


THE COLLEGE OF ARTS AND SCIENCES

RESEARCH DAY



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2013 Committee Members

Aleister Saunders – *Associate Dean* (ajs56@drexel.edu)

Amy Weaver – *Dean's Office* (amw55@drexel.edu)

Marion DiBattista – *Dean's Office* (md486@drexel.edu)

Diane Ketler, *Dean's Office* (dk882@drexel.edu)

Lloyd Ackert – *History & Politics – chair* (lta24@drexel.edu)

Jake Russell – *Biology – co-chair* (jar337@drexel.edu)

Deidre McMahan – *English* (dhm33@drexel.edu)

Jun Xi – *Chemistry* (jx35@drexel.edu)

Maria Hnaraki – *Culture & Communication* (mh439@drexel.edu)

Li Sheng – *Mathematics* (lsheng@drexel.edu)

Naomi Goldstein – *Psychology* (neg23@drexel.edu)

Charles Lane – *Physics* (lane@duphy4.drexel.edu)

Marina Potapova – *BEES* (mp895@drexel.edu)

2013 Judges

Biodiversity, Earth & Environmental Science

Walt Bien, Gary Rosenberg, Marina Potapova, Ted Daeschler,
Mike O'Connor, Ken Lacovara

Biology

Mesha Hunte-Brown, Eric Morschhauser, Bob Loudon, Dan Marenda,
Elias Spiliotis, Gail Hearn, Tali Gidalevitz, Aleister Saunders,
Karen Kabnick, Felice Elefant, Shivanthi Anandan, Joe Bentz,
Jennifer Stanford, Michael Akins, Monica Togna

Chemistry

Alex Turfa, Kevin Owens, Dan King, Susan Rutkowsky,
Frank Ji, Joe Foley

Culture & Communication

Alexander Friedlander, Maria de la Luz Matus-Mendoza,
Katherine Houseman, Rachel Reynolds, Thomas Johnson,
Joanna Lyskowicz, Carmen Vicente, Rakhmiel Peltz

English & Philosophy

Sheila Sandapen, Donna McVey, Abioseh Porter, Flavia Padovani,
Gabriella Ibieta, Peter Amato, Rebecca Ingalls, Scott Warnock,
Eva Thury, Marshall Warfield, Bessie Gouliaberis, Maria Volynsky,
Nathan Hanna, Ann Liberona, Karen Nulton

History & Politics

Amelia Hoover Green, Amy Slaton, Lloyd Ackert, Donald Stevens,
Jonathan Seitz, Jonson Miller

Mathematics

Li Sheng, Hwan Yong Lee, Jeanne Steuber,
Dennis Guang Yang, Justin Smith

Physics

Frank Ferrone, Luis Cruz, Brigita Urbanc, Bose Shyamalendu,
Jian-Min Yuan, Len Finegold, Charles Lane, David Goldberg,
Michelle Dolinski, Robert Gilmore

Psychology

Naomi Goldstein, Charles Williams, Kirk Heilbrun, Tamara Medina,
Despina Guthrie, Maria Schultheis, Mary Spiers,
Dorothy Charbonnier, Julia Sluzenski, Brian Daly,
Karol Osipowicz, Marlin Killen

ORAL PRESENTATIONS

Presenter(s): Pareshkumar Brahmbhatt
Major: Physics
Faculty Advisor: Dr. Luis Cruz Cruz

Email: pcb27@drexel.edu
Academic Field: Physics
Email: lrc42@drexel.edu

Compliance Control of MM-UAV in Experimental Test Platform

Author(s): Pareshkumar Brahmbhatt

Compliance control is an important strategy to minimizing damage to both equipment and environment. This work will use an impedance control method to achieve compliance control while solving the peg-in-hole problem. Peg-in-hole is the traditional task handled by most manipulators, however, the manipulators are usually mounted to ground-based mobile platforms, or a static base. This allows for impedance control to be accomplished with full environmental knowledge of target position and manipulator position. This work will build on this knowledge and provide data for mobile manipulation on an aerial platform. The complexity of the peg-in-hole problem increases as there no solid base for the manipulator to use for force feedback to mitigate static errors in positions that the manipulator takes on. The aerial mobile platform generates dynamic inertial properties of the system and shifting centers of mass. For achievable experimental results, a test platform will be developed using model reference adaptive control to emulate aerial platform dynamics as well as the errors which need to be mitigated. Dynamic models from previous works will be used to mimic flight dynamics of a UAV while in the hover position. A 3 degrees-of-freedom manipulator gantry will emulate X, Y, Z, and yaw, pitch, roll will be emulated by a gimbal attachment to the gantry system. A 7 degree-of-freedom manipulator will be used to attempt peg-in-hole with full environmental knowledge of positions. This emulated flight strategy will deliver safe and repeatable results that prevent loss of equipment, and compliance control to mitigate damages to environment and manipulator.

Presenter(s): Elliott Chiu
Major: Biology/Environmental Science
Faculty Advisor: Dr. Gail Hearn

Email: esc42@drexel.edu
Academic Field: Biological Sciences,
Environmental Science
Email: gwh26@drexel.edu

Chameleon Prey Selection: Implications for Survival and Conservation in Disturbed Habitats

Author(s): Elliott Chiu

Bioko Island, Equatorial Guinea harbors four chameleon species, including the endemic Chamaeleo (Triceros) feae. An analysis of prey selection by C. feae and Rampholeon spectrum allows us to evaluate different feeding strategies, while also suggesting possible conservation implications in developed landscapes where prey availability may be altered

dramatically. We hypothesized that species employing a “cruise” strategy would feed upon higher energy prey, while those that utilize a “sit-and-wait” strategy would be less selective. Night surveys were conducted in two sites to collect 100 specimens of both species (N=200), which were used to collect a total of 104 food pellets through gastric lavage. Within these sites, insect collection was performed using vegetation “sweeps” and “beats” along two transects to determine prey availability. Feeding strategies were determined for each species using 12-hour non-invasive observations. Initial results of fecal pellet analysis suggest both species select larger bodied insects within the available spectrum of prey. Observations of feeding strategies show that *C. feae* forages more often than *R. spectrum*. Ongoing analysis of insects using bomb calorimetry will reveal the energetic density across the prey spectrum. The forthcoming results should elucidate currently unknown details of each species’ feeding ecology. Comparisons of insect collection will also reveal the potential for an altered prey spectrum in modified habitats. Using these data, we may predict potential population fluctuations of each species in areas on Bioko that are currently undergoing development, and take appropriate measures to protect critical habitat if those predictions show significant population declines in either species.

Presenter(s): Jessica Coulon
Major: International Area Studies
Faculty Advisor: Dr. Gabriella Ibieta

Email: jgc36@drexel.edu
Academic Field: English
Email: ibietag@drexel.edu

New York City as Palimpsest: The Role of Palimpsest in the Narratives of Exiles

Author(s): Jessica Coulon

My research project seeks to explore the significance of palimpsest in Teju Cole’s recent novel, *Open City* (Random House, 2012). While the concept of palimpsest is complex, it may be briefly defined as a multi-layered record, and refers to texts in which part of the original has been removed in some way, only to be rewritten by later writers. Physical spaces can also be seen as palimpsests, places where new structures have been built upon old ones or have been totally replaced. This idea of palimpsest is, in fact, introduced into the story by Cole’s main character, Julius, who, upon viewing the ruins of the World Trade Center (the story takes place in 2001) states that “the site was a palimpsest, as was all the city, written, erased, rewritten” (Cole, 59). In my project, I focus on Julius’s perspective to analyze the multiple roles of palimpsest in various manifestations and contexts: spatial, cultural, historical, and personal. These will be examined by discussing Julius’s story in relation to those of the several exiles, immigrants, and transnationals that he meets during his walks through New York City. My project will delve deeper into the concept of palimpsest as the defining motif of *Open City* as it relates to issues of cultural identity.

Presenter(s): Mitchell D'Rozario
Major: Biology
Faculty Advisor: Dr. Daniel Marenda

Email: mrd65@drexel.edu
Academic Field: Biological Sciences
Email: dm562@drexel.edu

Transgenic Model for Hereditary Spastic Paraplegia

Author(s): Mitchell D'Rozario

Hereditary Spastic Paraplegia (HSP) are a group of genetic disorders that lead to a length-dependant degeneration of cortico-spinal tract fibers, resulting in lower limb spasticity, weakness, and gradual decreased ability to walk. Mutations of SPG4, a spastin-encoding gene, is the most common cause for HSP cases. Therefore, deciphering the mechanisms through which mutations can cause the disease is of great interest. In-vitro experiments show that mutated spastins are cytotoxic. *Drosophila* is a well-developed model to study human neurodegenerative disorders. We created transgenic flies expressing mutated human spastin proteins and expressed them in a tissue-specific manner. We observed that expression of these mutant spastin show punctate vesicular localization and behavioral defects. This suggests a toxic gain-of-function of the mutant protein that may cause the axons to degenerate. Future studies will focus on therapeutic drugs that aid in clearing misfolded proteins. This work increases our understanding of the etiology of HSP.

Presenter(s): Douglas Hammond
Major: Economics
Faculty Advisor: Dr. Eva Thury

Email: drh52@drexel.edu
Academic Field: Political Science
Email: thury@drexel.edu

Shift to the Left: Iceland's Economic Recovery Rooted in Traditional Nordic Values

Author(s): Douglas Hammond

Nobel prize winning economists, Joseph Stiglitz and Paul Krugman, among others praised Iceland for how it handled its economic crisis. These economists have noted that the Iceland case can and should be used as a model for the many still struggling EU countries. However, why did Iceland manage to achieve this while so many other countries are still struggling? To answer this question, this project studied why Iceland was the outlier in implementing what (Ólafsson 2012) concluded to be successful economic policies. An interesting observation made just in passing by (Wade & Sigurgeirsdottir 2012) was that after the financial crisis Iceland was the only country to have shifted distinctly to the left by

transitioning from the IP–SDA coalition to the interim SDA–LGM government. This idea was explored to determine if this is what truly set its recovery apart from other governments' responses to the financial crisis. The project involves a two part approach. First a quantitative approach is used to compare the effects of the policies implemented in Iceland, the US, and the EU. The second approach analyzes the change in the political culture of Iceland, the US, and the EU during their respective economic crises, and any changes to the standing regime. By connecting these two analyses, this project shows that Iceland's reversion to its traditional left-leaning ideology has been the fundamental cause of its impressive recovery. In addition, Iceland's promotion of this traditional Nordic social ideology inherently facilitates policy that is economically beneficial to depressed economies.

Presenter(s): Emily Haney-Caron
Major: Psychology
Faculty Advisor: Dr. Naomi Goldstein

Email: ehh29@drexel.edu
Academic Field: Psychology
Email: neg23@drexel.edu

Implications of Zero Tolerance Policies for Juvenile Justice

Author(s): Emily Haney-Caron

Despite a focus in research and public policy on zero tolerance policies in schools, there is a dearth of research regarding the existence or impact of zero tolerance policies in juvenile justice settings. Much has been said about the “school-to-prison pipeline,” and research has established that zero tolerance policies in schools create a direct pipeline into the juvenile justice system for large numbers of youth. This pipeline, in turn, leads to negative outcomes for juvenile justice-involved youth. However, zero tolerance policies create a pipeline into the juvenile justice system even greater than that generally recognized. This presentation will discuss that pipeline, as well as the zero tolerance-like policies within juvenile justice settings. Zero tolerance analogs in juvenile justice settings are triggered by fighting, substance use, verbal or physical aggression, or possession of anything that could be used as a weapon. Such behaviors result in automatic consequences for youth, including isolation or additional charges. This presentation will discuss the negative outcomes associated with such policies, including impacts on security within juvenile justice facilities and impacts on youth. Finally, this presentation will provide recommendations for alternative approaches to such policies. Such approaches include graduated sanctions, teen courts, and proactive strategies such as anger management or anti-violence programs. Graduated sanctions and teen courts are better able to assist youth who are victimized by taking into account the circumstances surrounding an infraction. Proactive strategies may decrease the perceived need for zero tolerance policies by decreasing the number of infractions committed in juvenile justice settings.

Presenter(s): Ashley Johnson
Major: Biology
Faculty Advisor: Dr. Felice Elefant

Email: aaz32@drexel.edu
Academic Field: Biological Sciences
Email: fe22@drexel.edu

Increasing Tip60 HAT Levels Rescues Axonal Transport Defects and Associated Behavior Phenotypes in a Drosophila Alzheimer's Disease Model

Author(s): Ashley Johnson

Axonal transport defects and axonopathy are prominent in early pre-clinical stages of Alzheimer's disease (AD), often preceding known disease-related pathology by over a year. As epigenetic transcriptional regulatory mechanisms such as histone acetylation are critical for neurogenesis, it is postulated that their misregulation might be linked to early pathophysiological mechanisms that contribute to AD. The histone acetyltransferase (HAT) Tip60 epigenetically regulates genes enriched for neuronal functions and is implicated in AD via its formation of a transcriptional regulatory complex with the amyloid precursor protein (APP) intracellular domain (AICD). Disruption of APP function is associated with axonal transport defects, raising the possibility that an epigenetic role for Tip60 might also be involved. Here, we examine whether Tip60 HAT activity functions in axonal transport using *Drosophila* CNS motor neurons as a well characterized transport model. We show that reduction of Tip60 HAT activity in the nervous system causes axonopathy and transport defects associated with epigenetic misregulation of certain axonal transport linked Tip60 target genes. Functional consequences of these defects are evidenced by reduced locomotion activity of the mutant Tip60 larvae and these phenotypes can be partially rescued with certain HDAC inhibitors. Finally, we demonstrate that Tip60 function in axonal transport is mediated by APP and that remarkably, excess Tip60 exerts a neuroprotective role in APP induced axonal transport and functional locomotion defects. Our observations highlight a novel functional interactive role between Tip60 HAT activity and APP in axonal transport and provide insight into the importance of specific HAT modulators for cognitive disorder treatment.

Presenter(s): Vishal Kasliwal
Major: Physics
Faculty Advisor: Dr. Michael S. Vogeley

Email: vishal.kasliwal@gmail.com
Academic Field: Physics
Email: msv23@drexel.edu

Understanding AGN Physics using Variability

Author(s): Vishal Kasliwal

Active Galactic Nuclei (AGN) are the luminous accreting supermassive black holes found at the center of AGN host galaxies. AGN are known to exhibit rapid stochastic flux variations across the electromagnetic spectrum on timescales ranging from hours to years. The stochastic nature of the flux variations is a powerful indicator of the physical accretion mode at play in the AGN. For example, if accretion occurs via the formation of an accretion disk, dynamo effects may produce local variations in the plasma-viscosity of the disk that results in the formation of temporary 'hot-spots' that radiate more strongly than the rest of the disk. We test stochastic models of the flux variations seen in AGN using data from the NASA Kepler planet-finding mission and the Sloan Digital Sky Survey (SDSS). Our stochastic models will be compared to theoretical models for the physical accretion mechanism to answer outstanding questions such as: Does the accretion mode vary with intrinsic AGN luminosity?

Presenter(s): Mitra Khaksari
Major: Psychology
Faculty Advisor: Dr. Pamela A. Geller

Email: mek352@drexel.edu
Academic Field: Psychology
Email: pg27@drexel.edu

Psychosocial Correlates of Infertility Treatment Among Minority and Non-minority Women

Author(s): Mitra Khaksari

Infertility is the inability to become or stay pregnant following a year of unprotected intercourse, and the annual prevalence is 7.4% in the United States (Chandra, Martinez, Mosher, Abma, & Jones, 2005). Approximately 42% of women with reported infertility have received some type of infertility service (Stephen & Chandra, 2000). African American, Hispanic, and other non-Caucasian women report higher rates of infertility, according to the National Center for Health Statistics (NCHS, 1995). However, the typical recipients of infertility services are non-Hispanic Caucasian women, without children, who are married, over the age of 30, with high income and education levels (Chandra, et al., 2005). This profile reveals racial, ethnic, educational, and income discrepancies (Stephen & Chandra, 2006). Although differences exist, there is little research addressing this issue. Increased levels of depression prior to treatment have been correlated with treatment dropout (Eisenberg et al 2010), which could potentially explain underutilization.

Hypothesized social, cultural or religious barriers could account for this discrepancy as well. The current study aims to illuminate perceived barriers to care and to examine the association between depression and these barriers. Researchers aim to recruit minority and non-minority women between the ages of 18-45 who meet criteria for infertility. Participants are being recruited online via social media websites (i.e., Facebook). Results from the study could guide future psychoeducation and policy to improve infertility treatment utilization by minority women. The protocol has been approved by the Drexel IRB and data collection is in progress. Preliminary results will be presented.

