all disciplines. Projects cover areas of student scholarship ranging from the experimental and the applied to the computational, theoretical, artistic, and literary. They are taken from class assignments as well as from independent projects. The projects do not have to be complete; presentations can represent any stage in the concept’s evolution, from proposal and literature review to fully completed and realized scholarly work. As in past symposia, the definition of scholarship will be sufficiently broad to include work presented in the biological and physical sciences, the social and behavioral sciences, computer science, mathematics, arts and humanities, education, and business. This is the eleventh annual Undergraduate Student Symposium.

USS 2012 Keynote Speaker

Dr. Emily Schmitt: Emily Schmitt, earned her Ph.D. in Biology at the University of Miami in 1997, and joined the NSU faculty in 2001. She is an associate professor and biology coordinator. She teaches and guides biology majors throughout their careers at Nova Southeastern University. Her areas of research include gene expression in yeast exposed to toxins, innovations in science education, genetics and genealogy, fish identification, ecology and behavior, and coral reef ecology and conservation. Emily is recognized for her extensive research mentorship and support, which connects her students with national and international research communities and with the advanced research skills necessary for success in graduate and professional schools. She has been the faculty advisor for 54 student projects at the NSU Undergraduate Student Symposium since its inception in 2002.

USS 2012 Organizing Committee

Dr. Don Rosenblum, Dr. Michael Caldwell, Dr. Tom Fagan, Dr. Matthew He, Dr. Marlisa Santos, Katie Beesting, Jeanne Hamacher

**11th Annual
Undergraduate Student Symposium**

April 13, 2012

Abstract Proceedings

**Farquhar College of Arts and Sciences
Nova Southeastern University**

Key Note: Dr. Emily Schmitt, Division of Math, Science, and Technology – “Reflections on Research”

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A B Cell Driven Model of Antibody Response in an Immunocompromised System

Adam Abdulhafid

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

Faculty Sponsor: **Dr. Evan Haskell**

Abstract

There are many ways in which the body responds to infections. The collective response of the innate and adaptive immune responses is called the immune response. The adaptive response is more sophisticated, and therefore requires greater study to understand it. It is the adaptive response that controls infections and prevents recurring disease. One of the main adaptive responses is the antibody response that can bind to virions and prevent them from infecting cells. Most studies of infection are done based on a single infectious agent and how it interacts with the immune system. In many cases there are multiple infections that must be repelled by the immune system at any given time. We mathematically model the dynamics of antibody response in an immunocompromised system. We study how immunocompromised patients such as pregnant women and pediatrics perinatally infected with HIV will respond to new infections. In particular we study an infection by a new strain of Influenza virus, Swine H1N1, on the system. We use our model to explore the different ways in which the mechanisms of antibody response are affected by different levels of immune suppression. These states of immune suppression are compared with the normal, or immunocompetent, state to determine the disparity in response. The model's validity is tested with a data set from a cohort of immunocompromised patients.

A Case of Mistaken Identity in the Pathogenesis of Type 1 Diabetes

Lynette Miller

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

Faculty Sponsor: **Dr. Tamara Frank**

Abstract

This paper will review what happens physiologically when the body's immune system mistakenly attacks the insulin-producing beta cells of the pancreas, resulting in the onset of Type 1 Diabetes Mellitus. The immune system is designed to fight infection and viruses, but in the case of diabetes, it responds inappropriately by targeting normal body cells and tissues. The hormone insulin is produced by specialized islet cells in the pancreas and is essential for glucose metabolism. When the body does not produce insulin, it cannot control blood glucose levels and therefore, patients must rely on subcutaneous insulin injections or continuous infusion with an insulin pump. Diabetes and its associated complications, including cardiovascular disease, retinopathy, neuropathy and kidney disease, are one of the major causes of mortality. This imposes both a socio-economic burden as well as a diminished quality of life for people and families affected by the disease. While it is known that Type I diabetes results from an auto-immune attack on pancreatic beta cells, the cause of the immune system response is unknown. Scientific research points to a combination of genetic, environmental and immunological factors. The current status of diabetes research towards the development of target therapeutic strategies to better manage, prevent and potentially cure this chronic disease will also be discussed.

A Cytotoxic Investigation of *Urtica dioica* and Pumpkin Seed on LNCaP Prostate Cancer Cell Line

Jackie Lynne Jornadal, Rajeswari Murugan, and Yanira Quinonez

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

Faculty Sponsors: **Dr. Mark Jaffe and Dr. Appu Rathinavelu**

Abstract

This study compared the cytotoxic effects of *Urtica dioica* and pumpkin seed on the LNCaP prostate cancer cell line. Various studies have shown that *Urtica dioica* and pumpkin seed exert positive clinical effects in cases of benign prostate hyperplasia (BPH) through the inhibition of testosterone's conversion to dihydrotestosterone (DHT). Indeed, *Urtica dioica* has shown additional effects in lessening the symptoms of prostate cancer by increasing the urinary flow of affected men, and pumpkin seed has shown some supplementary effects in inflammatory prostatitis, including an increase in prostate secretions; this study hypothesized that *Urtica dioica* and pumpkin seed would inhibit prostate cancer cell growth. The aqueous and alcohol extracts of pumpkin seed and hexane extract of *Urtica dioica* were obtained. After culturing the LNCaP cells, the duplicates of various concentrations of the drugs were added in four 6-well plates. Within 24 hours of treatment, a cell count was performed with the trypan blue exclusion test using a haemocytometer. Additional toxicity testing was performed by utilizing DNA fragmentation tests, mitochondrial staining, and ROS measurement. The results show that effective inhibition of prostate cancer cell growth was observed with both the pumpkin seed and *Urtica dioica*, with pumpkin seed having the greater overall effect. Although this study has shown in-vitro effectiveness of both compounds tested on the LNCaP cell line, further research is required prior to any use of these preparations as a chemotherapeutic agent. (The authors would like to thank Royal Dames of Cancer Research, Inc., Ft. Lauderdale, FL for their support)

A Holy Twist

Haydeli Ko

Division of Humanities
Farquhar College of Arts and Sciences

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

Abstract

“A Holy Twist” is a short film about a soon-to-be-priest named Paul who has a day to himself before officially completing his seminaries, so he decides to visit his parents. Paul reunites with some old friends and takes a leap of faith into a night that he will never forget – though he also won’t remember all of it. This film is directed by Haydeli Ko.

A Journey Brought to You in Part by: Improvisation

Amy Peters

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

Faculty Sponsor: **Elana Lanczi**

Abstract

The purpose of the research that I have conducted was to further my own understanding of dance improvisation. I used my own personal journals as well as other noted sources to explain what I discovered through my journey. I expressed my thoughts and feelings of my journey and how they related to the discoveries that I made. My discoveries include the importance of breaking bodily as well as mental habits, find new ground, becoming aware of one's self, his/her environment, and other people; and defining organized vs. unorganized improvisation. All of these discoveries are discussed in detail and pertain to the outcome of not only a more versatile dancer, but also a more adaptable and confident person.

**A Tale of Two Cities:
Comparison of Air Quality between Los Angeles and Miami Metropolitan Areas**

Raquel Prol, Enrique E. Serrano, and Hung Pham

Division of Math, Science, and Technology

Farquhar College of Arts and Sciences

Faculty Sponsors: **Dr. Song Gao and Dr. Katerina Tsakiri**

Abstract

The quality of air we breathe is an important public health concern that is often overlooked unless an imminent threat such as a brush fire is present. This study aims to gain an in-depth understanding of the air quality of South Florida through a quantitative comparison to that of Southern California, two coastal, urban regions with distinctive demographic and geographic features. It is an attempt to understand not only the characteristic health hazards currently in both regions, but also the measures being taken to prevent and control air pollution. This task is performed by creating time-series profiles of air pollutants including, but not limited to, hydrocarbons, ozone and particulate matter, and identifying their sources and formation pathways. These data are obtained by working directly with regional air monitoring stations and public databases, and treated with mathematical tools such as regression analysis. Qualitative inferences are made regarding the potential health concerns that could affect public health in the communities studied, which can be applied to other urban areas in the world.

Adhesion of Albumin to FDA Type II Soft Contact Lenses

Youstina Harkas, Maryam Harkas, Danielle Cooper, and Jessica Nichols

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

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

Abstract

Human tears have over 60 different proteins that deposit on contact lenses. Protein deposits on contact lenses can cause conjunctival irritation and bacterial infection. The adhesion of albumin to omafilcon and hilafilcon soft contact lenses was examined. Lenses were incubated for 1 - 4 days in a 2.0 mg/dl albumin solution. The protein concentration in the incubation vials and protein deposition on the lenses was determined each day by bicinchoninic acid assay. Albumin deposited on the omafilcon lenses in a steadily increasing fashion, while the albumin concentration in the incubation solution decreased. Albumin deposited on the hilafilcon lenses in a steadily decreasing fashion as lenses were incubated, while the albumin concentration in the vials increased. However, much more albumin absorbed to the hilafilcon lenses than the omafilcon lenses. Human serum albumin is a negatively charged single peptide chain of 585 amino acids that binds and releases a variety of hydrophobic molecules. Hilafilcon is more negatively charged than omafilcon, therefore the large differences between the adhesion of the negatively-charged albumin to hilafilcon as compared to omafilcon must be due to differences in the hydrophobicity of the polymers. Omafilcon lenses are coated with phosphorylcholine which may reduce adhesion by the hydrophobic domains of albumin. Our results demonstrating that the negatively charged tear protein albumin absorbed in a linear fashion to the slightly negative omafilcon material is consistent with the findings of others that albumin deposits on contact lenses in a concentration-dependent way with a single timescale.

Angiotensin III Induced STAT3 Phosphorylation in Cultured Rat Astrocytes

Nancy Sarmiento

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

Faculty Sponsor: **Michelle A. Clark**

Abstract

Angiotensin (Ang) III is a biologically active metabolite of Ang II with similar effects and receptor binding properties as Ang II. Most Ang III studies delineate physiological effects of the peptide but, the intracellular pathways leading to the actions are unknown and are a focus of ongoing studies in the laboratory. Recently, we showed that Ang III induces mitogen activated protein kinases and astrocyte growth in a similar manner as Ang II. In these studies, we investigated in cultured brainstem rat astrocytes whether Ang III stimulates signal transducer and activators of transcription (STAT) 3. STAT3 is an important link between activation of the AT₁ receptor and nuclear transcriptional changes leading to cell growth. Ang III significantly stimulated STAT3 in a dose- and time-dependent manner. The maximal stimulation occurred with 100 nM Ang III. This stimulation occurred as early as 1 minute, and was sustained for at least 15 minutes. Ang III induction of STAT3 occurred via stimulation of the Ang AT₁ receptor, since pretreatment with 10 μ M Losartan, a selective AT₁ receptor blocker, prevented Ang III-induced STAT3 phosphorylation. The selective AT₂ Ang receptor blocker PD123319 was ineffective. These findings suggest that Ang III has similar effects as Ang II in astrocytes since it rapidly stimulates the phosphorylation of STAT3 through activation of the AT₁ receptor. These studies are important in establishing signaling pathways for Ang III and provide validation of the central role of Ang III. (Support NSU PFDRG).

Antibacterial Properties of Meso-Substituted Cationic and Anionic Porphyrins

Mohamad ElChurafa

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

Faculty Sponsor: **Dr. Maria Ballester**

Abstract

In the conducted research work we tested various synthetic meso-substituted cationic and anionic porphyrin's antibacterial properties on gram positive and gram negative bacterial strains. Previous in vitro studies suggest that meso-substituted cationic porphyrins demonstrate effective antibacterial properties on gram negative strains; in contrast, anionic meso-substituted porphyrins prove to be efficient antibacterial agents with gram positive strains. Evidence suggests that the porphyrin's charge predisposes its reactivity on the bacteria's cell membrane, thus immobilizes reproduction at the site of administration. An antibiogram test was coordinated by way of diffusimetric method. Filter paper disks were impregnated with a specific metallated porphyrin and dispensed on the surface of a Mueller-Hinton agar plated by a bacterial strain, and incubated for forty-eight hours at room temperature. Despite prior corroboration, results suggest that copper (II) metallated cationic meso-tetra(4-N,N,N-trimethylanilinium) porphine tetrachloride, meso-tetra(N-methyl-2-pyridyl) porphine tetrachloride and meso-tetra(N-methyl-3-pyridyl) porphine tetrachloride are attributed with potent antibacterial properties associated with the gram positive *Staphylococcus aureus* bacterial strain.

Applications of Ethical Theories in Evaluating the Use of Performance Enhancing Drugs

Prasanna Marathe
Division of Humanities
Farquhar College of Arts and Sciences

Faculty Sponsor: **Joshua Kimber**

Abstract

Steroid use is a reality in professional and high school sports. Some fall into the traps of peer pressure and some are obsessed with breaking records. However, like most quick fixes, there is a large price to pay. Steroid users risk their own health. But, denouncing steroid use by simply saying, “That’s bad, don’t do it,” will not change attitudes. In order to persuade and appeal to current and future steroid users, focused, lucid, and valid ethical reasoning must be applied, even if that means steroid use cannot be condemned in a black and white, absolutist manner. By admitting and recognizing that prohibiting steroid use is not completely justifiable, we can at least get steroid users to listen. Hopefully, a nuanced argument will at least challenge current and future steroid users to stop and think about the implications of steroid use, even though it may not prevent them from “popping a pill.”

Assessing the Importance of the Chelator EDTA on Binding of an Angiotensin II Analog to Neurolysin in Rat Testis and Brain Tissue Utilizing 3-Dimensional Modeling and Radioligand Binding

Andrea L. Lopez, Kira L. Santos, Yaneve Shemesh, and Jamala D. Swindle

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

Faculty Sponsors: **Dr. Mark Jaffe and Dr. Robert C. Speth**

Abstract

Angiotensin II (Ang II) acts in the brain to increase blood pressure and is a major cause of cardiovascular disease and stroke. A novel non-AT₁, non-AT₂ binding site for Ang II in the brain was recently identified as a membrane bound-variant of the zinc metallopeptidase neurolysin. In the presence of PCMB (P-chloromercuribenzoate) and EDTA (Ethylenediaminetetracetate) ¹²⁵I-sar¹,ile⁸ Ang II binds with high affinity to neurolysin in rodent brain. To further explore the interaction of angiotensins with neurolysin we evaluated the 3-dimensional crystal structure of neurolysin. In addition we determined the importance of the zinc ion for angiotensin binding in the presence and absence of the zinc chelator EDTA. The zinc molecule is located at the active site of neurolysin and is required for catalytic activity. Results of the binding studies with ¹²⁵I-sar¹,ile⁸ Ang II in the presence of EDTA in rat brain and testis indicate that the zinc ion is not required for Ang II binding to neurolysin. Moreover, in the absence of EDTA the binding of ¹²⁵I-sar¹,ile⁸ Ang II was dramatically reduced in both tissues. Two possible explanations for these results are 1) That the presence of zinc in the active site of neurolysin inhibits Ang II binding to neurolysin, or 2) That Ang II is rapidly metabolized by neurolysin in its active state and it dissociates from neurolysin rather than remaining bound as the intact peptide. Pharmacological targeting of brain neurolysin may have therapeutic value in treating cardiovascular disease and stroke.

Attitudes Towards Business Ethics: A Study of Austrian Student Views

Dominique Wimmer

H. Wayne Huizenga School of Business

Faculty Sponsor: **Dr. Randi Sims**

Abstract

The Attitudes Towards Business Ethics Questionnaire (ATBEQ) has been used extensively to measure respondent views towards ethical business philosophies and situations. This study reports the ATBEQ survey results for a sample of 171 Austrian students. Results indicate that Austrian students believe that while morality is important in the business environment, the business world operates under its own set of rules. This thinking fits with an ethical business philosophy leading towards Machiavellianism. In addition, Austrian respondents reported support for an unethical decision, which unfairly favors the individual financially at the expense of an insurance company. These and other results are discussed in terms of national culture.

**Because You're a Good Man...Right?: A Deconstructive Analysis of Flannery O'Connor's
"A Good Man Is Hard to Find"**

Dan Abella

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Suzanne Ferriss**

Abstract

The meaning and "correct" use of semantic opposites—*up:down*, *male:female*, *black:white*, and *good:evil*, for example—seem obvious and uncontested in casual speech. Yet the understanding of such pairs remains anything but simple according to deconstructionist critical theory. Founded by French philosopher Jacques Derrida, deconstruction, employed as a literary and linguistic analysis, revels in the uncertainty of language, especially in the dynamic "play" of binary opposites. Hence, Derrida's theories broaden the possibilities of meaning in speech and writing by refusing to ascribe absolute referents to words. Flannery O'Connor's landmark short story "A Good Man Is Hard to Find" thoroughly meditates on the reader's grasp of "good" and "evil" with deft use of vernacular language, dark humor, violence, and irony, all against a religious backdrop. Although critics have referred to O'Connor's alleged moralizing and labeled her a writer of "Christian concerns," the story casts the reader's understanding of good and evil into doubt and, in quintessential deconstructionist fashion, subverts and dismantles that moral hierarchy.

Beyond The Borders

Anakarina Cuccurullo
Division of Humanities
Farquhar College of Arts and Sciences

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

Abstract

“Beyond the Borders” is a love story about the relationship between two young students, Jennifer and Jack. The story begins when Jennifer arrives in Miami with the dream of having a better life. Her family is making every effort to pay for her tuition, and she has set a goal of becoming a doctor. Her true dream is to become an artist, but the hard circumstances her family is experiencing drives Jennifer to pursue medical school. At Jennifer’s university, there is a good-looking guy named Jack, whose secret is that he has been living illegally in Miami for four years. Jennifer feels an immediate attraction to Jack, and they become friends. Jennifer’s attraction becomes even stronger after she learns that Jack shares her passion for art. Jennifer receives a call from her country saying that a tragedy has occurred; her father has passed away, and she has no option but to go back to her country forever. The film is directed by Anakarina Cuccurullo. Crew members include Le’a Kunipo and Haydeli Ko.

Bilingual Text Comprehension

Irina Cossio and Belkis L. Rivas

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

Faculty Sponsor: **Dr. W. Matthew Collins**

Abstract

There are competing theories regarding how bilingual individuals process language. The language selectivity view suggests that bilinguals only activate the language being used at that moment; therefore only one language is active in the brain at once. Other views, such as the language non-selectivity view, suggest that both languages are activated regardless of which language may be in use. Recent studies have provided evidence that both languages may be activated depending upon the context. Context is important because research examining monolinguals has shown that the left hemisphere is associated with processing contextually appropriate words such as inferences strongly implied by the passage context, while the right hemisphere seems to process more ambiguous words and weakly constrained inferences. Bilinguals, on the other hand, have shown that in strongly constrained conditions they process words faster than in weakly constrained conditions, which suggests that for bilinguals the right hemisphere may be more readily activated than monolinguals. In the present study, participants read English passages and performed a lexical decision task. Some passages encourage the generation of an inference (strong context) and are followed by the inference word printed in Spanish in either the left visual field or the right visual field. If textual constraint moderates activation of languages when generating inferences, bilinguals will not activate both languages while reading strongly constrained passages. However, in weakly constrained situations, bilinguals should activate both languages as indicated by their reaction time on the lexical decision task.