Presenter(s): Matthew McBride

Major: Chemistry

Faculty Advisor: Dr. Jean-Claude Bradley

Email: mjm497@drexel.edu

Academic Field: Chemistry

Email: jeanclaud.bradley@gmail.com

Using the Abraham Model to Predict Organic Solubility to Determine a Recrystallization Solvent

Author(s): Matthew McBride

This research investigates the ability of the Abraham Model to accurately predict the solubility of organic compounds in organic solvents at room temperature in order to assist in the choosing of recrystallization solvents and in the designing of synthesis reactions. Two sets of solubility predictions were generated using predicted solute Abraham Descriptors and experimentally measured solute Abraham Descriptors. These predictions were compared to experimentally obtained solubility measurements. This project has focused on organic compounds commonly recrystallized in organic teaching laboratories, such as trans-dibenzalacetone. A method for quantitatively measuring solubility in a temperature controlled water bath by Nuclear Magnetic Resonance (NMR) Spectroscopy was used. Using the predicted and experimental solubility values and in collaboration with Dr. Andrew Lang from Oral Roberts University, a smartphone application has been created that predicts the optimal solvents with which to recrystallize a compound. Trans-dibenzalacetone has often been recrystallized in ethyl acetate, but both the app and experimental measurement determined that ethanol is the preferred solvent. Additionally, the procedures for synthesizing the yellow crystal trans-dibenzalacetone by aldol condensation have been evaluated and lead to an investigation into the applications of dibenzalacetone and its derivatives. This research was conducted using Open Notebook Science, which releases all experiments online to promote the sharing of information and the efficiency of chemical research.

Presenter(s): Patrick McLaughlin
Major: Environmental Science
Faculty Advisor: Dr. Gail W. Hearn

Email: pjm79@drexel.edu
Academic Field: Environmental Science
Email: gwh26@drexel.edu

A Multi-Species Analysis of Chytridiomycosis Infection and Resistance in West-Central Africa

Author(s): Patrick McLaughlin

Chytridiomycosis is a disease in amphibians caused by the chytrid fungus (*Batrachochytrium dendrobatidis*), and is implicated in recent global amphibian declines. It is believed to pose a serious threat to over 30% of all amphibian species. There is an urgent need to identify ways to stop the spread of this fungal pathogen. The source of this pathogen is unknown, but strong evidence suggests a vector via the African clawed frog (*Xenopus laevis*), a popular model species for a variety of biological studies. Chytrid research in West-Central Africa may be pivotal to future conservation initiatives. Over 20 amphibian species across 13 genera were sampled in this region (Bioko Island, Equatorial Guinea) to examine chytridiomycosis infection. Skin swabs from each individual were tested for chytrid presence and infection load, while additional swabs were used to sample skin bacteria and bacterial metabolites. Sampling occurred across a wide elevational gradient during both the wet and dry seasons. Results from qPCR analysis reveal high prevalence (15+ species) across a wide elevational range. All positive individuals exhibited low, non-lethal infection loads, suggesting possible widespread resistance. Ongoing identification of skin bacteria and anti-fungal metabolites may reveal a possible mechanism for this resistance. The results will contribute to knowledge of chytrid origins and offer insight to recent efforts to develop a chytrid probiotic for threatened amphibian populations.

Presenter(s): Amanda NeMoyer
Major: Psychology
Faculty Advisor: Dr. Naomi Goldstein

Email: ann38@drexel.edu
Academic Field: Psychology
Email: neg23@drexel.edu

Juvenile Probation: What do Courts Require and Which Requirements do Youth Violate?

Author(s): Amanda NeMoyer

Probation is the most common disposition for adjudicated juveniles, but little is known about specific requirements imposed on juveniles, which requirements are most commonly violated, and how requirements might relate to probation outcomes. This study investigated the relationship between probation requirements and probation violation in juveniles. Results from 120 youths' archived public defender files identified 29 probation requirements imposed by judges and 18 common reasons youth violated probation.

Logistic regression results revealed a significant relationship between receipt of two specific probation requirements (Drug Tests and Drug and Alcohol Counseling) and probation outcome. Implications, limitations, and future research will be discussed.

Presenter(s): Alison Novak
Major: Communication, Culture, and Media
Faculty Advisor: Dr. Ernest A. Hakanen

Email: ann37@drexel.edu
Academic Field: Communication
Email: eah22@drexel.edu

The Female Email: The Leadership and Discourses of Female Representations of the 2012 Obama Campaign

Author(s): Alison Novak

Since President Barack Obama's April 4, 2011 announcement of his intention to run for re-election in 2012, the campaign sent out 1600 emails to voters and constituents. Despite each email being sent from the same non-reply email address (info@BarackObama.com), the ascribed authors of each email varied according to the topic and content of the message. Among the authors, there exists a set of women who send emails on behalf of the campaign, including First Lady Michelle Obama, Dr. Jill Biden, and Caroline Kennedy. This presentation investigates the topics addressed by these women as well as their discourses that assert leadership in online campaigning. Previous research by Winograd and Hais (2011) has identified campaign emails as a resource that can be used to investigate the strategies of a campaign. The segmentation of topics and discourses between the genders is fully showcased in this channel, and reveals the contemporary set of gendered political norms, roles, and language used to enact leadership. This presentation fully explores the topics and discourses of these female leaders of the Obama 2012 campaign. Through a mixed methods study of the 1600+ emails, a content analysis of topics and a discourse analysis of messages will allow for an extensive analysis of the Obama campaign strategies and use of women. The findings of this reflection will contribute to the conversation on the current role of women in online presidential campaigning.

Presenter(s): Steve O'Connor
Major: Science, Technology, and Society
Faculty Advisor: Dr. Christian Hunold

Email: sjo34@drexel.edu
Academic Field: History, Political Science
Email: hunoldc@drexel.edu

Access to Healthy Food in Philadelphia Neighborhoods: How Corner Stores Impact Food Choices

Author(s): Steve O'Connor

Over the last fifteen years, access to fresh and nutritious food has been recognized as a growing problem within the United States, specifically in low-income, urban neighborhoods. These areas are often described as “food deserts” in which healthy food options are not available within 0.6-mile walk. Typically, “food deserts” lack full service supermarkets. Residents instead have to make do with corner stores that specialize in processed foods while offering few, if any, fresh fruit and vegetables. The purpose of this study was to determine where and how residents of West Philadelphia obtain their food, specifically to better understand the role of corner stores in their food purchases. Using a mixed-methods approach of 100 quantitative surveys and 9 qualitative interviews this study found that residents of Mantua, West Powelton, and Belmont obtain most of their food from supermarkets located outside the neighborhood and do not rely on corner stores for the majority of their purchases. This paper finds that the Healthy Corner Store Initiative (HCSI) alone may do little to improve residents' diet since this program does not respond to how residents actually obtain their food. Coupling the HCSI with alternative food systems, such as urban gardens, can build social capital and stakeholder participation that has greater potential to increase the likelihood that residents will consume healthier foods.

Presenter(s): Khushbu Patel
Major: Psychology
Faculty Advisor: Dr. Rachel Wenrick

Email: kap337@drexel.edu
Academic Field: English
Email: rw346@drexel.edu

Collaborative Autobiographical Writing: An Exploration of the Process

Author(s): Khushbu Patel

Extant literature on the subject of collaborative autobiographical writing is relatively limited in scope. This is a unique writing process in which an individual's autobiographical account is relayed through a joint effort with another writer, and it occurs quite frequently in the context of artist/celebrity autobiographies. This project sought to elucidate the intricacies of the process through a combination of research and practice. Over a ten-week span, observations were taken of a writer who was professionally hired to co-author a musical artist's autobiography. These observations, supplemented by literature searches of

collaborative writing as well as lyric essay composition, provided a foundation from which the researcher attempted to collaborate on the narrative of her grandfather's life. This immersion technique allowed the researcher a firsthand discovery of the distinctive challenges of this process, namely in accurately capturing the voice of another living being, the importance of place in autobiographical narrative, and the usefulness of the lyric form to achieve both. These developments will be useful in contributing to the narrow extent of literature in this field. The project will outline the collaborative writing process, discuss the observations of and involvement in the professional book project, and trace the application of this research in the narrative draft, which stands as a work in progress.

Presenter(s): Brogan Piecara
Major: International Area Studies
Faculty Advisor: Dr. Eva Thury

Email: bpiecara@gmail.com
Academic Field: Communication
Email: thury@drexel.edu

Scientists' Rhetorical Dilemma: Tell the Truth or Shame the Devil

Author(s): Brogan Piecara

Science and religion have traditionally maintained separate and discrete spheres of influence. Only in the context of certain topics do they publicly address each other (e.g., evolution and abortion). At such times, scientists must confront audiences who are indifferent or, worse, hostile, to the scientific enterprise. People of faith constitute one especially vociferous example of these audiences. In such encounters scientists can maintain an adversarial position and antagonize their religious audiences, or they can accommodate the religious views of these audiences and alienate their scientific colleagues. This dilemma is the focus of this research project. Through Toulmin analysis of a body of scientific discourse that has become especially provocative among faith communities—clinical trials of the efficacy of intercessory prayer--this paper examines the discourse of scientists to see how they have attempted to negotiate this dilemma and to discover whether certain strategies emerge and how effective they are.

Presenter(s): Ariel Pollak
Major: Psychology
Faculty Advisor: Dr. Meghan Marsac

Email: ahp37@drexel.edu
Academic Field: Psychology
Email: marsac@email.chop.edu

Children's Willingness to Speak to Doctors: The Factor of Lexical Complexity

Author(s): Ariel Pollak

In pediatric medicine, parents often act as intermediaries between their children and their children's doctors. Children differ in how they prefer to interact with their doctors. Specifically, some children prefer that their parents speak for them while others want to speak to their doctors directly (Lambert, Glacken, & McCarron, 2008). This preliminary analysis describes the linguistic complexity of parent-child conversation about medical situations and how this complexity relates to whether the child is likely to be more passive or active in communicating with their doctor. We recruited inpatient pediatric patients aged 8-13 and their parents to participate in this study. Child-parent dyads completed interviews in which they were asked about hypothetical medical situations as part of a larger study investigating parent-child interactions after injury. Language samples were interpreted with measures of lexical density, lexical diversity, and syntactic complexity. Preliminary results suggest that low lexical diversity and syntactic complexity in children may be related to a greater likelihood that a child will prefer to take a passive role in medical conversations. This may indicate that verbal ability plays a role in a child's willingness to interact with physicians. Further research is necessary to confirm and elaborate on these results.

Presenter(s): Vivek Satyasi, Mark Killen
Major: Biology
Faculty Advisor: Dr. Daniel Marena

Email: vs397@drexel.edu
Academic Field: Biological Sciences
Email: dm562@drexel.edu

Characterization of EOAD Drosophila Melanogaster Model at the Synaptic Level Using Drosophila NMJ

Author(s): Vivek Satyasi, Mark Killen

Alzheimer's disease currently affects over 5.5 million people in America. Characterized by memory loss and decreased motor function, AD is a degenerative disease that can affect patients young or old. Study of this disease at the cellular level has revealed a great deal of detail about the processes that are responsible for the symptoms of AD. In the past decade, model organisms have been used to gain immense knowledge of the effects and causes of AD, and possibly facilitate the testing of new and novel drugs designed to combat the disease. Recently, the fruit fly, *Drosophila melanogaster*, has proved to be a great model of

AD through the expression of the proteins APP and BACE that are known to be involved in the pathology of human AD. We describe here the synaptic defects at the level of the neuromuscular junction (NMJ) associated with this model. Our results indicate that expression of the AD proteins APP and BACE in neurons of the NMJ lead to defective larval locomotion behavior, decreased pre-synaptic connections, altered mitochondrial localization in presynaptic motor neurons, and decreased postsynaptic protein levels. We suggest that this model will be useful to assess and model the synaptic dysfunction normally associated with AD in human beings.

Presenter(s): Dane Ward
Major: Environmental Science
Faculty Advisor: Dr. Walter F. Bien

Email: dcw33@drexel.edu
Academic Field: Environmental Science
Email: wfb22@drexel.edu

Estimating Population Densities from Radio-telemetry Data for the Northern Pine Snake in New Jersey

Author(s): Dane Ward

Understanding population dynamics is paramount for successful management and long-term conservation of a rare species. The northern pine snake, *Pituophis melanoleucus*, is a state-threatened species that is declining in New Jersey. Unfortunately, quantitative population data is lacking and the northern pine snake as this semi-fossorial cryptic species is difficult to census. The northern pinesnake remains vulnerable as a result of potential status delisting, habitat loss, habitat fragmentation, and isolation. We developed a “population density model” for estimating the number of pine snakes at the Warren Grove Gunnery Range (WGR). The model estimates the number of snakes per-unit-area (density) within preferred northern pine snake habitat (pine-oak forest) from radio-telemetry (spatial ecology) data. We estimate that an average of 229 adult snakes occurred in the local population on WGR, a site of 3880 hectares. The average estimated density is one individual per 16.9ha. These data were extrapolated to estimate the current, historical, and rate of decline of the northern pine snake population in New Jersey. We estimated that the northern pine snake has declined from an average of 16,476 snakes in 1986 to 15,188 snakes in 2007, a decline of 61 adult northern pine snakes per year. We plan to test the density model at both the local (WGR) and landscape (Pinelands) scale for better resolution and precision of population estimates. Understanding population size and trends is imperative for improved conservation management of this threatened species.

Presenter(s): Robert Wexler
Major: Chemistry
Faculty Advisor: Dr. Karl Sohlberg

Email: rlw56@drexel.edu
Academic Field: Chemistry
Email: kws24@drexel.edu

The Role of Water in Surface Charge Transport on Tin Dioxide as Revealed by the Thermal Dependence of Conductance

Author(s): Robert Wexler

The presence of water on an oxide surface can dramatically alter its electrical properties with important consequences for electrical measurements by scanning probe microscopy, and for the use of semiconducting oxides in sensing applications. Here, the thermal dependence of the surface conductance of tin dioxide is interpreted by combining equilibrium carrier statistics with the Grotthuss mechanism for proton hopping. First, the functional form of this charge transport model is fit to experimental conductance data for tin dioxide. Next, the important energy parameters in the model are computed with electronic structure methods. Comparing the values of the energy parameters obtained by fitting to the values for the same parameters obtained from electronic structure calculations yields new insight into the surface charge transport in tin dioxide. In particular, it is found that mobile protons, freed from the dissociative adsorption of water on the [110] surface, are an essential component of the observed thermal dependence of surface conductance in tin dioxide.

POSTER PRESENTATIONS

Presenter(s): Jillian Adair
Major: Environmental Science
Faculty Advisor: Dr. Rick McCourt

Email: jca55@drexel.edu
Academic Field: Biological Sciences
Email: rmm45@drexel.edu

Molecular Phylogenetic Study of the Green Alga Cylandrocystis (Zygnematophyceae)

Author(s): Jillian Adair, Dr. John Hall, Dr. Richard McCourt

Cylandrocystis is a unicellular member of the conjugating green alga, Zygnematophyceae. It has rod-shaped cells and two asteroid chloroplasts. Previous phylogenetic analyses indicated that the genus Cylandrocystis was not monophyletic; moreover one clade of Cylandrocystis was more closely related to Zygnemopsis and Mesotaenium kramstai than to the other clade of Cylandrocystis. Previous structural studies of Cylandrocystis focused on sexuality, spore morphology and vegetative characteristics, but included few representatives. We used these characteristics to test the hypothesis that morphological characteristics are phylogenetically informative with a two-gene phylogeny of Cylandrocystis. We prepared cultures of available strains and placed them under conditions that induced sexual reproduction. Reproductive and vegetative characteristics were examined by light microscopy. We sequenced the chloroplast-encoded genes rbcL and atpB from most strains. We used the resulting phylogeny to determine the relationships among the strains of Cylandrocystis and to infer the evolution of their vegetative and reproductive characteristics. Preliminary results from our investigation will be presented.

Presenter(s): David Ahern
Major: History
Faculty Advisor: Dr. Lloyd Ackert

Email: daa54@drexel.edu
Academic Field: History
Email: lta24@drexel.edu

Roosevelt and the Kingfish

Author(s): David Ahern

The Great Depression brought unprecedented instability to American politics and Huey Long and Franklin Roosevelt rose as two of the era's most important and divisive leaders. Although they were active in a political dialogue for only a few years, their relationship was tremendously dynamic and dangerous for the Roosevelt Administration. The two first came together on friendly terms, but they were each driven by their unique personal interests and planned to use the relationship to pursue their own goals. As time went on, their differences proved to be incompatible and frequent clashes between the two of them steadily drove the figures apart. In public, this shift appeared to be political in nature, but the reality was that their break was intimately personal. The hostility that replaced their friendship can only be understood within the full context of these elements. Here I

examine the distinct roles that each politician had in creating their fierce rivalry—one that threatened to dismantle the Roosevelt White House.

Presenter(s): Jasmine Alexander-Floyd
Major: Biological Sciences
Faculty Advisor: Dr. Tali Gidalevitz

Email: jja59@drexel.edu
Academic Field: Biological Sciences
Email: tg443@drexel.edu

Identifying Physiological Modifiers of Protein Aggregation Toxicity

Author(s): Jasmine Alexander-Floyd

Many late-onset neurodegenerative diseases, such as Huntington's disease (HD), Alzheimer's disease (AD) and Amyotrophic Lateral Sclerosis (ALS), are caused by the misfolding and aggregation of proteins, with the ultimate risk factor being aging. Individuals stricken with these diseases succumb to the detrimental symptoms associated with them, such as dementia, loss of motor function and ultimately death. Currently, there are no cures, and only few treatments to reduce the underlying symptoms are available. Ultimately, discovering the cellular and genetic pathways that are protective against protein aggregation will improve the understanding of potential treatments for these diseases. In neurodegenerative diseases the aggregation-prone proteins are expressed at birth, although symptoms of disease are not present until later in life. In addition, there exists great variability in age of onset among individuals who have the same genetically mutated protein. This suggests the presence of protective juvenile programs that potentially can also protect some resistant individuals later in life. Therefore, the aim of this research is to test whether activation of protective physiological programs during early development can improve resistance to protein misfolding and aggregation during aging. *Caenorhabditis elegans* has a physiological protective program (dauer diapause) that is known to be stress-resistant and protected from aging. Using polyglutamine (polyQ) aggregation models, we are testing whether transient activation of dauer diapause early in life, which allows for subsequent normal development, can be protective against phenotypes associated with polyQ aggregation later in life.

Presenter(s): Katherine Alvarez
Major: Psychology
Faculty Advisor: Dr. Mary Spiers

Email: kalvarez1305@gmail.com
Academic Field: Psychology
Email: Spiersm@drexel.edu

Do Oral Contraceptives Affect Women's Perception of Facial Anger?

Author(s): Katherine Alvarez

Females typically outperform males in facial expression processing (FEP). Although the underlying mechanism is unclear, theories suggest that variations in sex hormones, particularly testosterone, moderate FEP performance.

The literature suggests that recognition of angry facial expressions is especially linked to sex hormone fluctuations. Compared to males, females are more accurate at identifying anger, particularly in male faces. Studies show that anger recognition decreases during the higher estrogen and progesterone phase of the menstrual cycle at mid-cycle. Interestingly, natural testosterone levels are also higher during mid-cycle. Studies also show that anger recognition is reduced after administration of synthetic testosterone. Collectively, these findings suggest a negative relationship between testosterone levels and female recognition of anger.

Oral contraceptives (OCs) contain progestins with varying degrees of androgenic or masculinizing effects. Older progestins are testosterone-derived and considered highly androgenic whereas newer progestins are by design antiandrogenic. The literature suggests that androgenic OCs have “masculinizing” effects on female cognition whereas antiandrogenic OCs appear to “demasculinize” cognitive performance.

To date, no study has explored FEP performance in OC users. Based on previous findings that testosterone may be deleterious to anger perception, we predict decreased anger recognition in users of highly androgenic OCs. Conversely, we predict increased anger recognition in users of antiandrogenic OCs. This research is important because it will contribute to the sparse literature on female social cognition. Findings of OC moderated changes in anger perception have implications for interpersonal relationships. Additionally, this study’s findings will assist women with making better-informed decisions when choosing OC formulations.

Presenter(s): Eric Balgobin
Major: Biomedical Engineering
Faculty Advisor: Dr. Abby Dominy

Email: embalgobin@gmail.com
Academic Field: Biological Sciences
Email: abbydominy@yahoo.com

A Colorful History: Evolution of Color Theory

Author(s): Eric Balgobin

Objective color identification and quantification has proven difficult for much of human history. Only in the past few hundred years have scientists attempted to categorically analyze color and assign biological meaning. In the early 1700s Sir Isaac Newton created

the basis for all color theory, the color wheel, which consists of seven primary colors. Later, Tobias Mayer created the color triangle using three primary colors: yellow, red, and blue. This color theory has persisted and is used ubiquitously in the instruction of media arts. Scientist, however, have long replaced this color theory with the CIE color theory—which is frequently used by manufacturers to assess product quality and by scientists to assess animal coloration and evolution. It is here that color theory has branched into behavioral sciences. Color expressed by animals, plants and the environment affects how an organism perceives and interacts with other organisms. This has led to scientific inquiries into differential color perception. Human, and interestingly, honey bee visual abilities were some of the first to be measured. Humans are maximally sensitive to three distinct colors (and all their combinations): red, green and blue. Honey bees are also sensitive to three: green, blue, and UV. In the last few decades, scientists have discovered that visual sensitivities are varied and diverse. As a result, much of the color humans can admire in nature is actually just a portion of the colors that nature can express. Without the advancements in color theory and analysis in the last century, we would still be blind to much of nature's diversity.

Presenter(s): Petra Barancekova
Husanikova
Major: Physics
Faculty Advisor: Dr. Goran Karapetrov

Email: petra.husanikova@gmail.com
Academic Field: Physics
Email: goran@drexel.edu

Interplay of Superconductivity and Charge Density Wave in Cu_xTiSe_2 Single Crystals

Author(s): Petra Barancekova Husanikova, J. Doehla, S. Moore, M. Iavarone, S. May, G. Karapetrov

Charge density wave (CDW) is a symmetry reducing ground state most commonly found in layered materials. CDW collective states have been proposed as alternative physical state variables for information processing. TiSe_2 is a layered material that undergoes a transition to CDW state at 200 K with doubled lattice periodicity. The underlying mechanism of CDW in TiSe_2 was shown not to be Fermi surface nesting as in most of CDW bearing materials. Furthermore, TiSe_2 is the first material in which chiral CDW were observed. Recently, there has been a renewed interest in this material, as intercalation of copper induces superconductivity with a gradual suppression of CDW, thus there is a region of copper doping for which CDW and superconductivity co-exist. According to teoretical works, superconductivity in Cu_xTiSe_2 may be mediated by the same exciton and phonon modes, that dominate charge-ordered state.

We investigate the normal state and superconducting properties of 1T- TiSe_2 family of single crystals intercalated with different level of copper content by means of transport and

magnetization measurements. Magnetoresistance and Hall effect data indicate that 1T-TiSe₂ is a compensated narrow band-gap semiconductor or semimetal with small number of electron and hole carriers. We compare the influence of copper intercalant and titanium interstitials on the temperature evolution of charge density wave via resistivity and Hall effect measurements. From magnetization measurements we extracted the basic superconducting parameters of the material. Our results indicate that Cu_xTiSe₂ is a single-gap strong type-II superconductor with a moderate superconducting anisotropy.

Presenter(s): Anthony Basilevecchio
Major: Psychology
Faculty Advisor: Dr. Arthur Nezu

Email: acb329@drexel.edu
Academic Field: Psychology
Email: amn23@drexel.edu

Military Veterans with PTSD and the Role of Social Support in Attitude toward Treatment

Author(s): Anthony Basilevecchio

From its conceptual roots in Vietnam era combat, Post Traumatic Stress Disorder (PTSD) has shattered the boundaries of its political importance and become a focal point in the world-wide examination over how to help combat veterans successfully cope with this life-impeding disorder. Veterans with PTSD have confirmed greater and stronger barriers to care than other disorders, halting the positive progress of treatments before they even have a chance to make any positive effect on symptoms. Investigating into the research accomplished between the disorder's conception and modern day understandings, a clear line is drawn between seeking help for the disorder and a willingness to receive help. While considering the logistical aspects to care, this review focuses on the attitudes of Veterans with PTSD and what key factors result in such attitudes; specifically, social support. Personal relationships are a clear contender for the top spot in symptom/treatment mediation, highlighting the importance of a better understanding of the social dynamics of veterans with PTSD and implications for symptom improvement and treatment accessibility.

Presenter(s): Kaitlin Baudier
Major: BEES
Faculty Advisor: Dr. Sean O'Donnell

Email: kmb478@drexel.edu
Academic Field: Biological Sciences, Physics
Email: so356@drexel.edu

Sticky Fingers: The Evolution and Mechanism of Larval Adhesive Structures in Ponerine Ants

Author(s): Kaitlin Baudier, Kaitlin Baudier, Marjorie Austero, Caroline Schauer, Sean O'Donnell

Immature stages (larvae) of many species in the ant subfamily Ponerinae possess specialized sticky appendages to facilitate attaching the brood to nest chamber walls. We analyzed the evolution of larval adhesive structures by mapping the structural diversity of these organs onto a phylogeny of this subfamily. We explore patterns of change among diverse morphologies of the adhesive structures. We used histology and SEM technology to characterize adhesive structure morphology, and to generate hypotheses for possible mechanisms of larval adhesion.

Presenter(s): Katherine Berman
Major: Biological Sciences
Faculty Advisor: Dr. Shivanthi Anandan

Email: keb96@drexel.edu
Academic Field: Biological Sciences
Email: anandans@drexel.edu

Optimization of Transposon Mutagenesis of Synechococcus Elongatus PCC 7942 for Identifying Components of a High-light Regulated Signal Transduction Pathway.

Author(s): Katherine Berman

Synechococcus elongatus PCC 7942 is a type of cyanobacterium, a microorganism unique for its ability to perform oxygenic photosynthesis, similar to plants. Previous research has shown that photosynthesis in both plants and cyanobacteria is regulated by high-light intensity. In order to find the components of the signal transduction pathway of the high-light regulated gene psbDII, mutants in the pathway must be isolated. The purpose of my research is to create and isolate mutants in this pathway. To do this, we have created a recombinant strain of *S. elongatus*, in which the luciferase genes luxAB, reporter genes producing bioluminescence, have been fused to the high-light regulated psbDII promoter. Activity of the psbDII promoter can then be measured by assaying for the activity of the luciferase enzyme. Therefore, mutants with mutations in the psbDII signal transduction pathways will show changes in psbDII promoter activity, as assayed by luciferase activity. Mutants in the psbDII pathway will be generated by transposon mutagenesis. Transposon mutagenesis will be carried out by creating a transposome, the complex created between a transposon and transposase enzyme. The transposome will be electroporated into electrocompetent cells of the recombinant *S. elongatus* strain. Insertion of the transposon

randomly into the *S. elongatus* genome will give many different mutations. These mutants in the pathway of the *psbDII* gene will exhibit altered bioluminescence and luciferase activity, allowing us to identify the disrupted gene locus. This project will allow us to study the genetics of photosynthesis in cyanobacteria, which in turn, allows a greater understanding of the regulation photosynthesis by high-light in higher plants.

Presenter(s): Kevin Biallas
Major: Environmental Science
Faculty Advisor: Dr. James Spotila

Email: kcb67@drexel.edu
Academic Field: Environmental Science
Email: spotiljr@drexel.edu

Color Contrast as a Signaling Mechanism in the Diamondback Terrapin (Malaclemys Terrapin)

Author(s): Kevin Biallas, Lauren Donaghy

Signals, whether visual, acoustic, or chemosensory, play a vital role in intra-specific communication, ranging from conspecific recognition to the selection of mates. Potentially important visual communication in aquatic organisms in Barnegat Bay, NJ may be undermined by anthropogenic environmental degradation, as nutrient-loading and increases in turbidity accompany concentrated human activity. Due to environmental perturbations, visual messages must be able to effectively overcome variation in light availability. Given that terrapins have tetrachromatic visual ability, visual color signals may range from 300-700 nm in the light spectrum. The highly UV-reflective 'chin skin' of the terrapin is a potential signal employed in intra-specific communication. Reflectance spectra were measured on different anatomical areas of over 200 terrapins. These spectra were analyzed in the MATLAB program TETRACOLORSPACE which produced covariance matrices of hue and chromatic values. The contrasts (C') of chin skin to other sampling points were also calculated. Peak contrasts were frequent and significantly correlated in the UV and Red wavebands. The hue disparity, or contrast, of chin skin to other sampling points was modeled in different ambient light spectra available at different depths in the water column. The contrasts remained consistent across the range of light environments. Our results indicate that the highly UV-reflecting chin skin of the terrapin is a strong and efficient visual signal that contrasts with long waveband, or red colors, expressed elsewhere on the body and shell. The ability to remain consistently strong through varying light conditions suggests importance as a signal in intra-specific communication.

Presenter(s): Justin Bird
Major: Physics
Faculty Advisor: Dr. Dave Goldberg

Email: justin.bird@drexel.edu
Academic Field: Physics
Email: goldberg@drexel.edu

Clusters, Lensing, and Dark Matter Substructure Simulation

Author(s): Justin Bird

Over the last two decades, gravitational lensing has served as one of the cornerstones in the development of our standard model of cosmology and extragalactic astronomy. Given the importance of accurately measuring the mass, shape, and substructure of individual galactic clusters, and given the enormous expense of long time-exposure observation, it is vital to produce high-resolution maps of substructure within individual clusters. To test whether analysis routines accurately reconstruct substructure from a set of images, it is essential to have a pipeline for generating highly realistic simulation images for use by the astrophysical community. In this work, a second-order gravitational “flexion” field is incorporated into the current first-order modular galaxy simulation toolkit GalSim, as part of the GREAT3 collaboration. The flexion field may be thought of as the bending of an image. The great advantage to using flexion instead of, or ideally, in addition to shear is that it is far more sensitive to small-scale perturbations in the magnification field. This second-order field will allow a more accurate mass reconstruction pipeline for groups to test their lensing analysis techniques, with images that reasonably recreate effects of ground-based observation. The effects of flexion on simulated galaxies are presented, along with progress in incorporation into the larger GalSim galaxy simulator.

Presenter(s): Zachary Boles
Major: BEES
Faculty Advisor: Dr. Kenneth Lacovara

Email: zmb24@drexel.edu
Academic Field: Environmental Science
Email: kjl24@drexel.edu

Evidence of Extensive Scavenging/Predation by Late Cretaceous Marine Organisms from the Basal Hornerstown Formation, New Jersey, USA

Author(s): Zachary Boles, Kenneth Lacovara,

The Main Fossiliferous Layer (MFL) of the Hornerstown Formation represents an Upper Cretaceous marine bonebed. Examination of recently collected fossils and those in the collections at the Academy of Natural Sciences of Drexel University reveal bite marks produced by predators and scavengers, which can provide insight into the behavior, ecology, and functional morphology of the trace makers. The most common type of tooth marks are scores, which are typically linear marks in the bone that result from dragging the tooth along surficial compact bone. Such marks could have been produced by a variety of

organisms (e.g. sharks, fish, invertebrates) making identification of a producer nearly impossible. However, two diagnostic markings have so far been identified in the sample. The first group of marks is very common and consists of short (~1-2 mm) striations usually surrounding a circular pit in the bone. These markings closely resemble those produced by modern echinoids. While one echinoderm taxon has been reported in the underlying Navesink Formation, no remains have been reported from the MFL. Consequently, the presence of echinoderm trace fossils suggests their presence despite the lack of body fossils. The second group of markings is present on two crocodilian bones and is composed of several (~14) parallel striations produced by a carnivore with serrated teeth. These markings strongly resemble those previously attributed to the shark *Squalicorax*, for which we have teeth preserved at the site. Based on the anatomical location of many feeding traces, scavenging was common at this site.

Presenter(s): Alexa Bonacquisti
Major: Clinical Psychology
Faculty Advisor: Dr. Pamela A. Geller

Email: an335@drexel.edu
Academic Field: Psychology
Email: pg27@drexel.edu

Postpartum Depression and Mental Health Care Utilization in Mothers with Infants in the NICU

Author(s): Alexa Bonacquisti, Pamela A. Geller, Chavis A. Patterson

Postpartum depression (PPD) occurs in an estimated 10-15% of mothers, potentially resulting in adverse maternal and infant outcomes (O'Hara, 2009). Predictors of PPD have been identified, with screening measures implemented in many settings. Yet, little is known about how to best translate positive depression screens into increased mental health care access for women who need it (Psaros et al., 2010). In particular, because of the stress and uncertainty associated with the NICU experience, women with infants in the NICU may be at greater risk for PPD compared to women who deliver full term infants (Beck, 2003). Research has suggested that the NICU experience confers increased risk due to fears for the infant's survival, lack of maternal-infant physical contact, and difficulty coping with the loss of anticipated experiences, such as a "normal" pregnancy and delivery (Davis et al., 2003). Despite the demonstrated differences for NICU mothers in terms of postpartum experience, there remains a dearth of research on predictors of PPD and mental health care utilization for this high-risk group. Understanding predictors of PPD symptoms in NICU mothers and likelihood to pursue mental health treatment is critical to improve the health and well-being of mothers and their infants. This poster will review the literature on PPD and describe current strategies to increase utilization of mental health care services, particularly for NICU mothers. The development of a study to be conducted in the Harriet and Ronald Lassin Newborn/Infant Intensive Care Unit at The Children's Hospital of Philadelphia also will be detailed.

Presenter(s): Harrison Brown
Major: Communication
Faculty Advisor: Dr. Deirdre McMahon

Email: hcb25@drexel.edu
Academic Field: Communication, English,
Sociology
Email: dhm33@drexel.edu

Owen's Motives: Analysis of a Traitor

Author(s): Harrison Brown

In the United States, where national loyalty is rooted in a sense of dissent toward powerful outsiders, it is automatic to view those perceived to be native loyalists or unionists with scorn. It is easy to write them off as naïve or unscrupulous traitors. Similarly, in a fictional story of conquest like Brian Friel's *Translations*, it is easy to hate a character like Owen, the successful Irish native who returns to his home village of Baile Beag to help English army engineers map the surrounding area and translate its place-names. Considering the gloomy fate that ultimately befalls his Irish friends and family in Baile Beag, what motivates Owen to help the army engineers? Fear of two things motivates Owen to help these sappers: losing the prosperity he achieved in Dublin, and for his friends and family to be hurt during the inevitable Anglicization of his homeland. By better understanding these motives, which are rooted in fear, we can better understand the motives of others who support powerful outsiders.