Biomechanical Justification for Training Rowers with the Power Clean

Jada Buckner, Anamaria Cretu, and Kyle Gyarfas

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

Faculty Sponsor: **Dr. Monique Mokha**

Abstract

The main objective when training athletes is to base strength and conditioning programs on the needs and goals of the athlete and the team. This ensures that programs are sport-specific. The power clean (a specific strength training exercise) is seen by coaches as mimicking the technique and demands of the rowing stroke itself, and thus is commonplace in the strength and conditioning programs of rowers. However, the power clean has not been formally or biomechanically justified for specificity of training with rowers. The purpose of this study is compare body technique and muscle use between the power clean lift and the rowing stroke on an indoor ergometer. Twenty healthy and injury-free adult rowers ($n_1=10$) weight lifters ($n_2=10$) will be recruited for this study. All participants will test in the Exercise and Sport Science Laboratory at Nova Southeastern University. After a proper warm-up of stretching and either rowing on the ergometer (rowers) or lifting light weight (weight lifters), the rowers will be asked to perform a maximal effort rowing protocol, and the lifters will be asked to perform 3-4 repetitions of the power clean at 85% of their one repetition maximum while having their muscle activity monitored using electromyography and their mechanics monitored via high speed video. We hypothesize that the biomechanics will be similar between the two maneuvers. Results such as joint angles, velocities, and accelerations as well as timing and amplitude of muscle activity, will be useful for rowing coaches and strength and conditioning specialists that work with rowers.

Bridget Jones: Post Feminist, or Frantically Fawning?

Alison Parente

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Suzanne Ferriss**

Abstract

This essay contrasts Helen Fielding's '*Bridget Jones's Diary*' to Jane Austen's '*Pride and Prejudice*' on the feminist aspects of both works. The piece argues that Austen's protagonist Elizabeth Bennet is ironically more forward thinking in challenging gender stereotypes than Fielding's Bridget Jones, though Elizabeth Bennet lived during a period of discrimination against women that imposed severe restrictions upon female lives.

Characterization of the UV Absorption Spectra of N-Methylpyridyl Porphyrins

Kevin Winters

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Maria Ballester**

Abstract

Protonation of phenyl porphyrins induced by THF has been investigated. After ionization, the positive charge was localized in the π -electron system. UV spectras have been studied for the ortho, meso, and para cation positions. Upon acid treatment of N-methyl-2-pyridyl, and N-methyl-3-pyridyl, the soret peak and Q bands showed a slight red shift, signifying a lowering of energy levels of the excited and unexcited states of the π -electrons. However, the soret peak and Q bands of N-methyl-3-pyridyl showed a slight blue shift. This accounted for the increased solvation of π -electrons at the meso position, which increased the energy level difference between the excited and unexcited states. These findings proved that charge distribution of a molecule is influenced by cation positions.

Cholera Outbreak along the Congo River in Relation to Climatic and Environmental Changes

Anazilta Edward

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Deanne Roopnarine**

Abstract

Approximately five million cholera cases and one hundred and twenty thousand resulting deaths are reported annually. Past and present trends in cholera outbreaks along the Congo have led to great speculation about the influence of climate change on public health in that region. Thus, the research conducted sought to examine recent and past weather changes in relation to cholera outbreaks along the Congo River. Recent literature and correlation studies were used to associate the abundance and distribution of *Vibrio cholerae* with sea surface temperature, ocean currents, and weather changes. It was found that in several countries such as Peru, Mexico, Bangladesh and several African countries, cholera epidemics have been associated with flooding and sea surface temperatures resulting from more intense El Nino cycles. Climatic and environmental changes alter the growth of *Vibrio cholerae* in various ways. The most influence is on phytoplankton blooms as *Vibrio cholerae* most commonly attaches to the exoskeleton and abdomen of copepods, which feed on phytoplankton.

Comparative Neurogenesis in the Brain of the Adult Mayan Cichlid

Ahmed Ali, Kelsey Bragg, Catalina Breton, William Kotkin, and Jonathan Romanes

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

Faculty Sponsor: **Dr. James R. Munoz**

Abstract

Neural progenitor cells are the only cells in the adult brain that continue to proliferate, migrate, and integrate into existing neural networks throughout the life-span of all mammals examined to date, including humans. Understanding how neurogenesis (the birth of new neurons) is regulated has exciting therapeutic potential for a wide range of central nervous system diseases. Neural progenitor cells exist in two neurogenic regions of the adult mammalian brain: the dentate gyrus of the hippocampus and the forebrain subventricular zone. In recent studies, postnatal neurogenesis has been reported in several regions of the fish brain including the olfactory bulb, optic tectum, dorsal zones of the telencephalon, hypothalamus, and divisions of the cerebellum. While fish brain is reported to contain more neurogenic regions than the mammalian brain, little else is known about neurogenesis in the adult fish brain. This study aims to determine the contribution of neurogenesis in each brain region by examining the proliferation, integration, and cell fate of neural progenitor cells in neurogenic nuclei of the adult Mayan Cichlid brain. Comparisons will be made between the various nuclei to determine if differences exist in the rates of proliferation, integration, cell fate, and cell death. The findings obtained in this study will advance our understanding of how neurogenesis contributes to ongoing brain functions and will also contribute to future studies examining factors that may alter neurogenesis.

Complete Protection and Glycosylation of 5-hydroxy-DL-lysine

Rina M. Bhalani and Lindsey Nowland
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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Beatrix Aukszi**

Abstract

Adiponectin, a protein hormone, has been shown to play a role in preventing the development of atherosclerosis, a common cardiovascular disease. Altering some of the amino acids in adiponectin can provide beneficial effects towards that goal. One such amino acid, Hydroxylysine, can often undergo posttranslational modifications, such as glycosylation, the addition of a sugar molecule.

Hydroxylysine (Hyl) has the molecular formula of $C_6H_{14}N_2O_3$, and contains four functional groups: a hydroxyl group, a carboxylic group, and two amino groups. The ultimate goal of the proposed research is to galactosylate Hydroxylysine, that is, add a molecule of galactose to the hydroxyl group of the amino acid. The sugar cannot be exclusively added to the desired hydroxyl group without first differentially protecting each of the other reactive functional groups. Individual protecting groups will first be added to the three functional groups, then the sugar will be reacted with the free hydroxyl group, and finally the protecting groups will be removed. Subsequently, the product will be characterized and purified. The pure galactosylated hydroxylysine will be used as a building block to be incorporated into large peptides, modeling adiponectin, to explore its role in cardiovascular disease.

Development of the Removal of the Polyphosphate Kinase Gene in *Yersinia enterocolitica*

Travis Thomas

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Farquhar College of Arts and Sciences

Faulty Sponsor: **Dr. Julie Torruellas Garcia**

Abstract

The aim of the experiment was to delete the polyphosphate kinase (PPK) gene of the bacteria, *Yersinia enterocolitica*. *Y. enterocolitica* is one of three *Yersinia spp.* that are pathogenic to humans. *Y. enterocolitica* secretes toxic proteins out of needle-like structures found on its cell surface; these structures and the flagella of the bacteria are assembled by the same process. Diseases caused by pathogenic *Yersinia spp.* range from gastrointestinal diseases to bubonic plague; *Y. enterocolitica* is the causative agent of gastrointestinal diseases. PPK is a ubiquitous enzyme that has been identified as a factor in the motility and virulence of a considerable number of pathogenic bacteria, but its role in the virulence of *Y. enterocolitica* remains undetermined. The goal will be to create *Y. enterocolitica* strains that lack the PPK gene by using λ Red-mediated gene replacement. Establishing a connection between PPK and the motility of *Y. enterocolitica* could lead to a better understanding of how this bacteria causes disease.

Effect of Retinoic Acid on Osteogenesis of Human Umbilical-Cord Stem Cells

Stephanie Chery

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

Faculty Sponsors: **Dr. Umadevi Kandalam and Dr. Paul Arena**

Abstract

Mesenchymal stem cells (MSCs) are currently being used as a promising tool for bone tissue engineering. The application of these stem cells to bone tissue engineering requires inducing *in vitro* differentiation of these cells to bone forming cells; osteoblasts. Retinoic acid (RA), a metabolite of vitamin A, is involved in many cell functions including osteogenic differentiation. The objective of this study was to investigate the potential role of retinoic acid as an inducer of osteogenic differentiation in human umbilical cord derived mesenchymal stem cells (hUMSCs). This was done by exploring its applications in bone tissue engineering, specifically for the repair and regeneration of craniofacial bony defects. Stem cells were obtained from Sciencell (Carlsbad, CA) and cultured under appropriate conditions. Cells grown up to 70-80% confluency were treated with increasing doses of RA (0.5, 1 and 2 μ M). The gene expression of osteogenic markers was examined by RT-PCR. Alkaline phosphatase activity was determined at 1, 2 and 3 weeks intervals. Cell proliferation was significantly decreased in the cells exposed to RA at all concentrations. The expression of osteogenic marker genes was down-regulated by RA in dose dependent manner. Lastly, matrix mineralization was not observed in hUMSCs, suggesting that RA does not support osteogenic differentiation of these cells.