Presenter(s): Casey Burkard
Major: Psychology
Faculty Advisor: Dr. Naomi Goldstein

Email: cburkard23@gmail.com
Academic Field: Criminal Justice, Psychology
Email: neg23@drexel.edu

Juvenile Defendant Factors Related to Number of Probation Conditions Imposed

Author(s): Casey Burkard, Amanda NeMoyer, Ana Prelic, Jenna Ebbecke, Erika Foster,
Naomi E.S. Goldstein

Within the juvenile justice system, many factors play a role in judges' decision making. For example, the number of probation requirements juvenile defendants receive, a particularly salient issue within the juvenile justice system, may affect the number of opportunities for that juvenile to violate his or her probation. This study will investigate whether certain variables predict the number of probation requirements assigned to that youth. Specifically, this study will look at variables including gender, age, special education,

documented mental health history, and substance use as potential predictors for total number of probation requirements. Participants consist of 120 youth given probation in Philadelphia, who were represented by the Defender Association of Philadelphia. The data include information on current charges, probation recommendations, probation notes, previous arrests, demographic information, and personal history. It is predicted that the number of probation requirements will increase significantly as the severity of the crime committed increases. It is also predicted that special education, documented mental health history, and substance abuse will be positively correlated with the number of probation conditions, such that individuals with these categorical predictors present will be more likely to have a higher number of total probation conditions. No significant relationship is expected to be found between youth gender and the number of probation conditions imposed. Finally, it is expected that a positive relationship will exist between age and number of probation conditions, such that younger defendants will receive more probation conditions than their older counterparts.

Presenter(s): Allison Byrne
Major: Environmental Science
Faculty Advisor: Dr. Gail Hearn

Email: allison.q.byrne@gmail.com
Academic Field: Environmental Science
Email: gwh26@drexel.edu

Morphological Variation Across an Elevation Gradient in Two Amphibian Species from Bioko Island, Equatorial Guinea

Author(s): Allison Byrne, Patrick McLaughlin, Gail Hearn, Ph.D

Bioko Island, Equatorial Guinea is a continental island located 35 miles off the coast of Cameroon in the Gulf of Guinea. It has been isolated from the mainland for approximately 12,000 years. The presence of three large, dormant volcanic peaks on the island provides for a steep elevation gradient, within which there exists a variety of different forest types and resultant habitats. The tropical climate and high rainfall of the island helps to support a great diversity of amphibian species, including multiple endemic species. This study sought to examine morphological variation in amphibians that occur across the entirety of this varied elevational gradient (33-1825 m asl). Morphometric measurements were taken from two different frog species (*Petropedetes johnstoni* and *Arthroleptis variabilis*) using preserved museum specimens. Results suggest similar variations in both species, where foot size and tibia length correlated positively with higher elevation. Additionally, significant body size differences were detected between males and female *P. johnstoni*. These conclusions shed light on possible selection pressures along an elevation gradient, as well as how these pressures are manifested in frog morphology.

Presenter(s): Aqsaa Chaudhry
Major: Biological Sciences
Faculty Advisor: Dr. Joseph Bentz

Email: anc52@drexel.edu
Academic Field: Biological Sciences
Email: bentzj@drexel.edu

*Kinetic Identification of Membrane Transporters that Assist Transcellular Transport of P-gp
Substrates Across Confluent Cell Monolayers*

Author(s): Aqsaa Chaudhry, Samir Ambani, Snehaa Krishnan, Michael Park, Alexandra
Thompkins-Johns

P-gp is a 170kDa transmembrane glycoprotein expressed in the apical membrane of epithelial and endothelial cells that effluxes a wide variety of xenobiotics in an energy dependent manner. It is expressed in normal tissues including liver, kidney, colon, placenta and the blood brain barrier. It is over-expressed in cancer cells showing multi drug resistance, which can lead to chemotherapeutic failure. Understanding the functional aspects of P-gp is important to assess the risk of potential drug-drug interactions. Experimentally, confluent cell monolayers that over-express P-gp are used to study such interactions by conducting bidirectional transport and inhibition assays. Computationally, transport kinetics is analyzed using a mass action kinetic model we constructed to fit for each elementary rate constant. In this study, we have developed a new algorithm to fit the essential kinetic parameters that underlie the classic IC50 curve used by the pharmaceutical industry to rank order inhibitors of enzyme and transporter activity. Using data provided by the International Transport Consortium IC50 Initiative, we have fitted the inhibition of digoxin transport through three different polarized confluent cell lines by 15 different P-gp inhibitors. We found that these inhibitors not only inhibited P-gp mediated digoxin transport through the apical membrane, but also digoxin uptake by a transporter in the basolateral membrane. Thus, digoxin transport through the cells was independently inhibited at two kinetically consecutive transporters. This kinetic analysis of commonly derived IC50 data curves is a powerful tool expand our knowledge of the network of transporters associated with P-gp mediated transport in vivo.

Presenter(s): Mary Chessey
Major: Physics
Faculty Advisor: Dr. Dave Goldberg

Email: mkc44@drexel.edu
Academic Field: Physics
Email: dm39@drexel.edu

Mobile Apps for the Physics Classroom

Author(s): Mary Chessey

The purpose of this research is to develop pedagogical apps pertaining to undergraduate level physics course material for use on students' mobile devices in the classroom. Interactive learning as well as peer instruction are proven ways to enhance learning, and the technology available in smartphones, tablets and other handheld devices have great potential for bringing abstract physics concepts to students in new ways. Incorporation of the wide variety of interaction methods between student and mobile device allows brand new ways for professors to receive feedback from their students as well as for students to get a handle on physics lessons. With network connectivity, this mobile software will create a truly interactive classroom where students will have new opportunities for hands-on learning.

Presenter(s): Halle Choi
Major: Biology
Faculty Advisor: Dr. Gail Hearn

Email: hmc39@drexel.edu
Academic Field: Environmental Science
Email: gwh26@drexel.edu

Government Interventions Lead to "Mardi Gras" Market Dynamics in an Urban Bushmeat Market

Author(s): Halle Choi, Drew Cronin, Gail Hearn

Bioko Island, Equatorial Guinea is a region of rich primate diversity and the only home of the endemic and critically endangered Bioko Pennant's red colobus, *Procolobus pennantii*. However, field surveys indicate that, as a result of bushmeat hunting, primate densities are decreasing, leading to species-specific extirpation in some heavily hunted areas. The shift in primate community is believed to be primarily a result of illegal bushmeat hunting because the survey areas have not undergone any major ecological alterations. In order to better understand the dynamics of hunting, bushmeat market surveys were conducted from 1997-2012 as a proxy for hunting pressure. Results indicate substantial increases, as well as high variability, in the number of primates being consumed over time. While a number of laws have been passed supporting the conservation of primates on the island, the lack of subsequent enforcement continues to increase the market for rare species. Furthermore, government intervention in both 2007 and 2012 have instead led to sharp increases in the rate of primate carcasses in the market immediately following an initial

period of compliance. In 2010, for example, the annual average primate carcass rate was approximately 2.5 times the annual rate the year prior to the ban (Nov. 2006-Oct. 2007). Nonetheless, surveys have been limited in their scope, leaving the relationship between the bushmeat market and wild populations largely unresolved. What is clear is that effective conservation management on Bioko will require policy changes supported by meaningful enforcement efforts if vulnerable species like *P.pennantii* are to persist.

Presenter(s): Karsten Chu

Major: Physics

Faculty Advisor: Dr. Jian-Min Yuan

Email: karstenchu@gmail.com

Academic Field: Biological Sciences, Physics

Email: yuanjm3@gmail.com

Smoluchowski Coagulation and Fragmentation : A Generalized Model for Protein Aggregation

Author(s): Karsten Chu, John Schreck, Jian-Min Yuan

The objectives of this study are to classify the impact of association and fragmentation parameters on protein aggregation systems. To do so, we solve the Smoluchowski equations for all possible aggregation and fragmentation reactions. Starting with an initial concentration of protein monomers, we include all the different pathways to fibril formation from monomers to dimers, trimers, oligomers, protofibrils and eventually to fibrils. We are interested in classifying all possible dynamic patterns of this assembly system. In particular, we want to identify parameters that could affect both the time duration of the oligomer quasi-steady state regime as well as its peak concentration in this regime. The study was performed using Python and numerical integrators and fit parameters were obtained through comparison with external data. The long-term goal of the study is to determine how the steady state regime can be shortened and the concentration of intermediary oligomers reduced, which could help the design of a drug that could reduce the effects these proteotoxic species have on human brain.

Presenter(s): Drew Cronin
Major: Biology
Faculty Advisor: Dr. Gail Hearn

Email: dtc33@drexel.edu
Academic Field: Environmental Science
Email: gwh26@drexel.edu

*Looking for Lost Monkeys: Searching for Critically Endangered Red Colobus
in a West African River Valley*

Author(s): Drew Cronin, Cirilo Riaco, Gail Hearn

Bioko Island, Equatorial Guinea is home to a diverse assemblage of primates, making it one of the most important places in Africa for primate conservation. The only threat to the persistence of these primates is illegal bushmeat hunting. Since 1997, the rate of primate carcasses in the central market in the capital, Malabo, has increased significantly, with over 41,000 primates recorded through 2012. However, the relationship between market dynamics and wild populations is poorly understood. This is due, in part, to a lack of island wide survey data, which detracts from the accuracy of monkey population estimates. For instance, the range of the Critically Endangered, endemic, Pennant's red colobus (*Procolobus pennantii*), is divided into two isolated populations: a core range in the southwest corner of Bioko, and an unconfirmed population in the Iladyi River valley (IRV) to the southeast. This study investigated the presence of *P. pennantii* in the IRV and assessed the status of remaining monkey populations. We also evaluated temporal changes in the abundance of monkeys in the IRV relative to similar surveys conducted in 2007. While we found no evidence of *P. pennantii*, each of the other species known to these habitats were encountered. Primate abundance in the IRV decreased since 2007, concurrent to an increase in hunting in the region. Our results suggest that the primate community may also be undergoing a compensatory shift towards smaller-bodied monkeys, as larger species like *P. pennantii* are being hunted out.

Presenter(s): Katie D'Amelio
Major: Biological Sciences
Faculty Advisor: Dr. Walter Bien

Email: catherinedamelio@gmail.com
Academic Field: Environmental Science
Email: wbien205@comcast.net

*The Effect of Temperature Change on the Behavior of the Northern Pine Snake and
Implications for Climate Change*

Author(s): Katie D'Amelio, Dane C. Ward, Ronald M. Smith, Walter F. Bien

Although studies have examined the spatial ecology, habitat use, and long-term hibernation use of *Pituophis melanoleucus* (Northern pine snake) in the New Jersey Pine Barrens, few studies have focused on the influence of seasonal temperature variation on snake behavior. Because snakes are poikilotherms the temperature of their surroundings influences their behavior, ecology, and physiology. The New Jersey population is at the limit of its northern

range where spring temperatures are variable and in recent years mean spring temperature has arrived earlier. These changes may cue earlier egress from overwintering dens. We measured the soil surface and air temperature (1m above ground) at three hibernacula to determine the temperature at which snakes egressed from dens. We also measured the operative temperature (soil/air) of radio-tracked snakes from April - November in 2010 (N=21), 2011 (N=32), and 2012 (N=21) and calculated the mean linear distance traveled per day (m/day).

Snakes egressed starting 7 April (2010), 10 April (2011), and 23 March (2012) when temperatures ranged between 24 and 33°C. In March 2012 two snakes were found dead within one meter of hibernacula; mortality was attributable to an unusual early warming period followed by night temperatures falling below freezing. Snakes were surface active when temperatures ranged from 20 to 35°C (air) and 25 to 30°C (soil). Mean linear distance traveled per day was greatest in June (\bar{x} =113m; +/-25m) and July (\bar{x} =105m; +/-31m). Although more long-term data is needed, these data suggest that shifts in temperature regimes have the potential to alter egress and dispersal.

Presenter(s): Diana D'Argenio
Major: Psychology
Faculty Advisor: Dr. Jacqueline Kloss

Email: dbd37@drexel.edu
Academic Field: Psychology
Email: jdk29@drexel.edu

Motivational Interventions for Sleep Disturbance among College Students

Author(s): Diana D'Argenio

College students are among the most vulnerable populations for sleep problems, such as chronic sleep deprivation and poor sleep quality. In addition, college students encounter a higher prevalence of delayed sleep phase disorder and inadequate sleep hygiene, relative to the general population. As a result college students suffer from a number of daytime consequences related to sleep disruption, such as impaired academic performance, negative mood, risks for automobile accidents, less life satisfaction, and stress. A number of interventions have demonstrated success at alleviating sleep disturbance and its correlates among college students including cognitive-behavior therapy, psychoeducation, and mindfulness training. Although these treatments can be helpful, college students appear ambivalent and/or reluctant toward adopting sleep-related behavior change. Motivational interventions (MI) have been successfully applied for a number of health behaviors relevant to college students, such as binge drinking, smoking, substance abuse, and risky sexual behavior. Further, it has been proposed that MI may be efficacious in treating adolescent sleep health behavior in theory. Taken together, this presentation focuses on novel applications of MI geared specifically toward college students and sleep. Specific research ideas are identified for future empirical investigation. For example: how would we

categorize college student motivation/readiness to change regarding sleep health? Does increased motivation or readiness to change improve the likelihood that current sleep interventions will be effective among college students?

Presenter(s): Bradley Daniel
Major: Physics
Faculty Advisor: Dr. Michelle Dolinski

Email: bsd34@drexel.edu
Academic Field: Physics
Email: dolinski@drexel.edu

Search for Neutrino-less Double Beta Decay Using Solid Xenon Source Detector

Author(s): Bradley Daniel

Liquid Xenon (LXe) is particularly well suited to detect rare nuclear decays. The Enriched Xenon Observatory (EXO) is using a large LXe source to detect double beta decay in order to learn more about the neutrino. Theoretically, Solid Xenon (SXe) may act as a much more efficient detector than LXe, because it can act as a bolometer which will detect the heat energy of an event. This creates a higher energy resolution, which is very important for detecting double beta decay, which appears as a relatively low energy spike and can easily be lost in the background. However, it is unclear what the best way to grow and utilize a SXe crystal for the purpose is. This research will primarily focus on the actual growth and development of the crystal. Building on existing research into methods of growing SXe crystals as well as methods of detecting double beta decay, this paper will attempt to define the best way to grow a SXe for double beta detection. Developing an effective SXe detector could produce more accurate mass predictions for neutrinos using double beta decay. The observation of neutrino-less double beta decay would tell us about the nature of the anti-neutrino as well as shed light on an absolute mass scale for the neutrino.

Presenter(s): Michael DeMaria
Major: Physics
Faculty Advisor: Dr. Michelle Dolinski

Email: mad348@Drexel.edu
Academic Field: Physics
Email: mjd396@drexel.edu

Bolometer Design For Detecting Neutrinoless Double-Beta Decay in a Xenon Crystal

Author(s): Michael DeMaria

Neutrinos have become a popular topic recently now that we are getting better at detecting them. They are neutral elementary particles with very low mass. Their absolute mass and whether they are their own anti-particle or not is still unknown. If a specific nuclear

reaction known as neutrinoless double-beta decay exists, we will know that neutrinos are their own anti-particle. This may be measured by using a detector known as a bolometer. A bolometer is a low temperature thermal detector. My research project is to create a model of the thermal characteristics of a bolometer so that we may build one in the future. This will be used to detect double-beta decay to see if neutrinoless double-beta decay exists.

Presenter(s): Stephen Dench
Major: Environmental Science
Faculty Advisor: Dr. Gail Hearn

Email: smd374@drexel.edu
Academic Field: Environmental Science
Email: gwh26@drexel.edu

Conservation Status of Monkeys at Moka, Bioko Island, Equatorial Guinea

Author(s): Stephen Dench, Drew T. Cronin, Gail Hearn

Bushmeat hunting, or the hunting of wild animals for consumption, is common practice on Bioko Island, Equatorial Guinea. Seven species of monkeys and other larger vertebrates are being hunted at a high rate, which for several monkey species, has led to local extinction in some areas. This study was developed to assess the impact of bushmeat hunting on the primate populations surrounding Moka, an agricultural village in the Bioko highlands. Line-transect surveys were conducted on 3 preexisting transects in the immediate vicinity of the village. Two surveys were also performed opportunistically on a fourth unmarked transect located on the southwest slope of Pico Biao. The number of large mammal (including primates) encounters and hunting signs were recorded on each survey. Survey data for all encounters were then converted to sighting frequencies, calculated as the number of social groups or solitary individuals sighted per kilometer walked. Overall, only two primate species were encountered (*Cercopithecus erythrotis*, *Allochrocebus preussi*), as well as a high number of hunting signs across all transects. Primate sighting frequencies and hunting sign encounter rates were also compared between transects. The data show a significant difference in the hunting sign encounters between transects due to differences in the frequency of traps. Data on monkey group frequency between transects however, were statistically insignificant. Further studies are needed to better understand the hunting dynamics in Moka village (e.g. well-worn forest paths devoid of traps), as well as to elucidate the species-specific response to varying degrees of hunting pressure.

Presenter(s): Katherine DiAngelus
Major: Biology
Faculty Advisor: Dr. Marina Potapova

Email: kld76@drexel.edu
Academic Field: Environmental Science
Email: mp895@drexel.edu

Diatom Flora of the Northern Barnegat Bay, New Jersey

Author(s): Katherine DiAngelus

The purpose of this project was to investigate composition of benthic diatom assemblages of the northern part of the Barnegat Bay, New Jersey. This study is a part of a larger project aimed at incorporating diatoms into ongoing water quality monitoring of the bay and to develop a regional calibration set to relate nutrient levels and other human impacts to diatom communities. Diatoms are commonly used as water quality indicators because of their abundance in aquatic habitats and their rapid response to environmental change. The cell wall, or frustule, of diatoms is made of silica and preserves well in sediments, which is necessary in the identification of species. Although freshwater diatoms are well-studied, coastal marine diatoms are poorly known, and therefore, are still rarely used in bioassessment. This study is the first detailed taxonomic investigation of Barnegat Bay diatoms. Diatoms were identified using light microscopy and digital imaging. Nine surface sediment samples, arranged into three transects were examined. One sample from each transect was taken from a marsh, another from bottom of the bay close to the shore and the third from an off-shore location. So far, 12 species of centric diatoms and 250 pennate diatoms were identified in the northern area of Barnegat Bay. The flora contained taxa characteristic for both fresh and marine waters, as well as species known from estuarine habitats. Several populations could not be identified and probably represent species new for science.

Presenter(s): Lia Domico
Major: Environmental science
Faculty Advisor: Dr. Steven Pearson

Email: Ljd57@drexel.edu
Academic Field: Environmental Science
Email: Shp36@drexel.edu

Storm Intensity and Weather Stations: The Importance of Weather Station Placement on Measurement Accuracy

Author(s): Lia Domico, Steven H. Pearson, James R. Spotila

Barometric pressure is a major factor that determines the weather patterns. High barometric pressure is associated with good weather, while low pressure is associated with storms. In hurricanes, barometric pressure indicates the eye-wall, or most intense part of the storm, location. In October 2012, Hurricane Sandy barreled through the Atlantic Ocean, to the coast of New Jersey to become the lowest-pressure storm in recorded history north

of Cape Hatteras, North Carolina. In this study we compared New Jersey weather data from two independent weather stations in Barnegat and Haddonfield to NOAA weather stations in Atlantic City, Barnegat, and Philadelphia. To determine the intensity of the storm for various locations and the accuracy of the data from the independent weather stations we analyzed data from 48 hours between October 29-30. We found that the pressure was the lowest (946.6 mb) while the wind and gust speed were the highest at Atlantic City. Barnegat and Haddonfield pressures were higher, 953.3 mb and 951.7 mb, respectively, and the wind and gust speeds were lower compared to Atlantic City. Rainfall totals were 190 mm in Atlantic City, 136 mm at Barnegat and 64 mm at Haddonfield. These patterns indicate that the storm was most intense in Atlantic City, which is where it was known to make landfall. Weather measurements recorded from the independent stations were lower than measurements from nearby NOAA stations. From these results, we concluded that it is important to consider the placement of a weather station to accurately measure the intensity of storms.

Presenter(s): Kelly Douglass
Major: Physics
Faculty Advisor: Dr. Michael Vogeley

Email: kad347@drexel.edu
Academic Field: Physics
Email: vogeley@drexel.edu

Metallicity of Void Dwarf Galaxies

Author(s): Kelly Douglass

Due to large surveys like the Sloan Digital Sky Survey (SDSS), the Universe has been shown to have a structure similar to that of a three-dimensional cosmic web. Voids (large, under-dense regions of space) separate galaxy clusters connected by thin filaments of galaxies. These cluster galaxies are known to interact via galactic collisions – gases are regularly exchanged between the galaxies, drastically altering their future evolution. Existing in cosmological voids, void galaxies are thought to demonstrate the elemental characteristics of galactic evolution, as they undergo few interactions. In any of these galaxies, stars begin as hot balls of hydrogen gas; as they burn, nucleosynthesis creates heavier elements in the star's core via thermonuclear fusion (from hydrogen to helium to carbon, etc.). When the most massive stars expire, their supernovae disperse these heavier elements into the surrounding interstellar medium, from which new stars form. Commonly defined as the ratio of the abundance of oxygen to hydrogen in these HII regions, a galaxy's metallicity can provide insight into its age and star formation history. With the SDSS spectrographs, we estimate the metallicity of dwarf galaxies. Ratios of the fluxes of emission lines, particularly those of the forbidden [OIII] and [SII] transitions, provide estimates of the region's electron temperature and number density. From these two quantities and the emission line intensities, we estimate the abundance of these elements. We study how the environment affects galaxy evolution in the Universe by comparing the metallicities of galaxies in clusters with similar-sized galaxies in voids.

Presenter(s): Marc Doyle
Major: Physics
Faculty Advisor: Dr. Luis Cruz Cruz

Email: mmd72@drexel.edu
Academic Field: Physics
Email: ccruz@drexel.edu

Multiple Band Gaps a Complex Oxide System

Author(s): Marc Doyle

Density Functional Theory (DFT) has predicted multiple narrow band gaps in a Strontium Scandium Bismate and Lead Scandium Niobate solid solution. This alloy is predicted to be a ferroelectric semiconductor with at least four band gaps in the UV-Visible range. In this work we look at one end member, Strontium Scandium Bismate, to determine its electrical properties.

Presenter(s): Jenna Ebbecke
Major: Psychology
Faculty Advisor: Dr. Naomi Goldstein

Email: jenna.ebbecke@gmail.com
Academic Field: Psychology
Email: Neg23@drexel.edu

Collegiate Substance Use: Evaluating the Risks through a Developmental Framework

Author(s): Jenna Ebbecke, Sharon Messenheimer Kelley, M.S., Erika Foster, Christy Giallela, Naomi Goldstein

Human development has been predominantly studied across childhood and adolescence, despite more recent findings demonstrating that neurological and psychosocial development continue well into the twenties (Steinberg, 2010). These findings suggest that individuals in their twenties may show some improvements in various developmental domains during this time, which encompasses the typical age range for full-time college students. Substance use (SU) has also been linked to impairments in multiple domains of functioning, and may hinder healthy development (Arria, 2011; Masten et al., 2008). Further, substance-using behaviors are common among college students (Chen, Dufour, & Yi, 2004). The current study examined the relationship between SU and developmental immaturity (DI), a construct encompassing the developmental factors of emotional regulation, independent functioning, decision-making, and cognitive processing (Kemp, 2010), in students studying at an urban university. It was hypothesized that DI and SU would be significantly, and positively, correlated. A series of confidential self-reported questionnaires were administered to students online. The measures assessed DI, type of

drug use (including alcohol) and frequency of use, social networks, studying habits, and demographics. Results revealed a significant relationship between DI's decision-making factor and SU, suggesting some college students may still be maturing in their decision-making abilities. Furthermore, students with poor decision-making abilities may be more inclined to participate in various risk-taking behaviors. Additional analyses and implications of the findings will be discussed.

Presenter(s): Brendan Elias
Major: Biology
Faculty Advisor: Dr. Jeffery Twiss

Email: bre24@drexel.edu
Academic Field: Biological Sciences
Email: jlt98@drexel.edu

Translation of Ribosomal Protein L4 in Neuronal Processes

Author(s): Brendan Elias, Cynthia Gomes

Neurons are highly polarized cells in the nervous system that have short dendritic processes (≤ 2 mm) and long axonal processes (cm's to more than a meter). Dendrites receive signals from other neurons and transmit these signals to the cell body while axons transmit signals to other neurons and target tissues. Several studies have shown that axons and dendrites are capable of synthesizing proteins locally. Over the last five years, profiling studies have shown that hundreds of different mRNAs are actively transported into axons. Several ribosomal protein (RP) mRNAs are represented in these studies, which was a surprise since ribosome biogenesis was thought to occur in the nucleus. Thus the role that these RP mRNAs play in the axon is unknown. Here, we question whether or not ribosomal protein L4 (RPL4) mRNA is locally translated in axons and how this might affect axonal growth. We show that the 3'UTR of RPL4 mRNA drives its transport into axons. To determine if RPL4 is translated in axons, we have generated a gene construct containing RPL4 open reading frame, a FLAG 'epitope tag', and the fluorescent AcGFP reporter gene in the pcDNA 3.1(+) vector. By incorporating the 3'UTR of RPL4 into this construct, the mRNA is targeted to the axons, while using the 3'UTR from the pcDNA 3.1(+) results in a cell body restricted mRNA. The RPL4-AcGFP shows nucleolar localization in non-neuronal cells and axonal localization in primary cultures of adult rat sensory neurons. Initial siRNA-based depletion of endogenous RPL4 mRNA does not disrupt basal axonal growth, so the function of the locally synthesized RPL4 is still under investigation.

Presenter(s): Shayna Erickson
Major: Biology
Faculty Advisor: Dr. James Spotila

Email: sce32@drexel.edu
Academic Field: Environmental Science
Email: spotiljr@drexel.edu

Diet Composition for Trachemys scripta elegans and Pseudemys rubriventris in Two Wetland Complexes

Author(s): Shayna Erickson, Steven Pearson, Dr. James Spotila, Dr. Harold Avery

Competition for dietary resources can influence species distribution and abundance. Furthermore, invasive species can outcompete native species and have negative impacts on their populations. The red-eared slider (*Trachemys scripta elegans*) is an introduced species in Pennsylvania and may compete with the PA state threatened red-bellied turtle (*Pseudemys rubriventris*) for resources such as food. To determine the dietary overlap of these two species we analyzed diets at the Silver Lake Nature Center (SLNC) in Bristol, PA and at Fort Mifflin (FM) in Philadelphia, PA. Dietary components were collected through stomach flushing and fecal sample collection. Sample components were then identified to the lowest possible taxon. Items were measured by volume and mass to determine their relative abundance. Both species of turtle were observed to be primarily herbivorous. Red-bellied turtle diets were comprised of greater than 96% vegetation by volume at both sites. For red-eared sliders, the volume of vegetation varied between FM and SLNC, 95%, 75%, respectively. Animal matter was higher for red-eared sliders at SLNC, 21%, while it comprised 3.5% at FM. Animal matter in red-bellied turtles samples accounted for 2% of volume at both SLNC and FM. Our findings suggest that there is potential for interspecific competition for turtles located at FM due to their similar diets. At SLNC, competition might be less influential because there is less overlap for diets. In wetlands where less resource overlap occurs, red-bellied turtle populations may increase, while in wetlands with high overlap populations may decline due to competition with red-eared slider turtles.

Presenter(s): Stefanie Farrell
Major: BEES
Faculty Advisor: Dr. James R. Spotila

Email: saf89@drexel.edu
Academic Field: Biological Sciences,
Environmental Science
Email: spotiljr@drexel.edu

Genes and the Environment: Factors Causing Scute Anomalies in the Diamondback Terrapins (Malaclemys Terrapin)

Author(s): Stefanie Farrell, Allison Tipton, Abigail Dominy, James Spotila, Harold Avery

A combination of environmental and genetic factors may contribute to phenotypic anomalies in many animal species. The current study was conducted to determine whether

the environment, genetics, or a combination of both, contribute to the presence of anomalies in diamondback terrapins (*Malaclemys terrapin*) inhabiting Barnegat Bay, New Jersey. Prior research has suggested that exposure of developing terrapin eggs to toxic chemicals, particularly Persistent Organic Pollutants (POPS), as well as crude oil, can cause disruption in development, leading to extraneous or malformed scutes on the turtle's shell. Genetic factors may also contribute to the formation of scute anomalies; the presence of an anomaly in a mother may result in her hatchlings having an increased chance of developing an anomaly. These scute anomalies could contribute to an overall decrease in individual fitness, making the turtle less likely to reproduce. A series of chi squared (χ^2) tests for proportions were performed to determine whether location of site, level of salinity, or presence of anomaly within the mother influenced the presence of a scute anomaly in a turtle. All factors investigated led to inconclusive evidence; however, further research could reveal a more complicated interaction between genetic and environmental factors involved in the formation of scute anomalies. Since diamondback terrapins are a Species of Special Concern in New Jersey, it is important to investigate and reduce any environmental factors that may cause anomalies that can reduce reproductive success in this species.

Presenter(s): Erika Foster
Major: Psychology
Faculty Advisor: Dr. Naomi Goldstein

Email: erf44@drexel.edu
Academic Field: Psychology
Email: neg23@drexel.edu

Developmental Immaturity as a Moderator of the Relationship between Substance Use and Academic Performance among College Students

Author(s): Erika Foster, Christy L. Giallella, Jenna Ebbecke, Sharon Messenheimer Kelley, Naomi E. S. Goldstein

Recently, the construct of developmental immaturity (DI) has emerged as a way of describing the changes in multiple domains of functioning that occur from adolescence through early adulthood (Kemp, 2010). The period of development in which DI is most relevant is a time during which individuals are simultaneously vulnerable to problems with substance abuse and expected to develop personal strengths in different academic domains. Although the underlying components of DI (i.e., independent functioning, decision-making, emotion regulation, general cognitive processing) have been linked to both substance use and academic performance (Masten et al., 2008; Brown et al., 2008; Denhardt et al., 2011), DI is a relatively new construct and has received minimal explicit attention in research. Furthermore, research has yet to reveal how DI, academic achievement, and substance use might interact with one another. DI may help explain the relationship between substance abuse and poor academic achievement, and research on these relationships may reveal important information about risk and protective factors in the latter two areas. Data was collected from 264 (25% male, 75% female) undergraduate

students at Drexel University to assess the relationships among these three variables. It was hypothesized that DI would moderate the relationship between substance use and academic achievement. Results of this study and implications of the findings will be presented in this poster.

Presenter(s): Emma Fowler
Major: Custom-Design Major: Paleontology
and Paleo-Art
Faculty Advisor: Dr. Kenneth Lacovara

Email: ekf34@drexel.edu
Academic Field: Biological Sciences
Email: kjl24@drexel.edu

Digital Reconstruction of a Juvenile Hyposaurus Braincase: Location of Major Nerve and Vessel Passageways

Author(s): Emma Fowler, Aja Carter, Nathan Schiff, Kenneth Lacovara

Using a surface-scanned digital model of a well preserved brain case from a juvenile Hyposaurus (an extinct crocodilian), major nerve and vessel passageways were identified. Adjacent cranial elements were digitally articulated with the braincase to reconstruct the overall morphology of the posterior part of the skull. Using modeling and animation software (Autodesk Maya), hypothesized nerves and vessels were digitally restored to reconstruct the cranial anatomy of this ancient animal. These results will be used in comparative anatomical studies with extant crocodilians, with particular a focus on the identification of the nerves and vessels that pass through cranial foramina. This study demonstrates the power of 3D technology in paleontology, which is so often limited by fragile and incomplete specimens.

Presenter(s): Alina Freire-Fierro
Major: BEES
Faculty Advisor: Dr. Walter F. Bien

Email: agf36@drexel.edu
Academic Field: Environmental Science
Email: walter.f.bien@drexel.edu

Infrageneric Classification of the Plant Genus Monnina (Polygalaceae)

Author(s): Alina Freire-Fierro

Monnina (Polygalaceae) is a monophyletic plant genus of about 200 species. It is morphologically diverse and an important and common element of the Neotropical montane flora. The genus was established in 1798 and the first infrageneric classification of

the genus was published in 1896. Recently, several classification schemes have been attempted and there has been significant disagreement about phylogenetic relationships. A phylogenetic study based on morphological data divided the genus into genera Monnina, Pteromonnina and Ancylostropis (Eriksen 1993). Ongoing phylogenetic analyses based on the nuclear markers ITS1 and ITS2, the chloroplast intron trnL and the intergeneric spacer trnLf reveal the monophyly of only two genera: Monnina and Ancylostropis. Species currently placed under genus Pteromonnina need to be transferred back to genus Monnina. A more complete understanding of these relationships will provide a powerful tool for explaining current species distributions and may elucidate differences in habitat and ecology.

Presenter(s): Anna Gourlay
Major: Environmental Sciences
Faculty Advisor: Dr. James R. Spotila

Email: agourlay523@gmail.com
Academic Field: Environmental Science
Email: spotiljr@drexel.edu

Home Ranges of Reproductive Female Diamondback Terrapins in Barnegat Bay, New Jersey

Author(s): Anna Gourlay, Julianne M. Winters, James R. Spotila, Harold W. Avery

Reproductive female diamondback terrapins (*Malaclemys terrapin*) have a larger home range than males during nesting season. For example, landscape genetic studies show female terrapins spending more time around nesting beaches during nesting season, while spending more time foraging away from nesting beaches post-nesting. The diamondback terrapin is a flagship species, meaning their presence or absence can greatly affect the salt marsh ecosystem; terrapins have a top-down regulatory effect on salt grass abundance. In order to effectively protect the population, wildlife managers need to identify the seasonality of terrapin habitat use in Barnegat Bay, NJ. Our goal was to utilize biotelemetry to quantify the home ranges of reproductive female terrapins, both during and post-nesting season. In 2011, diamondback terrapins were tracked with radio and sonic telemetry from June through July (nesting season) and from August through September (post-nesting). By tracking these terrapins from both land and boat, their home ranges could be calculated, using Kernel and minimum convex polygons analyses, to indicate reproductive females' habitat use. Our results show that nesting season females' home range to be within a closer proximity to the beaches and nesting sites, while post-nesting season terrapin home range is further out in open waters. Thus, home ranges are quantifiably different for mature female terrapins while nesting than after nesting season. These biotelemetry data support past landscape genetic studies which suggests that terrapins utilize a variety of habitats based on separate needs such as foraging, mating, nesting, or basking. These home range data are important to wildlife managers protecting the species, the waters it inhabits, and the ecosystem terrapins help regulate.