Effectiveness of a Biocontrol Agent on Aphid Infestations

Saamia Shaikh and Darshan Solanki
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Farquhar College of Arts and Sciences

Faculty Sponsors: **Dr. Paul Arena and Dr. Jason Gershman**

Abstract

Aphids, insects in family Aphididae, are common, minute organisms (~ 5mm) that thrive in agricultural settings by sucking phloem sap via stylets that penetrate the plants vascular tissue. Past research has demonstrated the effectiveness of pesticide treatments to eradicate these destructive insects, however many of the most commonly used pesticides are highly toxic synthetic compounds. In our previous research we examined the effectiveness of synthetic, organic, and insecticidal soap pesticides on aphid infestations. This current study aims to determine the effectiveness of another alternative, known as biological control, for treating aphid problems. The biocontrol agent used in this study was the lady beetle (*Hippodamia convergens*). Results indicate the lady beetle is an effective alternative to pesticide use. When compared to the control, a significant reduction in numbers and near total elimination of oleander aphids (*Aphis nerii*) was observed over a five day period on scarlet milkweed plants (*Asclepias curassavica*). The use of bio-control agents reduces dependency on harmful, synthetic pesticides and should be considered a viable option for consumers looking for an environmentally friendly treatment for aphid infestations.

Evaluation of Fluoride and Fluorosis

Jessica Bouzo

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Faculty Sponsor: **Dr. Deanne Roopnarine**

Abstract

Fluoride consumption has been linked to dental and skeletal fluorosis as well as osteosclerosis, cancer, renal failure, fertility problems and cognitive effects for years. In this research, the fluoride concentrations of different mouthwashes, teas, toothpastes and water were evaluated. The results showed a broad spectrum of values but none of the values exceeded the average daily intake maximum (0.05-0.07 mg per kilograms per day) for adults. Considering that all the counties in the United States have their fluoride concentration in water at two parts per million (secondary drinking water standard) a person that drinks 64 oz of water every day would have already consumed approximately 83% of their daily value. The most significant product found to provide fluoride in diet was tea. Both bottled tea, and brewed tea show high volume fluoride concentration which may lead to fluorosis in a population that consume more tea in their diet.

Examining Relationships of Transferrin Adhesion to Hilafilcon, Omaficon, and Tisifilcon A Contact Lenses

Darshan Solanki

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

Abstract

Lacrimal glands adjacent to the eye secrete tear proteins that deposit onto contact lenses. In order to study this process, three types of FDA group II contact lenses fabricated from hilafilcon, omaficon and tisifilcon A were incubated in 2.0 mg/mL solutions of *holo*-transferrin for 1, 2, 3 and 4 days. The degree of protein adhesion was determined by bicinchoninic acid assay. Transferrin adhered to hilafilcon contact lenses in an increasing pattern from day 1 to day 3, with a decrease on day 4. Transferrin adhesion to omaficon contact lenses followed the same trend with greater protein adhesion than the hilafilcon lenses. Transferrin adhesion to tisifilcon A contact lenses increased on days 1 and 2, and then decreased on day 3, and increased again on day four. These differences in transferrin adhesion may be associated with the inherent positive charge on its N-terminus and positively charged arginine residues in the protein, but other factors must be important because the hilafilcon material is more negatively charged than the omaficon material, leading one to expect that transferrin should bind to a greater degree to hilafilcon than to omaficon, in contrast to my results.

Exploring a Potential Pathway for Secondary Organic Aerosol Formation in Urban Atmosphere by Laboratory Experiments

Melanie Campbell and Elizabeth Mortazavi

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Farquhar College of Arts and Sciences

Faculty Sponsors: **Dr. Song Gao and Dr. Dimitrios Giarikos**

Abstract

Formaldehyde, other carbonyl compounds and amines are common atmospheric pollutants emitted from industrial sources in urban areas. These compounds have been proposed to contribute to secondary organic aerosol formation, thus urban air pollution, through a process known as the Mannich reaction. Here we report a laboratory study of the reactions among carbonyl and amine precursor compounds in the bulk phase to determine if the anticipated Mannich-type products form. The reactions are performed under various temperatures ranging from 0°C to 55°C using low concentrations of inorganic or organic acids as the catalyst. The products are characterized by Gas Chromatography-Mass Spectrometry (GC-MS) for structure elucidation. Results suggest that Mannich-type products form under certain conditions, revealing a potentially new pathway for secondary organic aerosol formation in urban atmosphere.

Exploring Rural Medicine: Internship in Linville, North Carolina

Lynette Miller

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Robin Sherman**

Abstract

Nova Southeastern University (NSU) and the Appalachian Regional Healthcare System, Inc. (APPRHS) formed a unique internship opportunity. The purpose of the internship was to expose students to different specialty areas of medicine providing an educational experience that cannot be duplicated in the classroom. Over the course of six weeks, I participated in rotations in the Pharmacy, Surgery, Emergency, Cardiac Rehabilitation, Radiology and Medical/Surgical Departments of Cannon Memorial Hospital in Linville, NC. Due to its remote location, the hospital is classified by the U.S. Department of Health and Human Services as a Medicare Critical Access Hospital with an underserved population. Many patients had limited access to medical care and as a result, were suffering long term complications of living with chronic conditions like heart disease, lung disease, stroke and diabetes. My experiences were diverse and included; observing gallbladder operations and colonoscopies, suturing of leg lacerations, MRIs, CT scans and x-rays. I also discussed current diabetes protocol with the hospital pharmacist and interacted with patients in various stages of cardiac rehabilitation. Although there is a serious shortage of health practitioners in the field of rural medicine, the professionals at Cannon Memorial were dedicated to caring for each patient in a thorough and unhurried manner seldom seen in healthcare today. This experience has prompted me to explore a career in rural medicine.

Forever in My Heart

Vittoria Santini

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Farquhar College of Arts and Sciences

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

Abstract

“Forever in My Heart” is a coming-of-age dramatic short film about an 18-year-old university student, Jackie, who was drugged and raped at a party. Shortly after this incident, Jackie discovers that she is pregnant, and she must decide whether to have the baby or get an abortion. The film is directed by Vittoria Santini. Other crew members and actors include Victoria Rajkumar, Davis Yahn, Esther Swilley, Maggy Klingberg, Anthony Anania, and Joseph Anania.

Gone

Gregory Hinds

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Farquhar College of Arts and Science

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

Abstract

“Gone” is a short film about a young college student, Jason Love (AKA “J-Love”), whose younger brother Darius is killed. Jason seeks revenge on the people responsible for Darius’ death. Eventually Jason must learn to overcome his grief and find love. The film is directed by Gregory Hinds.

How Math and Music Jams Together

Felicia Bell

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

Faculty Sponsor: **Dr. Abdelkrim Bourouhiya**

Abstract

For centuries, mathematicians have been trying to analyze and model music. Music can be described and analyzed through quite a few equations which are based on trigonometric functions, derivatives and integration. A wave equation can be used to represent harmonic notes such as a vibrating string from a guitar. A single tone can be described by a sine function, while multiple notes played together can be described by the sum of each single tone. Processing a piece of music as a signal, the theory of Fourier Transform can identify each note and its amplitude or volume.

Human Derived Contaminants in Water Systems: Occurrence, Treatment, and Prevention

William Kotkin, Roshni Patel, and Jennifer Rankin

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Song Gao**

Abstract

Human derived contaminants, such as pharmaceuticals and personal care products, have been detected in the aquatic environments including ground, surface, sewage, and drinking waters. The occurrences and distributions of such compounds, such as hormones, caffeine and pharmaceuticals, in various water systems are reviewed in this paper with a focus on South Florida. Along with potential health hazards caused by these contaminants, existing water treatment technologies are discussed to understand their presence in this region. Recommendations for improved technologies and preventative measure are also presented.

Lady of the Night

Amrish Ramnarine
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Faculty Sponsors: **Dr. Chetachi Egwu and Dr. Weylin Sternglanz**

Abstract

“Lady of the Night” is a short film about crime and punishment regarding a rape. It is a psychological thriller in which the hunter and the hunted often cross that thin line which distinguishes them. The film is directed by Amrish Ramnarine. Other crew members and actors include Syam Ramnarine, Raquel Hardie, and Michael Elhaj.

Lemuel, the Egocentric Human

Sasha Strelitz

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Faculty Sponsor: **Dr. Lynn Wolf**

Abstract

This essay investigates Jonathan Swift's *Gulliver's Travels*, spotlighting a central message of his, warning humankind against the folly of vanity. Following his protagonist, Lemuel Gulliver, through four fantastical worlds, one begins to see a pattern of unwinding humanity. Before arriving in Lilliput (the first whimsical land), Gulliver is a typical human being, with typical hard-wired narcissism. After years of voyaging, and after a memorable stay with the Yahoos, Gulliver rejects his humanity as being brutish, vain, and egocentric. However, banished from Houyhnhnm Land, he finds solace and sanity in horse stables. Perhaps this seems excessive, but this reader attributes this radicalism to Swift's central message: egocentrism is often times unwarranted, but always a defining human quality. Without vanity, would we not just be horses in stables?

Loop Hole

Esther Swilley

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

Abstract

"Loop Hole" is a short film about two lifelong friends who have found themselves failing their first semester of college. Kathy and Heather desperately attempt to find a loophole which will allow them to pass their classes. The film is directed by Esther Swilley. Other crew members include Davis Yahn, Victoria Rajkumar and Vittoria Santini.

Loss of ¹²⁵I-Sarcosine¹, Isoleucine⁸ Angiotensin II Binding in the Brain of Neurolysin Knock-Out Mice

Jamala D. Swindle, Luz Gonzalez, Andrea Linares, and Kira L. Santos

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Robert Speth**

Abstract

The brain renin-angiotensin system profoundly affects the cardiovascular system, often with pathological consequences. However, many unresolved questions about its functionality remain. Recently it was shown that a novel, non-AT₁, non-AT₂ binding site for angiotensin II (Ang II) exists in the mammalian brain. This protein has been identified as the metalloendopeptidase neurolysin (E.C.3.4.24.16). To assess the localization of this binding site in mouse brain, 3 mice deficient in neurolysin as well as 3 wild-type mouse brains were evaluated for radioligand binding with ¹²⁵I-Sarcosine¹,Isoleucine⁸ Ang II (250 pM) in the presence of receptor-saturating concentrations of losartan (an AT₁ receptor antagonist), PD123319 (an AT₂ receptor antagonist) and 150 μM parachloromercuribenzoate (to unmask the binding site) using in vitro autoradiography. Specific (10 μM Ang II displaceable) ¹²⁵I-Sarcosine¹,Isoleucine⁸ Ang II binding in wild-type mouse brains was abundant, with highest levels in the molecular layer of the cerebellum, cerebral cortex, hippocampus, amygdala, caudate-putamen, hypothalamus, lateral septum, and external plexiform layer of the olfactory bulb. There was a profound reduction in specific ¹²⁵I-Sar¹,Ile⁸ Ang II binding in neurolysin-deficient mouse brains, however, the extent of reduction was region-specific. The greatest decreases were seen in the cerebral cortex, substantia nigra, hippocampus, paraventricular thalamus, lateral septum, and nucleus accumbens in neurolysin deficient mouse brains. The cerebellar cortex and hypothalamus showed the smallest reductions in ¹²⁵I-SI Ang II binding. These results verify that the previously-reported novel non-AT₁, non-AT₂ receptor binding protein, is neurolysin, but that there may be additional non-AT₁ non-AT₂ binding sites in the mouse brain. Supported by NHLBI HL-096357.

Mathematical Modeling, Simulation, and Compression of Images

Jonathan Reyna

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. José Ramos**

Abstract

This project builds a mathematical model that obtains parameters and statistical properties of residuals taken from a picture in JPEG format, to later simulate replicas of the original picture. The importance of this problem stems from the large amount of bandwidth required to transmit a high resolution picture over the Internet. The mathematical model built from this picture and its set of residuals has a much smaller magnitude than the original picture elements (pixels). This implies that if one were to transmit the parameters alone, a high compression rate would be achieved, thus saving bandwidth. In order to replicate the picture, the receiver has to randomly generate a set of residuals (inputs) with the same statistical properties as those from the received mathematical model, and process them in order to get the output. The output of the model will be a replica of the original picture. As an alternative approach, one can also transmit the residuals of the model, which will still require less bandwidth than the original picture. Real examples will be presented.

Paleoceanographic Productivity Reconstructions Using Marine Mammal Bone Collagen

Jonathan H. Gomez

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Amy C. Hirons**

Abstract

Changes in primary ocean productivity play a key role in determining the structure and biomass yield of the North Pacific ecosystem. Are recent dramatic fluctuations in marine ecosystem productivity a function primarily of industrial and other anthropogenically induced changes or part of larger ecosystem scale processes? Archaeofaunal remains of pinnipeds and cetaceans from the Aleutian Islands, Alaska are used as a proxy for marine productivity changes over decade, century and millennial scales throughout the Holocene. Marine vertebrate remains from several previously excavated well-dated archaeological deposits on Unalaska Island span the period AD 1912-5500 BP. Stable carbon and nitrogen isotope ratios ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) derived from marine mammal bone and tooth collagen provide information about changes in food web dynamics and marine productivity levels, and through inference, about ecosystem changes. The paleorecord of phytoplankton production, in response to changes in atmospheric and oceanic fluctuations, is reflected in the stable isotope composition of the skeletal remains of these animals. Our current understanding of the controls on production, and the time-scales over which these controls vary, is extremely limited. We are developing a time series of stable isotope signatures from these zooarchaeofaunal remains to assess changes in trophic dynamics related to changes in primary productivity. The results of this study will contribute to baseline data on marine productivity and how these data relate to recent declines in the carrying capacity of the Bering Sea and the northeastern Gulf of Alaska.

Peeking Behind the Mask of Tolerance: Investigating Implicit Views Towards Gay Adoption

Christine Harlow

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Glenn Scheyd**

Abstract

We examined implicit attitudes (Fazio & Olson, 2003) towards same-sex couples' rights to adopt. Although there is no clear scientific evidence to suggest that gay couples are less capable of raising adopted children, those opposed to gay adoption argue, from intuition or ideology, that placing adopted children with same-sex parents is detrimental to the children's well-being. If those opposed to gay adoption base their decision on the well-being of the child rather than the parents' sexual orientation, it follows that they would also share concern for at-risk children adopted by heterosexual parents and that sexual orientation per se would not be a factor in the concern. However, we hypothesize that raising the issue indirectly (as described below) will reveal that opposition to gay adoption is driven by heterosexist bias. Participants completed a questionnaire concerning policies that might follow from specified hypothetical scientific discoveries, e.g., "If people who drink more than 2 liters of water per day are found to be less likely to require corrective eyewear or surgery to improve their vision..." After each hypothetical finding, participants endorse those policies they would support in response. Half the participants read the statement "If people who were raised in an adoptive family by straight parents are found to have an 18% higher rate of suicide than those who were raised in an adoptive family by gay parents..." For the others, "gay" and "straight" are switched. Consistent with our hypothesis, participants endorsed more restrictions in the gay parents' condition.

Population Densities of *Porites sverdrupi*, a Coral Limited to the Mexican Eastern Tropical Pacific

Eduardo Carrera

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Joshua Feingold**

Abstract

Porites sverdrupi is a rare, endemic free living coral that only inhabits the Mexican Eastern Tropical Pacific at depths typically between 20 and 40 meters. Until recently it was considered an ecomorph of the more abundant congener *Porites panamensis*, so there are few studies focused solely upon this species. The volatility of the populations of corals in this region and a continually decreasing habitat has led some researchers to conclude that *P. sverdrupi* may be undergoing a natural process of extinction. This study initiates a multi-year analysis of the population trend of *P. sverdrupi* off the coast of Isla Catalana in Baja California. Forty randomly positioned ½ x ½ m photo quadrats were obtained in an area with an exceptionally dense population of this species. Images were analyzed using the CPCe program, revealing that *P. sverdrupi* had an average surface area of 2.44 cm², with about 55 colonies per square meter and an average live coral tissue cover of 1.35%. This compares with other studies that report population densities and live tissue cover over one order of magnitude lower. This suggests that microhabitat refuges, such as the one at Isla Santa Catalina, allow hope for the continued survival of *Porites sverdrupi*. This important baseline study on one population of this species will be followed by biennial surveys to determine long-term trends. It will then be possible to identify if more aggressive conservation efforts will be needed to prevent the extinction of this locally important species.

Porous Compounds as Drug Transfer Agents

Angelo J. Capobianco

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Farquhar College of the Arts and Sciences

Faculty Sponsor: **Dr. Donald Baird**

Abstract

For a while now there has been an interest in porous compounds to act as transfer agents for other compounds. Porous compounds are defined as such because the molecular structure of these compounds so as there is empty space, or a channel between each molecule of the compound. Therefore, the more molecules that the compound has, the more channels exist and the compound is more porous. The channels in these molecules allow molecules from other compounds, or guest molecules to become locked inside of the porous material. The compound being studied in this experiment is a solid, crystalline compound created from a series of copper(ii) complex molecules called NBA II. As it is a porous compound, NBA II has a molecular framework such that channels form in between its molecules that are available for storage. During the experimentation being done on this compound, NBA II was placed in a hexane solution containing carbon tetrachloride (CCl₄) and is then transferred to a solution of methanol. This reaction system is now being studied utilizing x-ray crystallography, infrared spectroscopy and gas chromatography/mass spectrometry. The results of the experiment will be presented at the student symposium.

Role of Mesenchymal Stem Cells in Chronic Wound Healing

Shahjahan Shareef

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. James R. Munoz**

Abstract

Stem cells has been well characterized to be multipotent cells that can differentiate into multiple tissue-forming cell lineages, as osteoblasts, adipocytes, chondrocytes, tenocytes and myocytes. It has been shown that bone marrow derived cells provide stem and progenitor cells to wounds during inflammation, proliferative and remodeling phase of wound healing. On the other hand, mice have become the premier animal model for the study of numerous complex human diseases. Mouse models are cost effective and have a favorable generation time for cross breeding experiments. In our work we show the use of two mice models to determine which is the most applicable to evidence the function of stem cells during wound healing. Using the appropriate animal model, the mobilization and engraftment of different populations of stem cells (bone marrow complete cells, fresh bone marrow cell and mesenchymal stem cells) are analyzed by histology and flow cytometry, we will study the role of stem cells during repair of chronic wounds. This will further reveal what cells present in bone marrow contribute the most to the wound healing process.

SharkCal: The Solution to Scheduling Dilemmas

Jeremy Austin Cantor

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Saeed Rajput**

Abstract

Current business practices and scheduling systems are inefficient, and as a result, they often force the customer to wait for assistance, toiling on hold while listening to elevator music and confronting layers of representative before reaching somebody who may be able to help us. SharkCal will provide a solution to this reoccurring annoyance, as it will replace the scheduling systems of the clients' organizations. SharkCal will allow users to set appointments for help and services with the staff at the customer's organization. It will display a user-friendly calendar with weekly and monthly view options so users can clearly see what time-slots are available for selection. It will also eliminate human error in scheduling while allowing the office secretary to attend to other important office functions. Other available scheduling software that is currently utilized by industry such as Google Calendar, Microsoft Outlook, and Apple's iCal lack a key feature that the SharkCal system prides itself on. This key feature that these systems lack is the ability to allow customers to schedule appointments with a particular person from an organization and the particular person can approve or disapprove the suggested appointment. The objective of the SharkCal project is to create a fully functional, automated scheduling system suitable for a range of different business practices with unique demands.