Presenter(s): Caroline Grady
Major: Psychology
Faculty Advisor: Dr. Pamela Geller

Email: cmg349@drexel.edu
Academic Field: Psychology
Email: pg27@drexel.edu

Proposed Study: Diabetic Women's Perceptions of Pregnancy

Author(s): Caroline Grady, Dr. Pamela Geller

Approximately 1.3% of all pregnancies occur in diabetic women (Lawrence, Contreras, Chen, & Sacks, 2008). The American Diabetes Association (ADA; 2013) recommends that preconception counseling begin at puberty to decrease the risk of adverse pregnancy outcomes. Recommended interventions include maintaining ideal HbA1c levels, possible medication changes, and health evaluations. Assessment of these interventions show that they are not delivered consistently and that many women do not attend appointments for preconception counseling (Janz et al., 1995). Women have reported a lack of awareness of risks related to poor glycemic control and receiving negative responses from health-care providers (Peters & Laffel, 2011). Previous studies have used qualitative data to gain insight about pregnancy experiences; however, views about pregnancy from diabetic women who have never been pregnant have not been explored.

This study aims to assess quantitatively how women with diabetes understand the risks of pregnancy. Diabetic, nulligravid women between the ages of 18 and 40 will take an online survey assessing perceptions of fertility, pre-pregnancy preparations, and possible risks to the baby and mother. The Perceived Control of Diabetes Mellitus and Diabetes Related Health Beliefs questionnaire will be administered to assess participants' belief in health outcomes. Knowledge, perceptions about preconception counseling, and questionnaire results will be analyzed. Results will evaluate how thoroughly health-care providers follow the ADA recommendations and how much of the information is retained by patients. Findings will inform providers about topics that should be covered with diabetic patients and the importance of maintaining a supportive attitude.

Presenter(s): Mackenzie Grapes
Major: International Area Studies
Faculty Advisor: Dr. Gail Hearn

Email: mag423@drexel.edu
Academic Field: Environmental Science
Email: gwh26@drexel.edu

Structure of the Bird Community in an Agriculture Matrix at Moka, Bioko Island, Equatorial Guinea

Author(s): Mackenzie Grapes, Drew T. Cronin, Gail W. Hearn

Avian diversity is high in the Gulf of Guinea as a result of the intersection of the Guineo-Congolian rainforest belts, as well as the habitat heterogeneity afforded by the elevation range of the Cameroon Line volcanic formations. Consequently, Bioko Island, Equatorial Guinea, situated off the coast of Cameroon, has developed a species-poor avifauna, but a high degree of endemism in isolation. Nevertheless, little attention has been paid to avian ecology to date, and much baseline data are needed to assess the impact of increasing environmental change on Bioko. The village of Moka offers a unique opportunity for this type of study, as it is located on the threshold between upper and lower montane forest and it is surrounded by an expanding agricultural matrix. In an effort to describe the diversity and abundance of avian species at Moka, we captured individuals using mist nets arranged around the Moka Wildlife Center (MWC), as well as along the rim of the Pico Biao crater. Following capture, we collected a series of morphometric data, and individuals were then banded with aluminum tags in accordance with an ongoing avian monitoring project conducted by the Bioko Biodiversity Protection Program at the MWC. Overall, 27 species of birds (109 individuals) were captured, of which greenbuls (Pycnonotidae) and finches (Fringillidae) were most abundant at the MWC and Pico Biao, respectively. These results serve as a baseline for ongoing research about the avian abundance, diversity, and species composition at the Moka Wildlife Center and other sites on Bioko Island.

Presenter(s): Austen Groener
Major: Physics
Faculty Advisor: Dr. David Goldberg

Email: amg338@drexel.edu
Academic Field: Physics
Email: goldberg@drexel.edu

Weak and Strong Lensing Mass Reconstructions of Galaxy Clusters: Orientation Bias and Radially Varying Shape

Author(s): Austen Groener

The shape, number, and mass of galaxy clusters in the universe are all sensitive probes of the underlying physical paradigm of the universe. In order to better constrain our current cosmological model, weak lensing, strong lensing, and X-ray methods of determining total mass and shape of clusters must converge. Galaxy clusters are surrounded by large

extended 'halos' of dark matter, whose iso-density surfaces in the inner regions are tri-axial and in the outer regions are largely spherical. Cluster density profiles are also very well characterized by a universal scaling relationship for dark matter halos over many decades of mass in the LCDM cosmological framework. My present work focuses on quantifying the uncertainty in reconstructions of cluster parameters between weak and strong lensing methods by the introduction of two things: 1) An orientation bias in the way cluster halos are viewed, and 2) the smooth transition of the shape of isodensity surfaces with radius.

Presenter(s): Johnathan Guest

Major: Biology

Faculty Advisor: Dr. James R. Spotila

Email: jdg77@drexel.edu

Academic Field: Environmental Science

Email: spotiljr@drexel.edu

Bigger claws are better: Interspecific and intraspecific competition for limited resources in two turtle species

Author(s): Johnathan Guest

Competition between species has been well documented worldwide. If two species utilize the same limited resources in the same environment, then the species with a competitive advantage will avoid population decrease or extinction. In turtles, a physical mechanism that may give an individual or species a competitive edge could be claw size of a turtle relative to body size. If turtles with larger claws in proportion to body size feed and bask more frequently than turtles with smaller claws, then proportional claw size may play a role in a turtle's ability to obtain limited resources. In this study, we examined how the ratio of plastron length to claw length (PL:CL) of an invasive turtle species, *Trachemys scripta elegans*, and a native species, *Pseudemys rubriventris*, impacted the ability to utilize limited resources. We placed *T.s. elegans* (N=18) and *P. rubriventris* (N=18) across three mixed species tanks, each with a stationary platform, and observed basking and feeding with digital film. Turtle claw length was measured on the middle claw of the right forefoot. The PL:CL ratio was significantly lower for *T.s. elegans* than *P. rubriventris* ($p < 0.05$). Furthermore, *T.s. elegans* had a significantly higher success rate in feeding and basking attempts ($p < 0.05$), which suggests increased competitiveness for *T. scripta*. Our results suggest that the PL:CL ratio is a useful metric for determining a species competitive ability and may be useful in determining if interspecific competition between these two species may contribute to the population decline of native *P. rubriventris*.

Presenter(s): Brittany Handler
Major: Anthropology
Faculty Advisor: Dr. Judith Storniolo

Email: blh65@drexel.edu
Academic Field: Anthropology
Email: jas92@drexel.edu

Hannah Freeman: A Colonial Wage Laborer in the 18th Century

Author(s): Brittany Handler

Hannah Freeman, or Indian Hannah, has been credited with being the last Lenape Indian in the Delaware Valley during the late 18th century. Becker has argued that she was a Lenape Indian who adapted her life when persecuted and exemplified how Lenape dealt with changes to their geographical landscape (1990, 1992, 1993). According to Becker, Freeman became an acculturated Lenape and modified her way of life to survive in the changing world (1993). However, the present project suggests that these views of Hannah Freeman are not adequate to describe her way of life. Examination of colonial records, studies of the Lenape way of life, the colonial wage labor life, and information obtained from Lenape informants show that although Freeman had Lenape blood and belonged to a Lenape band for some time of her life, she did not live as a Lenape Indian in adulthood. Freeman went through the process of separation, liminality, and inclusion and worked through stages of bereavement to develop a new way of life (Beneduce 2008; Henry et al 2009). She had embraced a colonial wage laborer way of life and lived that way, relying on other colonists, until her death in 1802; she did not alter her way of life simply to survive. Thus Hannah Freeman should no longer be considered the last Lenape, as she was not culturally a Lenape Indian. This perspective will alter the perception and legacy of Hannah Freeman and allow a more complex view of American Indian acculturation.

Presenter(s): Wendy Harris
Major: Physics
Faculty Advisor: Dr. Derek Dolney

Email: wbh25@drexel.edu
Academic Field: Physics
Email: derek.dolney@uphs.upenn.edu

Simulating 3D Detector Array for Pencil Beam Proton Therapy

Author(s): Wendy Harris, Derek Dolney, PhD

The main objective when performing radiation therapy on malignant tumors is to supply the maximum dosage of radiation to the targeted area while keeping the surrounding tissue and organs healthy. An advantage to treating with proton therapy, rather than the usual X-ray radiation therapy, is that it can irradiate a targeted area with greater precision, while delivering minimal radiation to the surrounding tissues and organs. Our goal is to develop a simulated 3D detector array to be used for pencil beam proton therapy by using Geant4 Monte Carlo simulation software. The 3D detector will be made up of many stacked layers

of 2D detectors so that a 3D image can be created. The preliminary goal is to accurately simulate a 2D layer, such that the measured dose will appear as if it were in water or tissue. I will analyze how material density and atomic number can be chosen to yield a detector design that will more faithfully mimic patient tissue.

Presenter(s): Maxwell Henderson
Major: Physics
Faculty Advisor: Dr. Luis Cruz

Email: mph58@drexel.edu
Academic Field: Physics
Email: ccruz@drexel.edu

Network Dynamics of Neuronal Networks with Various Geometric Distributions and Distance Dependent Connectivity

Author(s): Maxwell Henderson

One characterization of the cerebral cortex is that neurons are arranged in small, vertical columns. These microcolumns (or minicolumns) have been experimentally observed and are believed by some to play a fundamental role in the information processing of the brain. However, because of the complexity and difficulty of carrying out experiments at the level of the cell that could prove or disprove this hypothesis, solid evidence of the functionality of microcolumns is still lacking. Here, we present computer simulations of neural networks that attempt to shed light on this hypothesis. In these computer simulations, a model of a neural network is developed with tunable geometry whose firing properties are characterized. Neurons in this model use direct electrical coupling through gap-junctions, a common way for neurons to communicate between each other, that are shown to exhibit periods of spontaneous activity that correlate with periods of poor signal transmission and periods of synchronized activity that correlate with good network performance. The network dynamics are analyzed as a function of neuronal spatial distributions (different geometries), inter neuronal coupling strengths, number of neurons, and connectivity schemes. Our results are shown to establish a relationship between neural network geometry and distant dependent connectivity.

Presenter(s): Allison Herens
Major: Psychology
Faculty Advisor: Dr. Naomi E.S. Goldstein

Email: alh327@drexel.edu
Academic Field: Psychology
Email: neg23@drexel.edu

Juvenile Defendant Characteristics Associated with Pre-Adjudication Diversion

Author(s): Allison Herens, Amanda NeMoyer, Rachel Hirst, Naomi E.S. Goldstein

Although the juvenile justice system in the United States has been criticized as punitive, many states, including Pennsylvania, offer lenient alternatives to youth who wish to avoid adjudication (Benekos & Merlo, 2008). For example, before juvenile court hearings begin, all parties involved may agree to the terms of a consent decree—a suspension of juvenile proceedings under which the individual charged adheres to court-mandated terms of probation (Farrell & Zanan, 2012). If the juvenile successfully completes the term of supervision without violation, his or her adjudication hearings are never reinstated (Farrell & Zanan, 2012). Prior research indicates a significant relationship between race, gender, and prior convictions and leniency in judicial decision-making (Lieber & Peck, 2012; Mueller-Johnson, 2010). The current study investigates whether variables—including race, gender, age of arrest, previous arrest history, number of charges, family presence at hearings, race, and prosocial behaviors such as work or extracurricular activities—affected the likelihood that a juvenile defendant received a consent decree. The files of 120 juvenile defendants represented by the Defender Association of Philadelphia were examined, 34 of whom were offered and accepted a consent decree as a pre-adjudication diversion. Results of logistic regression analyses revealed that age at the time of the arrest and number of previous arrests were both significantly related to an increased likelihood of a consent decree. Implications and limitations will be discussed.

Presenter(s): Eric Horton
Major: Economics
Faculty Advisor: Dr. Peter Amato

Email: eh423@drexel.edu
Academic Field: Philosophy
Email: peterama@drexel.edu

Re: Reading Plato

Author(s): Eric Horton

Over the centuries academic philosophers have offered a number of opinions on the best ways to interpret Plato's dialogues. Despite the close readings of innovative thinkers, much of the scholarship in this field is steeped in orthodoxy and offers unsatisfying, doctrinal analyses of Plato's texts. By avoiding these interpretations in favor of those that emphasize more literary elements, readers can come to refreshing conclusions about Plato's philosophies and the scope of the Platonic corpus in general. Particularly, a literary

approach brings clarity to questions regarding the distinction between Socratic and Platonic philosophy, the chronology and trajectory of Plato's works, and the philosophical meaning behind the dialogue form.

Presenter(s): Mark Houck
Major: Psychology
Faculty Advisor: Dr. Naomi Goldstein

Email: mjh348@drexel.edu
Academic Field: Psychology
Email: neg23@drexel.edu

Juveniles' Capacities to Enter Guilty Pleas and Oversight of the Guilty Plea Process

Author(s): Mark Houck, Sharon Messenheimer-Kelley, Christy Giallella, Naomi Goldstein,
Rachel Hirst

This theoretical study integrates developmental and legal research surrounding the juvenile guilty plea process to inform the legal policies and authorities (e.g., attorneys, judges, parents) that are involved with this process.. Developmental research suggests that juvenile delinquents experience diminished capacities in comprehension, appreciation, and decision-making in the legal arena when compared to adults (e.g., Cauffman & Steinberg, 2000; Steinberg, 2009). In addition, legal research indicates that proceedings, defense attorneys, prosecutors, and judges are heavily biased toward using guilty pleas (Drizin & Luloff, 2007; Kaban & Quinlan, 2004; Redlich, 2010). This bias, in combination with juveniles' diminished legal capacities, may increase juveniles' risk of falsely entering guilty pleas. The scope of this issue is great; 97-99% of convictions are the result of guilty pleas (Kaban & Quinlan, 2004; Redlich, 2010). With 488,000 juveniles adjudicated delinquent in 2009 (Puzzanchera, Adams, & Hockenberry, 2012), hundreds of thousands of youth are waiving their rights to trial and accepting plea offers, though they may not possess the required functional legal abilities (i.e., understanding, appreciation) to do so. This poster will review preexisting examples of judicial code development, policy revision, and education and training programs that have demonstrated effectiveness in reducing juveniles' risk of entering false pleas. This study extends the body of literature on juvenile guilty pleas by combining the existing forensic literature with developmental and legal research, and will aid in the development of empirically-based policies and practices surrounding the juvenile guilty plea process.

Presenter(s): Janna Howard
Major: Psychology
Faculty Advisor: Dr. Michael R. Lowe

Email: janna.b.howard@gmail.com
Academic Field: Psychology
Email: ml42@drexel.edu

Hedonic Hunger and Restrained Eating: An Examination of Their Effects on Consumption of Highly Palatable Snack Foods

Author(s): Janna Howard, Alice V. Ely, M.S., Michael R. Lowe, Ph.D.

The obesity epidemic, currently a major public health issue, has grown in recent years. Weight gain occurs through an imbalance between energy intake and energy expenditure. Due to the lack of effective, lasting treatment options for weight loss, prevention research examining factors that encourage excess energy intake is crucial. Two of these factors include hedonic hunger, or responsiveness to the food environment in absence of physical hunger, and cognitive restraint, or tendency to restrict or inhibit intake. Previous research suggests that higher levels of hedonic hunger and lower levels of cognitive restraint are predictive of greater intake of highly palatable foods following a preload. The current study examined this phenomenon; female undergraduate participants (n=77) completed measures of hedonic hunger (Power of Food Scale; PFS) and cognitive restraint (Three Factor Eating Questionnaire Cognitive Restraint Subscale; TFEQ-CR), ate an oatmeal preload, and participated in an ostensible taste test of highly palatable snack foods. Results revealed that neither the main effects of PFS total scores or TFEQ-CR scores alone, nor their interaction, were significant predictors of intake. However, there was a statistically significant interaction ($p=0.045$) between TFEQ-CR score and PFS Factor 1 score, a PFS subscale reflecting availability of palatable foods in the environment. Further examination revealed that this interaction was primarily due to significantly greater ($p=0.043$) mean snack food intake in participants with high TFEQ-CR and low PFS Factor 1 scores than those with high TFEQ-CR and high PFS Factor 1 scores. This finding is counterintuitive; possible explanations will be discussed.

Presenter(s): Steven Hromada
Major: Biology
Faculty Advisor: Dr. Gail Hearn

Email: sjh64@drexel.edu
Academic Field: Environmental Science
Email: gwh26@drexel.edu

Frog Distribution and Diversity along an Elevation Gradient near Moka, Bioko Island, Equatorial Guinea

Author(s): Steven Hromada, Amancio Motove Etingüe, Drew T. Cronin, Patrick J. McLaughlin, Gail Hearn

Bioko Island, Equatorial Guinea is an important and relatively understudied biodiversity

hotspot off the coast of West Africa. Containing habitats of both the Cross-Sanaga-Bioko Coastal Forests and the Mount Cameroon and Bioko Montane Forests ecoregions, as well as rugged topography, Bioko is home to high endemism and diversity across many taxa, including amphibians. Worldwide, changes in anuran community over an elevation gradient are known to be easily observable with traditional survey techniques. This project sought to build upon a 2010 study of the structure and density of the anuran community over an elevation gradient, in the area around the mountain village of Moka. 13 surveys were performed on 6 transects surrounding Moka, totaling 300 frogs sampled over an elevation gradient of approximately 900 m. Survey data were converted to sighting frequencies (frogs/hour), to estimate relative population density across transects and between species. Incorporating opportunistic surveys, an elevational range plot was also created for the most commonly encountered species in the area. Although only locally abundant on the Lago Biao transect, *Hyperolius tuberculatus* was the most commonly encountered species, while *Arthroleptis variabilis* was encountered on all transects and across the greatest range of elevations. Diversity was highest on the Cascades transect, while the relative density of frogs was highest on the upper Lago Biao transect. This project will serve as a baseline for future studies, and ideally lead the way for a long-term frog monitoring project in the Moka region.