Spartacus: Blood and Oil

Holly Buttach, Lisa De La Vega, Dean Gardner, and Daniel Strien

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Evan Haskell**

Abstract

Population dynamics and socioeconomic factors are closely entwined and play a large role in shaping civilizations. Among the many factors influencing populations are resource production and allocation and the impact of violence, either predatory or retaliatory. Of the resources crucial to civilizations today, few are as important as oil, as oil is used in a variety of applications and is a finite resource. Differential equations can be used to model associations between oil production and various other elements of society in order to predict future events. It is by using such equations that we will examine the relationship between rates of violence in or between civilizations and rates of oil production and availability.

Summer Transplant Surgical Internship in Graz, Austria

Reena Parikh and Catalina Rodriguez
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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Robin Sherman**

Abstract

In the summer of 2011, we were given the opportunity to travel to Graz, Austria to complete a seven-week surgical internship. We were able to assist with an organ transplant team at the Medical University of Graz. As interns, our responsibilities included attending morning rounds, drawing blood samples, setting up IVs and assisting in several surgeries. We also had the chance to observe several different specialties in surgery including cardiothoracic, neurology, obstetrics, pulmonary, pediatrics, reconstructive, and orthopedics. During our entire stay, we were on-call and responded to emergencies, which included traveling to a nearby city to collect organs for transplantation. In addition to our clinical experience, we facilitated research with live pig specimens. Our research was focused on hepatic carcinoma and localized radiation treatment. We would like to use the undergraduate student symposium to present our experience in Austria and encourage other students to delve further into unique research opportunities and internships such as this.

Temperature Effect on Florida Manatee Abundance in the Port Everglades

Ashlyn Chazhikat

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

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

Abstract

Florida Manatees (*Trichechus manatus latirostris*), can be found in Port Everglades, which is located near Nova Southeastern University's Oceanographic Center. Manatees can be found here during the winter because they thrive in the warm-water habitat created by the discharge of warm water from the FPL Power Plant. The data that were used in this study was obtained during weekly trips from the Oceanographic Center through Port Everglades. The trips were taken on a biweekly basis during the summer and early fall months and on a weekly basis during the winter months. During the boat trips in the Port, data were collected on the number of manatees present as well as the water temperature at certain areas of the Port. After collecting the temperature data at different points of the Port, these data were correlated with the numbers of manatees found in each of the locations. The null hypothesis for this study was that the temperature will have no effect on the number of manatees seen in the area. However, the data showed that when the water temperature was lower, there were more manatees that could be seen.

The Different Shades of Black

Charnele Michel

Division of Humanities
Farquhar College of Arts and Sciences

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

Abstract

“Different Shades of Black” is a short documentary film about the ongoing conflict between light-skinned and dark-skinned people in the black community. This is a controversial issue among people of African-American and Caribbean descent, some of whom believe that lighter-skinned black people are considered more attractive, and often receive better opportunities, than darker-skinned black people. Such stereotypes about skin complexion may be fueled by the media (e.g., music videos, movies, television shows, and advertisements). This documentary will showcase the opinions of people in the black community about this issue. The goals of this film are to bring awareness to this controversy and to explore the conflicts that result. The documentary film is directed by Charnele Michel. Other crew members include Anakarina Cuccurullo, L’ea Kunipo, and Gregory Hinds.

The Effects of Sleep Deprivation on Neurophysiological Measures of Emotion and Biochemical Measures of Stress

Ramey Alfarra

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

Faculty Sponsor: **Dr. Jaime Tartar**

Abstract

The relationship between sleep and emotion is not well understood. Existing studies typically link sleep and emotion based on subjective assessments- rarely are objective measures utilized to examine the interaction between sleep and emotion. Here, we determined the effect of 24 hours of sleep deprivation on a neurophysiological measures of attention to emotional stimuli through the use an electroencephalographic (EEG) event related potential (ERP) measure of emotion- the late positive potential (LPP). Each participant underwent two testing sessions between 7:00-9:00 am: the first session occurred five days prior to sleep deprivation (baseline testing), the second session occurred the morning after sleep deprivation. During each session participants viewed a variety of positive, neutral and negative pictures from the International Affective Picture System (IAPS). In addition to recording the average LPP to each picture type (negative, neutral and positive) we also recorded behavioral affective ratings of each picture. Cortisol levels and self reported anxiety (STA-Y) were taken before and after picture viewing during each session. We show that one night of sleep deprivation decreases the amplitude of the LPP in response to emotional stimuli with a concomitant decrease in behaviorally rated emotional valence. There was no change in cortisol after sleep deprivation. These findings suggest that a single night of sleep deprivation blunts the cognitive processing of emotional stimuli relative to cognitive processing of emotional stimuli after a typical night of sleep.

The Effects of Stress and Sleep Restriction on Attention and Inhibitory Task Performance

Brandi Viparina and Isaac Chayo
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Farquhar College of Arts and Sciences

Faculty Sponsors: **Dr. Jaime Tartar and Dr. Jonathan Banks**

Abstract

Stress and sleep deprivation impairs performance on attention and inhibitory tasks. Due to the bidirectional effects of sleep restriction and stress, it is difficult to determine the combined and independent effect of each of these on cognitive performance. In an effort to disentangle the unique contribution of stress and sleep on performance, we sought to examine students during a time in which they are both sleep restricted and stressed. To that end, we employed a repeated measures within-subject design in which each participant was tested twice, once during a non-exam week and once during exam week. The Stroop and a continuous performance tasks were used to assess inhibition and attention, respectively. A biochemical measure of stress (cortisol) was quantified at each testing session in order to determine individual variability in response to the exam week stressor. Participants also indicated their sleep patterns for the week prior to each session. Results show the individual and combined effects of stress and sleep restriction on inhibition and attention. These results further add to our understanding of possible mechanisms that impair cognitive functioning.

The Effects of Various Concentrations of Sugar and Sugar Substitutes (Sucralose, Stevia, and Aspartame) on Gene Expression in *Saccharomyces cerevisiae* (Yeast)

Beric Berlioz

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

Faculty Sponsor: **Dr. Emily Schmitt**

Abstract

Artificial sweeteners are promoted for their apparent medical benefits in regards to issues of weight control, diabetes, and tooth decay. The primary objective of this study was to collect information about how table sugar (sucrose) and three sugar substitutes Splenda (sucralose-based), Truvia (stevia-based) and Equal (aspartame-based) affect gene expression at varying concentrations. Regular yeast growth-media, plus low (10 tsp/100 pounds), medium (34 tsp/100 pounds), and high (340 tsp/100 pounds) added concentrations of the sugar or sugar-substitutes were used. These concentrations were selected according to recently published literature based on the diet of typical American teenagers. Yeast were used as a model eukaryotic organism and the sugar or sugar substitute concentrations scaled for an environment of liquid yeast media in a 50 mL conical tube. These concentrations were selected to replicate hyperglycemic, moderate, and hypoglycemic diets. Since yeast share approximately 30% of their genome with humans, several conserved genes in the functional categories of digestion, kinases, transcription, cell cycle, ion channels, and chaperones were targeted in this study. The relative degree of expression of these genes (via reverse transcriptase polymerase chain reaction and gel electrophoresis) at the three concentrations of the four substances, and also the typical yeast growth-medium were compared resulting in particular gene expression profiles for the selected genes in each environmental condition. Findings of particular interest included the lack of expression of SUC2 (digestion gene) and YHC3 (ion channel gene), and more consistently high expression of DAP2 and GIP1 (digestion genes) among the tested environments.

The Effects on the UV Spectra of H₂pOH-TPhP as Dication and Dianion Formation Occurs

Yadira Barreiro, Priya Mohan, and Alexis Otero

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

Faculty Sponsor: **Dr. Maria Ballester**

Abstract

Porphyrins differ in the nature of their peripheral substitution; β substituted are known as natural porphyrins and meso substituted as synthetic porphyrins. Within the meso substituted porphyrins we studied the H₂pOH-TPhP. The UV absorption spectra of this porphyrin is observed and monitored between 350 and 750 nm. The resulting absorption spectra after the creation of the dianion and dication with the respective titrations using NaHCO₃/HCl and NaOH/HCl will be explained based on the position of the OH in the phenyl group and contribution to the formation of the respective dication or dianion.

The Epistemological Status of Theoretical Simplicity

Yineth Sanchez

Humanities Division

Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. David McNaron**

Abstract

In this paper, I argue that theoretical simplicity is not an epistemic virtue. Therefore, we need not prefer the simpler explanation of two competing scientific theories. First, I clarify the concept of theoretical simplicity as it figures into discussions in the philosophy of science. Next, I evaluate the strongest arguments in favor of this view as a criterion of theory selection. Then, I present two instances where theoretical simplicity is not preferable as such a criterion. Lastly, I show that while there may be a number of nonepistemic criteria of theory choice, including simplicity, none of them bears upon truth. So, if our aim is truth, the appraisal of scientific theories should depend upon empirical evidence alone.

The Function of Sleep Disorders in Explaining Gender Differences in Adolescent Depression

Jaibel Makiyil

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Faculty Sponsor: **Dr. Jaime Tartar**

Abstract

The purpose of this literature review is to discuss gender differences in adolescent depression, and the role of sleep disorders in this difference. There is an evidenced gender disparity in adolescent depression in that women are more than twice as likely to experience depression. Similarly, women have a greater preponderance for lower sleep quality, and certain sleep disorders such as insomnia.

Adolescent depression is the most widespread psychiatric disorder globally, and affects more than eighteen million Americans annually. The average age of adolescent onset has been progressively decreasing over the last thirty years. It is during adolescence that a “gender shift” occurs where females have twice the probability of experiencing depression compared to their male counterparts in the thirteen to fifteen age bracket. This early onset depression, if not understood early on, reoccurs in adulthood as well as later in life. Accurate and early detection and treatment is important in minimizing future complications. To better prevent and treat depression, researchers must better understand adolescent depression.

This literature review analyzes data on the role of sleep disorders in affecting adolescent depression by gender. The highlights of this review are that after controlling for age, there is a significant relationship between sleep disorders and depression by gender. This analysis recommends that both the gender, and sleep disorders should be taken into consideration for future prevention, and treatment measures for adolescent depression.

The Influence of Emotional Stimuli on Response Inhibition

Sarah Yassin

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

Faculty Sponsor: **Dr. Leanne Boucher and Dr. Jaime Tartar**

Abstract

It has been shown in numerous studies that emotion affects cognition. This study looks at the interaction between emotion regulation and response inhibition. Specifically, it looks at how negative pictures impact one's performance on a complex task that requires inhibition of an on-going response. This was tested by presenting negative and neutral pictures within the context of a stop signal task while measuring electroencephalograph (EEG) Event Related Potentials (ERPs). We found that there was an increase in the amplitude of an ERP measure of attention to emotional stimuli (the LPP) to negative pictures compared to neutral pictures. We further found that neural processing to subsequent target stimuli increased (as evident in the increase in amplitude of the late processing negativity component). However, it seems that due to several limitations of this study, behaviorally significant differences were not found, and no significant ERP findings to the stop signal was found (no P300 effect). Therefore, this study shows that emotional stimuli work to prime a physiological measure of attention to a subsequent visual target, but this emotional priming effect does not influence behavior to the auditory stop signal.

The Preparation of Ultrapure Isolated Glycosylated Hemoglobin

Arash Nasajpour

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

Faculty Sponsor: **Dr. Terence McCaffrey**

Abstract

One of the most important techniques of research is purification. The objective of the experiment was to collaborate with Veterinarian Scott Hay DVM and Roche Diagnostics to explore the use of purified horse hemoglobin as a model to research glycosylated hemoglobin (HbA1c) in human disease diabetes mellitus types I and II. The international Federation of Clinical Chemistry and Laboratory Medicine have set global standard values for calibrators of HbA1c and the current targets for HbA1c are ~7%. Throughout the experiment horse hemoglobin was isolated by anionic exchange chromatography and glycosylated *in-vitro*. HbA1c is primarily used for quantification of average plasma glucose concentration. The formation of HbA1c is a non-enzymatic glycosylation called Amadori rearrangement where-in glucose in the horse's plasma binds to the N-terminal valine residue of the β -chain of hemoglobin in horse red blood cells which forms the irreversible product HbA1c. The HbA1c circulates for the lifespan of the blood cell. Therefore HbA1c is used medically to quantify the day to day blood glucose concentration over the preceding 2-3 months. The rationale for collaborating, monitoring and studying HbA1c is a measure to discover long-term associated risks with researched diabetic complications. The results were analyzed by immunochemical and electrochemical means.

The Proposal: Show Her Who's Boss

Alison Parente

Division of Humanities
Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Suzanne Ferriss**

Abstract

This essay identifies the romantic and screwball comedy elements within the film *The Proposal*, while simultaneously relating the motion picture to women's issues. This piece argues that though *The Proposal* is eclectic in style, it is ultimately a film that proposes nothing new to audiences, and in fact is regressive in nature with respect to its reinforcement of clichéd gender roles and stereotypes.

The Relationship Between Working Memory and Response Inhibition

Lauren Adames, Joe Cirno, and Jacqueline Lefebre

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Farquhar College of Arts and Sciences

Faculty Sponsor: **Dr. Leanne Boucher**

Abstract

The purpose of this study is to determine whether two facets of executive functioning, working memory and response inhibition, are interrelated or independent. Working memory refers to the ability to acquire, manipulate, and retain information. Response inhibition refers to the ability to stop an ongoing action. In this experiment, we measured the working memory capacity of all participants using a traditional span-task. We then manipulated working memory load by having participants either count up (low load condition) or down (high load condition) while performing a stop signal task. In this task, participants were told to respond to a stimulus unless a tone was presented in which case they were instructed to inhibit their response. We hypothesized that under high working memory load conditions that it would be more difficult to inhibit a response. We further hypothesized that individuals with a high working memory capacity would perform better than individuals with a low working memory capacity. We found that in the low working memory load condition, high working memory capacity participants inhibited their responses sooner than those with low capacity. In the high working memory load condition, we found no advantage for high working memory capacity participants. We conclude that working memory and response inhibition are interrelated.

The Study of *Lagenidium Giganteum* crinkler Genes

Ana Paula Delgado

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

Faculty Sponsor: **Dr. Aurelien Tartar**

Abstract

Lagenidium giganteum is an entomopathogenic oomycete known for its ability to infect and kill the larvae of mosquitoes. This project seeks to find a potential alternative to chemical insecticides by isolating and sequencing the pathogenic genes found in this organism. More specifically, *crinkler* genes were targeted, as they have been associated with host cell toxicity in plant pathogens. A combination of several wet-lab techniques such as polymerase chain reaction, gel electrophoresis, gel extraction, and RNA extraction; and the use of bioinformatics tools are used in this project. These techniques will be used for the analysis and screening of the transcriptome for this pathogenic oomycete. The results of this research will not only illustrate the research being done on the *crinkler* gene, but a secondary pathogenic gene that is also fundamental in this project.

To Remove the Hook or Not: Degradation Rates of Fishing Hooks: Preliminary Results

John W. Coker and Jesse J. Secord
Division of Math, Science, and Technology
Farquhar College of Arts and Sciences

Faculty Sponsors: **Dr. Robin Sherman and Dr. David Kerstetter**

Abstract

Post-release survival is the foundation of sustainability upon which most management plans for Gulf and Atlantic finfish exist. An inherent assumption is that a substantial percentage of fish survive capture. We critically evaluate the merits of leaving hooks in released fish. The work examines the degradation of commonly used hooks in recreational and commercial fisheries. Ten separate hook types, 4 commercial and 6 recreational, were used to represent a variety of fishing applications. Acid solution testing was run for a period of 3 months. Saltwater testing was done for a period of 6 months. These data suggest that seawater may have a greater effect on hooks than physiological acids. During approximately the same time period (95 days in seawater vs. 81 in acid), hooks in seawater degraded by up to 58% with an average of 16.51%, while hooks in acid degraded up to 50.7% with an average of 5.63%. This study raises more questions than it answers. Are the materials used in fishhooks the best choice for catch and release fishing? Are survival estimates best made based on the assumption that hooks corrode? Given the time frames in this study, will corroding hooks cause blood poisoning or other negative health effects before they are shed? We will continue to examine the data already collected. The results of this study suggest the need for additional work looking at possible negative health effects of embedded hooks and the need for more concrete data regarding the survival of fish with embedded hooks.

Total Synthesis of Functionalized Acenes

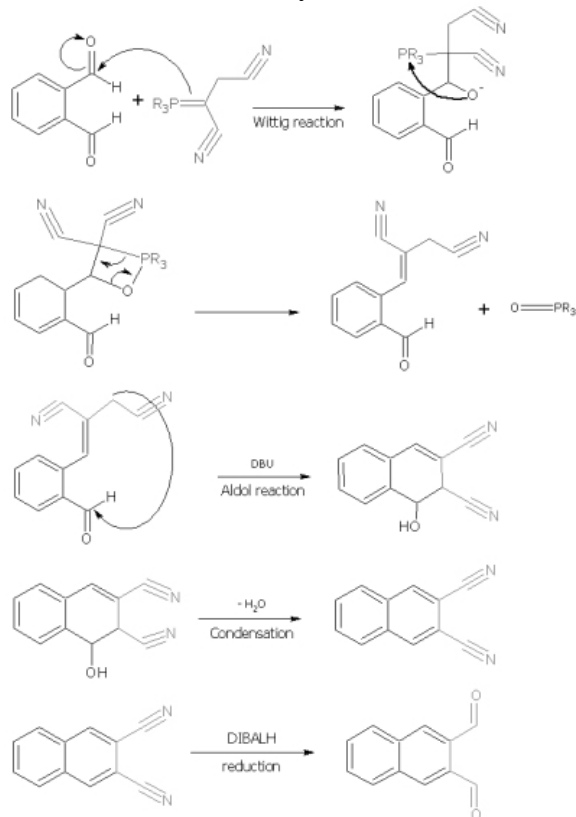
Reena Parikh

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

Faculty Sponsor: **Dr. Beatrix Aukszi**

Abstract

Research project focused on the preparation of acene dinitriles from benzene 1,2-dicarbaldehyde. A Wittig reagent of fumaronitrile and triethylphosphine yielded a new C-C double. The increased the acidity of the α -H, between the new alkene bond and a cyano group, allowed an Aldol reaction to take place and resulted in a ring closure. Condensation reaction established aromaticity in the new ring, carrying dicyano functionality. To allow additional ring formations via reaction sequence repetitions, nitrile groups were reduced with DIBALH to dialdehydes.



Unpublished

Victoria Rajkumar
Division of Humanities
Farquhar College of Arts and Sciences

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

Abstract

“Unpublished” is a short film about a young woman struggling to get her novel published in the midst of abusive relationships and rejection. She believes that her published book is the key to her salvation, but comes to face the harsh reality that happy endings are not meant for everyone. The film is directed by Victoria L. Rajkumar. Other crew members and actors include: Davis Yahn, Esther Swilley, Alyssa Sterkle, Vittoria Santini, Dean Williams, Darshani Singh, and Carlos Alanya.

Upside Down

Le'a Kunipo

Division of Humanities
Farquhar College of Arts and Sciences

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

Abstract

“Upside Down” is a short film about a young woman who struggles with being a perfectionist, who must learn to live her life and have fun. As she begins a new chapter of her life as a freshman in college, she meets a young man who teaches her that all work and no play is not a healthy lifestyle. The film is directed by Le'a Kunipo. Other crew members and actors include Haydeli Ko, Jean Ganter, Anakarina Alcala, and Vincent Grana.