Presenter(s): Yi Hu

Major: Environmental science

Faculty Advisor: Dr. Jacob Russell

Email: yh332@drexel.edu

Academic Field: Environmental Science

Email: jar337@drexel.edu

*Variation in Gut Communities across Diets and Colonies of the Ant *Cephalotes Varians**

Author(s): Yi Hu, Piotr Lukasik, Corrie Moreau, Jacob Russell

Insect guts are often colonized by multi-species microbial communities, and limited research suggests that these microbes can play integral roles in nutrition, digestion, and defense. While community composition can vary across species with increasing dietary divergence and decreasing relatedness, gut microbiota can also differ between conspecific insects and, possibly, within individuals over their lifespan. However, the degree of gut community differences within insect groups and the associated causes have not been well explored. In this study, we investigate the composition of microbial gut communities from a species of herbivorous ant, *Cephalotes varians*, exploring variation across colonies and from ants reared on different diets. We find that communities of *C. varians* are comprised of nine core bacterial species, which make up the majority of the gut microbiota in adult workers. However, the relative abundance differed significantly across colonies for at least one of these core microbes and for related bacteria from the same ant-specific lineages. Field-caught and lab-reared *C. varians* harbored slightly different gut communities, due largely to an increased abundance of a core Rhizobiales species in lab-reared individuals.

Dietary manipulations also altered relative bacterial abundance, with pollen promoting the proliferation of some Rhizobiales microbes. Our findings suggest that gut communities of *Cephalotes* ants show some plasticity, in spite of their stability across evolutionary timescales. Furthermore, when considered in light of our findings, pollen feeding across the *Cephalotes* genus suggests potential roles for gut microbes in the use of this dietary resource.

Presenter(s): John Hunyara
Major: Biological Sciences
Faculty Advisor: Dr. Elias Spiliotis

Email: jlh338@drexel.edu
Academic Field: Biological Sciences
Email: ets33@drexel.edu

Regulation and Organization of the Actin Cytoskeleton by Septin 2 in Renal Cells

Author(s): John Hunyara, Lee Dolat

Cell migration is a tightly regulated process during development and wound healing, but is aberrantly upregulated in metastatic cancers. A key event in cell motility is defined by the formation of adhesions between a cell and the surrounding extracellular matrix. Cell-ECM adhesions link to the contractile actin cytoskeleton, which is crosslinked and bundled by actin-binding proteins and myosin II motors, providing the traction forces necessary for translocation. Here, we investigate the role of septins, filamentous GTPases that are frequently misregulated in cancers, in the regulation of the actin cytoskeleton during cell migration. Previously, septins have been shown to interact with actin through myosin, but its role in actin assembly and/or organization in motile cells remains unknown. Septin 2 (SEPT2) is frequently overexpressed in renal cell carcinomas, a highly aggressive cancer with poor patient outcomes. Using the renal Marin-Darby canine kidney (MDCK) cell line, we investigate the role of septins in actin organization at cell-ECM adhesions. SEPT2 localizes to actin tethered to cell-ECM adhesions, and SEPT2 depletion using RNAi led to smaller and more numerous adhesions with reduced actin density relative to control cells. SEPT2 co-localizes with the actin-binding protein, tropomyosin-4, which recruits myosin II to nascent actin filaments, and alpha-actinin. Overexpression of alpha-actinin, an actin-crosslinking protein that regulates actin assembly at cell-ECM adhesions, rescued the size of cell-ECM adhesions and suggests that SEPT2 functions to crosslink the actin cytoskeleton. Ongoing studies aim to determine if SEPT2 is required for the localization of actin-binding proteins at cell-ECM adhesions.

Presenter(s): Anna Jaworski
Major: Environmental Science
Faculty Advisor: Dr. Kenneth Lacovara

Email: asj46@drexel.edu
Academic Field: Environmental Science
Email: kjl24@drexel.edu

Drowned Forests and Buried Salt Marshes: Reconstructing Local-relative Sea Level Change along the Delaware River Estuary

Author(s): Anna Jaworski, Kenneth J. Lacovara

As global temperatures rise, coastal communities and wetlands are at risk of inundation. Researchers have shown a global rate of sea level rise of 1.8mm/yr for the 20th. This long-term rate subsumes the more recent, and far more rapid, rate of sea level rise measured from 1993 to 2008 at 3.11 +/- 0.6mm/yr. Additionally, the 100-year estimate reflects eustatic change only. However, because of changes in base level and sediment supply, the effects of sea level rise do not manifest evenly along coastlines. Therefore, it is important to assess changes on a site-by-site basis. In this study, we determine the local-relative rate of sea level change for the Delaware Estuary coastline between the bay mouth and the C&D Canal. Since historic tide gauge records do not exist for the study area, we use the dendrochronologic record from a downed cedar forest and C14 dates of basal *Spartina* sp. peat to establish two independent proxies for local-relative sea level rise. Initial dendrochronology results show that the marsh has move 0.58km inland in the last 50 years. Understanding the historic response of a coastline to sea level rise permits policy makers and natural resource managers to better anticipate the effects of climate change on the estuary's fragile wetland biomes and coastal developments.

Presenter(s): Frank Jones
Major: Physics
Faculty Advisor: Dr. Luis Cruz Cruz

Email: fj38@drexel.edu
Academic Field: Physics
Email: lrc42@drexel.edu

Automated Neuron Recognition in Immunostained Images of the Fly Brain

Author(s): Frank Jones, Daniel Marenda, Luis Cruz

Individual locations of many neuronal cell bodies are required in order to obtain statistically significant measurements of spatial organization within the brain such as nearest-neighbour and microcolumnarity measurements. We hypothesize that the degree of order of micrometer sized structures in some areas of the fruit fly brain correlates with cognitive processing. In this work, we present a method of automated neuron recognition which obtains the (x, y) location of individual neurons within digitized whole brain immunostained images of the fruit fly brain. Identification of neurons is inherently difficult due to image resolution, magnification, and the overlap of neurons as a result of the

imaging process. To overcome these challenges and identify neurons, we apply a combination of image preprocessing techniques, image segmentation, and clustering algorithms. The steps involve adaptive equalization and thresholding to find potential neurons, and statistical analysis to distinguish between neuron and non-neuron objects. The resulting (x,y) locations are clustered together in 3D space to produce the 3 dimensional coordinates of each neuron. This process results in fast and accurate identification of neurons, greatly reducing recognition time when compared with manual measurement methods. Using this 3D data we will assess 3D positional relationships between neurons and test whether degrees of organization correlate with higher cognitive processing functions.

Presenter(s): Ashley Kalinski
Major: Biological Sciences
Faculty Advisor: Dr. Jeffery Twiss

Email: alk66@drexel.edu
Academic Field: Biological Sciences
Email: jlt98@drexel.edu

Spatial Constraints for mRNA Targeting to PNS vs. CNS Axons

Author(s): Ashley Kalinski, Rahul Sachdeva, John Houle

Neurons use axonal processes for short- and long-range communication. These processes can extend for centimeters from the cell body to their target in rodents. Injury to axonal processes disrupts their transmission of information and these cytoplasmic extensions must initiate a regrowth program to reinnervate targets and restore function. Although axons in peripheral nerves (PNS) readily regenerate, axons in the brain and spinal cord (CNS) are less successful. We recently showed that axonal protein synthesis supports regeneration in the PNS, but it is not known if injured CNS axons exhibit a similar molecular response. Here, we address this by comparing axonal mRNA content of CNS vs. PNS axons. We used a model of a peripheral nerve graft (PNG) into the transected rat spinal cord to support growth of injured central processes of sensory neurons, and performed fluorescent in situ hybridization to detect mRNAs that have been associated with the neuronal response to injury in the PNS. Importin β 1, Reg3a and Hamp1 mRNAs can be detected in the PNG axons, suggesting that regenerating CNS axons are capable of localized protein synthesis. However, the RNA content of these regenerating CNS axons is more comparable to naive rather than regenerating PNS axons, suggesting there are spatial constraints on where the neuron sends its mRNAs. Nonetheless, there does appear to be a decline in CNS axon mRNA content as these growing spinal axons near the distal end of the PNG, suggesting that the lack of synaptic contact could hinder the regenerative ability of these axons.

Presenter(s): Sakshi Kaul
Major: Biological Sciences
Faculty Advisor: Dr. James R. Spotila

Email: sakshi.kaul@drexel.edu
Academic Field: Biological Sciences
Email: spotiljr@drexel.edu

The Importance of Olfaction in Prey Detection by the Diamondback Terrapin

Author(s): Sakshi Kaul

The ability to find prey is an important ecological behavior that may be indirectly affected by anthropogenic activity. The northern diamondback terrapin (*Malaclemys terrapin* terrapin) is a Species of Special Concern in the State of New Jersey due to historical overharvesting and current habitat loss. Numerous studies have investigated the importance of vision and hearing in the terrapin life cycle, but none have addressed the potential importance of olfaction. This study seeks to determine the role of olfaction in prey detection by the terrapin. Turtles have intermediate nasal structures that specialize in olfaction within aquatic environments, suggesting that turtles can detect odors under water. Another study shows that sea turtles have the ability to detect dissolved chemicals and use olfaction to detect food, danger, and migratory pathways. To test the ability to detect prey in the terrapin, individual females (N=8) were placed in a 3-armed choice experiment, consisting of a central release chamber with three eight-foot arm extensions, oriented towards northeast, southeast, and west. One arm contained a dissolved odor that mimics the odor of a prey while two arms contained no odor. Six 10-minute control trials, in the absence of a stimulus odor, were first performed to control for individual variation. Six 10-minute experimental trials were then performed with prey odor dissolved in a random arm. The water in the tank was emptied and refilled between each trial. No significant difference was found in the amount time spent in each arm, suggesting that the terrapin may use other sensory cues for prey detection. Future studies with longer acclimation periods and controlled feeding times may help to strengthen these conclusions. The fact that terrapins may primarily use vision and/or hearing to detect prey may have important ecological consequences as this may limit the terrapin's ability to respond to anthropogenically modified environments.

Presenter(s): Christopher Kepics
Major: Physics
Faculty Advisor: Dr. Luis Cruz Cruz

Email: ck392@drexel.edu
Academic Field: Physics
Email: ccruz@drexel.edu

Simulating Amyloid- β Folding Under Confinement

Author(s): Christopher Kepics

Small aggregates of the Amyloid- β ($A\beta$) proteins have been implicated in the pathology of Alzheimer's disease. The mechanisms of formation of these aggregates, however, is not known. A first step in understanding this problem is to examine how a single peptide misfolds into pathologic structures in biologically-relevant environments. To this end, in this study molecular dynamics computer simulations are used to examine how a fragment of the $A\beta$, the $A\beta_{21-30}$, folds in a confined environment, mimicking cellular environments in vivo. This $A\beta_{21-30}$ fragment is important because it has been identified as a folding nucleus for the full-length protein. Confinement is modeled by a spherical fullerene of adjustable size containing the $A\beta_{21-30}$. This confinement limits the range of movement of the peptide favoring small conformational structures. By studying the $A\beta_{21-30}$ under these conditions, our goal is to gain valuable insight into how confinement can affect the folding dynamics of the full-length protein.

Presenter(s): William King
Major: Physics
Faculty Advisor: Dr. Luis Cruz Cruz

Email: wking@drexel.edu
Academic Field: Mathematics
Email: ccruz@physics.drexel.edu

Teaching Software Carpentry: Better Science through Science

Author(s): William King

Most scientists use software to help with their research, and many scientists write their own software to control experiments, analyze data, or simulate theoretical behavior. During their education, scientists may be trained in experiment design and numerical analysis, but training in software construction is usually limited to a single introduction to C or numerical methods course. While languages and algorithms are certainly fundamental, the lack of formal training in higher level software design skills leads to difficulty in generating robust, reproducible scientific software. The Software Carpentry organization has been leading workshops and teaching courses at institutions around the world introducing scientists to the basics of software development: version control, testing, data management, modular coding, Current workshops are two-day events with subject matter experts leading lectures with students (helped by knowledgeable assistants) following along on their personal computer. With limited time and resources, maximizing

the demonstrable efficiency of instruction is important. I will discuss factor analysis and related methods for designing and analyzing pre- and post-workshop surveys to assess the effect of the workshop on student understanding.

Presenter(s): Tara Knox
Major: Biology
Faculty Advisor: Dr. Elias Spiliotis

Email: tkk28@drexel.edu
Academic Field: Biological Sciences
Email: ets33@drexel.edu

Investigating the Molecular Cause of Hereditary Neuralgic Amyotrophy

Author(s): Tara Knox, Xiaobo Bai, Elias T. Spiliotis

Hereditary neuralgic amyotrophy (HNA) is a rare autosomal dominant neuropathy that is characterized by sudden onset of severe pain in the shoulder girdle, together with arm and shoulder muscle degeneration (atrophy). To date, the only gene associated with HNA is septin9 (SEPT9). Missense mutations of SEPT9, R88W and S93F, and partial duplication of SEPT9 sequence have been reported in HNA patients. Septins are oligomeric GTP-binding proteins and SEPT9 was found to associate with microtubules (MTs) and regulate MT-dependent processes. By incubating the SEPT9_i3 or its mutants with pre-polymerized microtubules and sedimenting the complexes at 39,000xg (high speed pelleting) or 8,000xg (low speed pelleting), we tested the ability of the proteins to bind and bundles microtubules, respectively. The high speed pelleting assay showed that neither the missense mutations nor the partial duplication (aa19-233) of SEPT9_i3 alter the microtubule binding of SEPT9_i3. The low speed pelleting assay showed that both missense mutations can decrease the microtubule bundling to 30% of the wild type levels. The low speed pelleting assay with partial duplication shows a significant increase in MT bundling. Visual assays were also performed by incubating polymerized rhodamine-MT with wild type SEPT9_i3, the mutations or partial duplication. Wild type SEPT9_i3 induced bright and long MT bundles. Missense mutations resulted in a decrease of the brightness and length of MT bundles. In contrast, MT bundles induced by the partially duplicated mutant were both brighter and longer than wild type. Collectively, our data suggest that the HNA-associated mutations and partial sequence duplication disrupt the intracellular organization of microtubules and thus might contribute to the pathology of the disease.

Presenter(s): Sravanthi Koduri
Major: Biological Sciences
Faculty Advisor: Dr. Jane Clifford

Email: sk933@drexel.edu
Academic Field: Biological Sciences
Email: jane.clifford@drexelmed.edu

The Participation of Sp1 and p300 in Double Strand Break Repair Choice

Author(s): Sravanthi Koduri, Kate Beishline

Double Strand Breaks (DSBs) are the most detrimental DNA lesions, as they may lead to genomic rearrangements and loss of genetic material which can contribute to the development of cancer. The cell has two mechanisms by which it can repair the damage: Homologous Recombination (HR) and Non-homologous End Joining (NHEJ). Sp1, Specificity Protein 1, has been shown to contribute directly to DSB repair. In addition, p300, a histone acetyl-transferase, is recruited to the sites of damage by Sp1 and is involved in nucleosome remodeling around the DSB to facilitate repair. Whether Sp1 and p300 are involved in the cellular decision between HR and NHEJ remains to be studied. To monitor the repair of DSBs in cells, the Traffic Light Reporter System (TLR), will be utilized to distinguish cells performing HR or NHEJ by green and red fluorescent reporters. The TLR system will be enhanced with an optimal red fluorescent protein, tdTomato for more sensitive detection of NHEJ. The levels of HR and NHEJ will be monitored in cells depleted of Sp1 and p300. We aim to determine the effect on depletion of these proteins on the repair process of cells. In addition we can rescue these experiments with mutants of both proteins to show direct function in the repair processes. The results from these experiments will elucidate the role of Sp1 and p300 in the cellular choice of HR vs. NHEJ and allow for more insight into the DNA damage repair pathway in normal and cancerous cells.

Presenter(s): Mark Kondrla Jr
Major: Physics/Mathematics
Faculty Advisor: Dr. Alejandro Carabe-Fernandez

Email: mpk44@drexel.edu
Academic Field: Physics
Email: A.Carabe@uphs.upenn.edu

Radiobiological Optimization in Proton Radiotherapy

Author(s): Mark Kondrla Jr, Daniel Sánchez Parcerisa, Alejandro Carabe-Fernandez

Optimization of dose distributions in radiotherapy has been part of the recent developments of treatment planning software (TPS). It is based on the development of mathematical algorithms that take into account the fundamental physics of particle interactions with matter and combines it with cost functions in order to produce the best radiation dose distribution for a given target volume (tumor) and surrounding tissues.