What is Owed

Davis Yahn

Division of Humanities
Farquhar College of Arts and Sciences

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

Abstract

“What is Owed” is a short film about a man who faces intense physical and mental hardships after being forced back into the life of crime that he had previously abandoned. The film is directed by Davis Yahn. Other crew members and actors include Esther Swilley, Victoria Rajkumar, Kevin Phillips, Taylor Acre, Brandon Ralph, and Vitoria Santini.

Zendikar: The Cancerous Mathamagics

Abbiana Arenas, Megan Brewster, Sharbel Bousemaan, Evan Cavallini, and Mark Glover

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

Faculty Sponsor: **Dr. Evan Haskell**

Abstract

Mathematics grants us a wide variety of problem solving from simple arithmetic to the theoretical weight of the sun. The mathematics of differential equations is used to describe a relationship of continuous variables as time and space go on. Described as systems of functions, these equations are used to predict what will happen to the variables included within the functions. Real world applications of these functions attempt to correlate dynamic variables, and predict the outcome of those variables as different factors are slowly introduced to the model. In this project, we will state unique models that are manipulated over time by diverse factors. We will predict the fate of humanity in the realm of Innistrad, a plane within the multi-verse of Magic the Gathering. In a world unlike our own, humans have become the bottom of the food chain as the monsters of Innistrad seek to thrive off a strict diet of man. We will describe the predator-prey relationship between monsters and humans while introducing factors individually that may save or destroy the human race. Additionally, we will dissect the population growth of tumor cells as they thrive within a body. We will describe a model of the tumor cells as the body triggers an immune response to them. As time goes on and factors are slowly introduced, we seek to find a specified immune response to the tumor, and how that response effects the tumor cell population.

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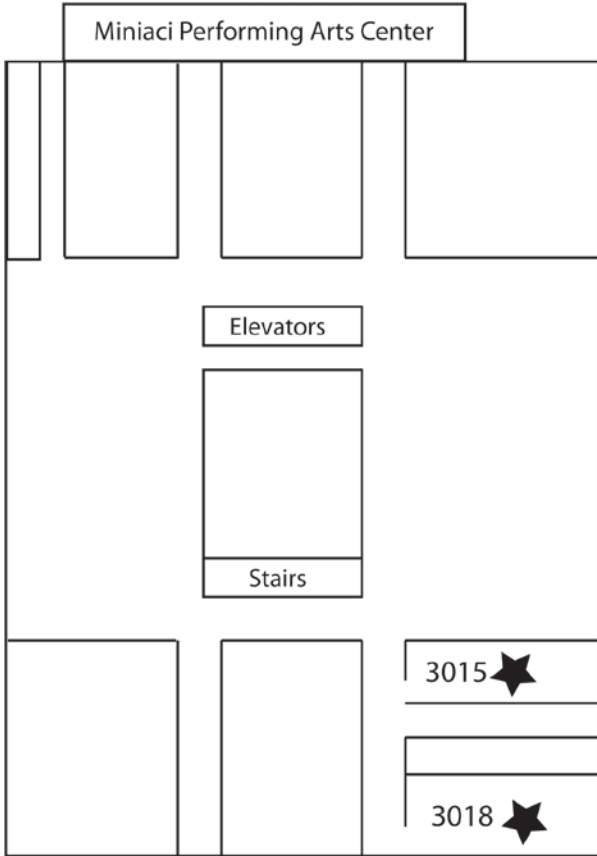
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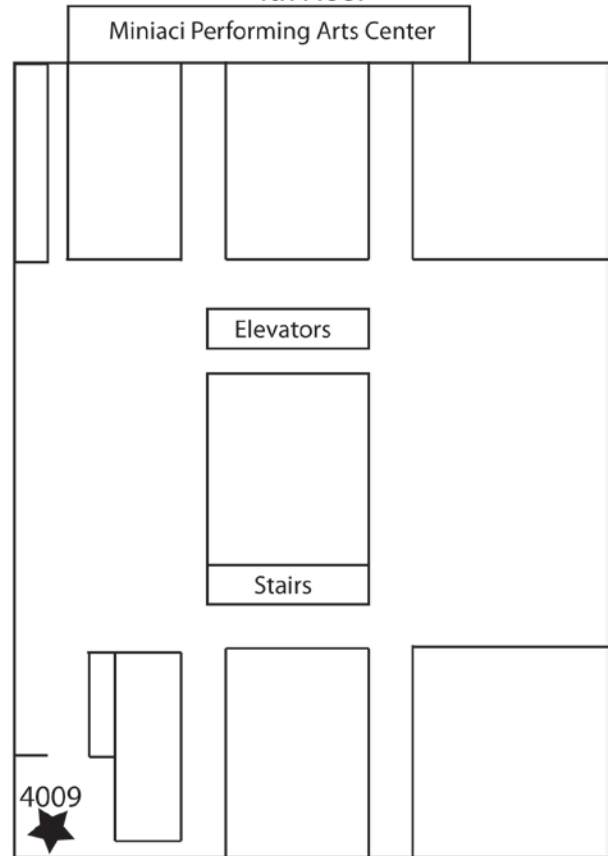
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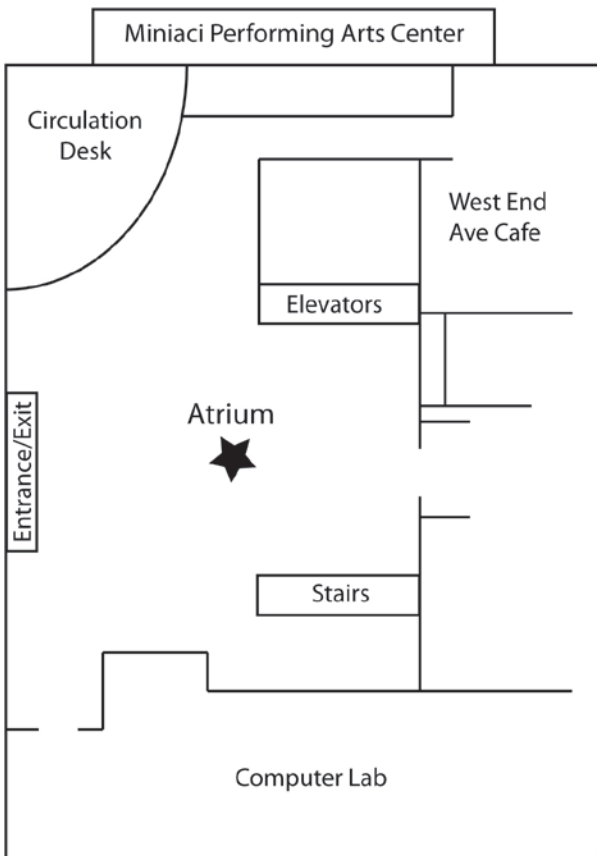
3rd Floor



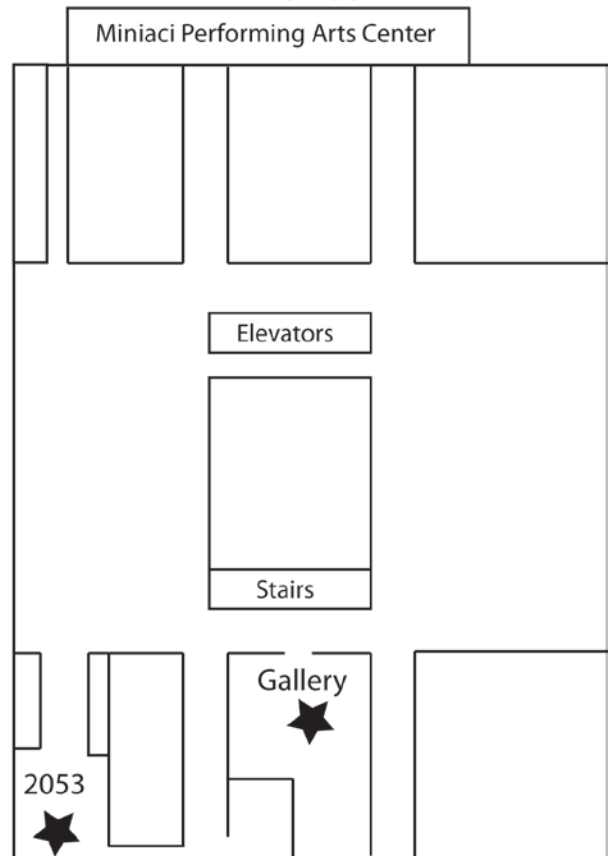
4th Floor



1st Floor



2nd Floor



UNDERGRADUATE STUDENT SYMPOSIUM

2012 Program Schedule

TIME	EVENT AND LOCATION		
1:00 p.m. to 1:45 p.m.	Welcome and Introduction – Don Rosenblum, Ph.D. Keynote Speaker – Emily Schmitt, Ph.D., “Reflections on Research” <div style="text-align: right;">Performance Theatre Don Taft University Center</div>		
1:45 p.m. to 3:00 p.m.*	Poster Presentations	First Floor Atrium	Alvin Sherman Library
1:45 p.m. to 4:00 p.m.*	Film Presentations	Second Floor Gallery	Alvin Sherman Library
3:00 p.m. to 4:00 p.m.*	Oral Presentations	Room 2053	Alvin Sherman Library
	Oral Presentations	Room 3015	Alvin Sherman Library
	Oral Presentations	Room 3018	Alvin Sherman Library
	Oral Presentations	Room 4009	Alvin Sherman Library
4:30 p.m. to 5:30 p.m.	Awards Ceremony	Performance Theatre	Don Taft University Center

*See separate detailed schedule for poster easel numbers, specific film showing times, and oral presentation room assignments.