There is published data [Grassberger et al, Int J Radiat Oncol Biol Phys. 2011 Aug 1;80(5):1559-66] that allow one to think there is room in proton radiotherapy to optimize treatments not only in terms of dose distributions but also in terms of the proton stopping power characterized by the Linear Energy Transfer (LET) distribution within beam. It is well known that radiation effectiveness to induce damage in the DNA structure increases with LET, so optimization techniques are based on reducing the dose and the LET to the normal tissue while increasing them within the tumor to enhance the effectiveness of the treatment. However, there are no data showing a second level of optimization: How much dose can we eliminate from the treatment plan, by increasing the LET inside the targeted volume (tumor) while maintaining the effectiveness of the treatment? We will implement an analytical LET and Dose model and then test our optimization scheme on a treatment plan involving a brain tumor. We will then compare and contrast our plan with the treatment plan that was administered.

Presenter(s): Coleman Krawczyk
Major: Physics
Faculty Advisor: Dr. Gordon Richards

Email: cmk82@drexel.edu
Academic Field: Physics
Email: gtr@physics.drexel.edu

Mid-IR through UV SEDs and Dust Reddening in SDSS Quasars

Author(s): Coleman Krawczyk, Gordon Richards

We explore the form of extragalactic reddening of $\sim 50,000$ quasars with redshifts $0 < z \leq 2.2$. Our sample comes from the Sloan Digital Sky Survey's (SDSS) 7th data release, cross-matched to Spitzer and WISE in the mid-IR, 2MASS and UKIDSS in the near-IR, and GALEX in the UV. We normalize our photometry by the modal quasar color as a function of redshift to see if the resulting SED is well fit by a power-law or if there is evidence of curvature from dust reddening. From this fit we find that the quasar reddening is well described by a LMC-like or SMC-like reddening law.

Presenter(s): Nicholas Kruczek
Major: Physics
Faculty Advisor: Dr. Brigita Urbanc

Email: nek26@drexel.edu
Academic Field: Physics/Biology
Email: brigita@physics.drexel.edu

The Effect of Amino Acid Substitutions K16A and K28A on Amyloid Beta-Protein Self-Assembly

Author(s): Nicholas Kruczek

Alzheimer's disease (AD) is the leading cause of dementia among elderly. The build-up of amyloid beta (AB) aggregates in the brain is associated with the onset of AD, an affliction that leads to a massive loss of neurons. Of the two predominant AB alloforms in the brain, AB40 and AB42, the latter forms more toxic assemblies. Molecular tweezers, which specifically bind lysine (K) residues, were recently shown to inhibit AB toxicity and the effect of two amino acid substitutions, K16A and K28A, was shown to significantly affect the resulting toxicity.

Discrete molecular dynamics (DMD) simulations combined with the four-bead peptide model in implicit solvent were shown to reproduce the experimentally observed AB40 and AB42 oligomer size distributions. Here, we applied this DMD approach to simulate oligomer formation of the AB40 and AB42 mutants. This approach allows us to calculate oligomer size distributions that can be directly compared to experimental distributions and can also be used to see statistically significant differences between the mutant peptides and their wild type counterparts. These differences correspond to fundamentally different structures that can be explored in further detail through analysis of higher order structures, the solvent accessible surface area, and others. Studying the differences found in [K16A]AB and [K28A]AB will provide clues to how toxicity of AB oligomers is affected by their structure and what role the two Lys residues play in the assembly. The resulting structure--toxicity relationship will in turn provide important information needed for development of drugs that specifically target AB oligomers.

Presenter(s): Lindsey Kummerer
Major: Biology
Faculty Advisor: Dr. Jake Owens

Email: lk423@drexel.edu
Academic Field: Biological Sciences
Email: jowens102@gmail.com

The Species Abundance Between Elevation Ranges and General Habitat Use of Galagos in Moka, Bioko Island, Equatorial Guinea

Author(s): Lindsey Kummerer

Bioko Island, Equatorial Guinea is home to eleven species of primates, including four species of galagos. Several of these species are endemic to the island. We studied relative

abundance levels of the four different species of galagos on Bioko Island, along six trails near Moka Wildlife Center in the southeastern part of the island to investigate species abundance levels and general habitat use. A total of 52.6 km were surveyed over 10 days. We encountered a total of 61 galagos with a rate of 1.16 encounters/km. In comparison to previous studies on these trails, encounter rates of Pallid Needle-Clawed galago (*Euoticus pallidus pallidus*) remain the smallest, while Demidoff's galago (*Galagoides demidovii*) and Allen's galago (*Sciurocheirus alleni alleni*) were again encountered most frequently. However, there was an overall decrease in the encounter rate of this survey and the previous (2.78 galago/km to 1.16 group/km). In comparing the number of encounters between three elevation ranges (1135-1335m, 1336-1535m, and 1536-1735m) there seems to be a preference toward elevations in the range of 1336-1535m. Looking at general vegetation use of galagos, the majority of encounters were made in forest and roadside trees (42 out of 61 encounters). Unfortunately, a limitation to this study was the disruption of trails by hunters; hunters were encountered on three out of 10 surveys, which is an increase from previous studies. This study contains information about general habitat use and distribution of galagos in Moka, Bioko Island, which with further investigation may yield important data about conserving these populations.

Presenter(s): Joseph Lambert

Major: Physics

Faculty Advisor: Dr. Roberto Ramos

Email: jgl29@drexel.edu

Academic Field: Physics

Email: robertoramos99@gmail.com

Conductance Fluctuation Measurements of Superconducting Graphene Devices

Author(s): Joseph Lambert, Steven Carabello, Roberto Ramos

We report on gate voltage dependent conductance fluctuations (CF) in superconducting graphene devices and compare measurements in the superconducting versus normal state at temperatures down to 20 mK. The CF arise from the averaged interference of charge carrier wave functions caused by scattering in the graphene. An enhancement in the magnitude of the average CF is expected when in the superconducting state due to Andreev reflections. We fabricate devices by contacting graphene with two parallel superconducting leads that are spaced a few hundred nanometers apart. The leads are a Pd/Al or Ti/Al bilayer with the thin Pd or Ti layer providing high transparency contact to graphene. On going results will be presented.

Presenter(s): Adria Leeper-Sullivan
Major: English
Faculty Advisor: Dr. Eva Thury

Email: acl56@drexel.edu
Academic Field: English, History, Psychology
Email: thury@drexel.edu

U.S. Travel Writing Trends And The Future of Travel Writing

Author(s): Adria Leeper-Sullivan

Travel writing is a genre that deals with objective reality, but is subjected to the personal views of the author. Researchers argue this genre is unable to prove itself as non-fiction creating tension around the genre's continuance (Bissell; Soumani; Sillem). Globalization also threatens travel writing because the world is synthesizing cultural, political, and economic variants (Zakaria; Defoe; Farley; Culler). My research is inspired by Pratt's definition of autoethnography: when an insider provides information to outsiders so they can understand the customs of a regional culture. Descriptions of how Americans interact across the states in these travel narratives is revealing of a writer's perspective. My project analyzes the autoethnographic information provided by American travelers writing about the U.S. in three periods: 1960's to early 1970's (Steinbeck, Beagle), mid 1970's through 1980's (Dillard), and 1990's to present (Ellis, Miller, blogs). The project has identified aspects of U.S. cultural identity, revealing patterns of disclosure and assessing the future of travel writing domestically and in the globalizing world. The genre reveals a path of discovery in the United States including identity, isolation, proof of self, to interactive social media. Self-discovery does not destroy the details of location but enriches it. The argument that globalization will produce a world without variation is unrealistic and as personal aspects of the genre become more important to writers, they also become the life force of travel writing as a whole.

Presenter(s): Martin Leichter
Major: Psychology
Faculty Advisor: Dr. Eva Thury

Email: mwl32@drexel.edu
Academic Field: English
Email: thury@drexel.edu

Opinions on Cormac McCarthy's Child of God

Author(s): Martin Leichter

Despite Cormac McCarthy's popularity, not much is known about his books or how they should be interpreted. *Child of God* is a McCarthy novel that scholars have called violent (Hayes, Owens-Murphy, Brewton, Mark, Bartlett), comedic (Hayes), full of religious rhetoric (Combast), about nothing but poorly stereotyped rednecks (Carr), and animalistic (Carr, Owens-Murphy, Bartlett). This study explores what the reading public thinks of this novel. In order to achieve this, I did a content analysis of Amazon book reviews. To make

sure that this process of coding Amazon reviews went smoothly, I researched ways to read these reviews and interpret their validity (Salvetti, Angemeer, Huang). The goal of this was to reveal a pattern among these reviews. After these reviews were coded and analyzed, they were compared to scholarly pieces. This is the first project of this sort done on McCarthy's *Child of God*. I looked for patterns among Amazon reviewers and whether these readers say similar or different things than scholars. The Amazon readers displayed most of the categories of analysis found among the scholars but the categories they emphasized were different. The other main difference I found is that some Amazon reviewers compared *Child of God*'s main character to Ed Gein, a 20th century murderer who inspired iconic villains Buffalo Bill (*Silence of the Lambs*) and Leather Face (*The Texas Chainsaw Massacre*).

Presenter(s): Brittany MacLean
Major: International Area Studies
Faculty Advisor: Dr. Kathleen Volk Miller

Email: bkm42@drexel.edu
Academic Field: English
Email: krv23@drexel.edu

Celebrating 40 Years of Painted Bride Quarterly: A Retrospective

Author(s): Brittany MacLean

With its 40th birthday taking place this year, *Painted Bride Quarterly* has reason to celebrate. Birthed at Philadelphia's *Painted Bride Art Center* in 1973, PBQ is now housed at Drexel University and is still going strong. Few literary magazines can say they've lasted four decades, but the years were not without their difficulties, triumphs, and changes. With this significant anniversary close at hand, there is no better time to take a retrospective look at PBQ's journey. This project will give an overview of PBQ's history, while also focusing in on each decade and editorial board in order to identify changing trends. The information garnered from my research is not only useful in situating PBQ historically, but also in lending some insight as to its role in the literary field today. So much work was put into running this literary magazine for the past forty years that editors and writers could rarely pause to see what impact they were having on a larger scale. With this presentation, the importance of the magazine, drawn not only from the talent it publishes but also its continual presence over the decades, will be displayed proudly to the community.

Presenter(s): Dimitri Madonis
Major: Biomedical Engineering
Faculty Advisor: Dr. James R. Spotila

Email: dcm76@drexel.edu
Academic Field: Biological Sciences,
Environmental Science
Email: spotiljr@drexel.edu

Quantification and Potential Evolutionary Selection of Orange Pigments on the Terrapin

Author(s): Dimitri Madonis, Abby E. Dominy, James R. Spotila, Harold W. Avery

As a keystone species, terrapins occupy an important ecological niche in complex estuarine ecosystems. Through predation, terrapins exert top-down ecological control on crabs and mollusks, and through reproduction, provide predators with nutrients and calories from their eggs, thus providing an important link in the food chain. Understanding this Species of Special Concern in New Jersey is critical to conservation. Studying the phenotypic coloration expressed by terrapins can help us to understand if they use this to conceal themselves, communicate, and/or regulate physiological processes. Orange coloration in animals, which is usually the result of carotenoid pigment deposition in dermal tissue, is frequently cited as a marker of genetic quality and/or foraging efficiency in several vertebrate species. To quantify orange color patterning, we examined 369 high resolution digital photographs of male terrapin plastrons. These images were analyzed using MATLAB programming to find the ratio of “orange” coloration that the plastron contained. The resulting data were then analyzed using a Chi-Square Goodness of Fit Test which indicated that the distribution was significantly different than normal ($p < 0.05$), and instead was skewed right, meaning that many terrapins have a small proportion of orange coloration and only a small number had a high proportion of orange coloration. Further analyses will be completed to explore the presence of other specific pigments (i.e. red, yellow, green, brown). These findings have implications for potential color selection in the terrapin, either through natural or sexual selection, and can be applied to other organisms of similar nature.

Presenter(s): Raffaella Marano
Major: Environmental Science
Faculty Advisor: Dr. Dane Ward

Email: rm857@drexel.edu
Academic Field: Biological Sciences,
Environmental Science
Email: dcw33@drexel.edu

The Effects of Substrate Type on the Behavior and Movement of Pituophis melanoleucus, the Northern Pine Snake

Author(s): Raffaella Marano, Jacquelyn Garcia, Katie D'Amelio, Spencer Roberts, Kevin P. Smith, Walter F. Bien

Paved and unpaved roads can act as barriers to ecosystem connectivity linkages. Increased road density contributes to habitat fragmentation, wildlife mortality, loss of genetic corridors, and decreased reproductive success. Roads represent a major threat to slow moving herpetofauna that are extremely vulnerable to vehicular road injuries and death. Of 536 reported occurrences for northern pine snakes (*Pituophis melanoleucus*) in the New Jersey biotics database 120, or 23%, were dead on road (NJDEP, 2009). We examined the mean rate of movement of the northern pine snake across three different substrates: sand, asphalt, and concrete. We tested twelve snakes ($n=12$) in spring, summer, and fall 2012 at the Warren Grove Gunnery Range (WGR), Burlington County New Jersey. Snakes had the fastest rate of movement across sand ($\bar{x}=0.11\text{m/s}$) compared to paved substrates: asphalt (0.09m/s) and concrete (0.06m/s). These data suggest that coarser substrates facilitate increased mobility of snakes. In addition, we examined whether snakes would move through under-road-culverts. We installed nine 12-inch diameter culverts under a new military runway at WGR to monitor wildlife movements. We documented 364 'visits' at the mouth of the culverts and 54 'usage' events (14.8% culvert usage by visiting fauna, including snakes). These data support that culverts are a viable option for mitigating road impacts to wildlife. To better understand the impact of roads on genetic exchange of pine snakes a landscape genetic study is warranted.

Presenter(s): Matthew Mawhinney
Major: Physics
Faculty Advisor: Dr. Brigita Urbanc

Email: mtm93@drexel.edu
Academic Field: Physics, Biological Sciences
Email: brigita@drexel.edu

Application of biophysical methods to elucidate pathways of insulin assembly

Author(s): Matthew Mawhinney, Tom Williams

A large number of proteins self-assemble into amyloid fibers. Protein misfolding and aberrant fibrillization underlie many neurodegenerative conditions, such as Alzheimer's and Parkinson's disease. Insulin, which does not self-assemble under physiological

conditions, becomes amyloidogenic at low pH and high temperatures, making it a good candidate for studying the mechanisms that causes fibril formation. To monitor aggregation of insulin into fibrils, kinetic Thioflavin T (ThT) fluorescence spectroscopy is used. ThT is a fluorescent dye binding to the cross-beta structure that characterizes amyloid fibrils. To monitor initial pre-fibrillar stages of insulin self-assembly, photo induced cross-linking of unmodified proteins (PICUP) and Sodium Dodecyl Sulfate-Polyacrylamide gel electrophoresis (SDS-PAGE), are applied. We further explore the effect of crowding agents on insulin aggregation. Comparison of structural data to computational modeling will help us unravel the key interactions driving amyloid formation and its inhibition.

Presenter(s): Garrett Mayo
Major: Biology
Faculty Advisor: Dr. Jacob Russell

Email: gsm43@drexel.edu
Academic Field: Biological Sciences
Email: jar337@drexel.edu

Pea aphid defensive symbiont dynamics in response to parasitoid wasp

Author(s): Garrett Mayo, Drew Smith, Jacob Russell

Molecular techniques have recently demonstrated numerous mutualisms between heritable bacterial endosymbionts and their animal hosts. The pea aphid, *Acyrtosiphon pisum*, hosts a variety of non-essential symbionts that confer important ecological traits, including thermo-tolerance and improved resistance to parasitism and fungal pathogens. Pea aphids can reach high densities on crops, and are regulated, to some extent, by the parasitoid wasp, *Aphidius ervi*. One bacterial endosymbiont, *Hamiltonella defensa*, is known to increase pea aphid resistance against *A. ervi*. Therefore, we expect that changes in wasp density will correlate with *H. defensa* frequency under natural environmental conditions. In order to test this hypothesis, aphids in PA and NY were collected from alfalfa and clover fields over nine sampling dates during the spring, summer, and fall of 2011. These samples were screened for various symbionts using a diagnostic PCR. Aphids were reared on plants in the lab to determine rates of parasitoid mortality, and sweep net sampling provided data on wasp density. *H. defensa* frequency positively correlated with wasp density in alfalfa, but not in clover populations. While wasp densities were higher in alfalfa fields, parasitoid-induced pea aphid mortality was higher for aphids from clover. This was probably a reflection of higher frequencies of *H. defensa* in alfalfa. Overall, it is likely that wasp density is driving changes in *H. defensa* frequency in alfalfa but not clover. In future work, field cage experiments will be conducted to more carefully measure the effects of *H. defensa* on wasp populations under natural conditions.

Presenter(s): Drew McQuade
Major: Environmental Science
Faculty Advisor: Dr. James R. Spotila

Email: dpm53@drexel.edu
Academic Field: Biological Sciences,
Environmental Science
Email: jrspotila@verison.net

Site Fidelity and Social Behavior in the Diamondback Terrapin (Malaclemys Terrapin)

Author(s): Drew McQuade, Katelynn Keen

The diamondback terrapin, a Species of Special Concern in New Jersey, is ecologically important to its estuarine environment where it plays the role of an ecosystem engineer. Subspecies of terrapin range up and down the salt marshes on the Eastern and Gulf Coasts of the United States, with data supporting behavioral similarity amongst the subspecies. Some populations, such as those in costal South Carolina, have been shown to exhibit high site fidelity as adults while also participating in social breeding aggregations. To quantify site fidelity and potential social behavior in the Barnegat Bay, NJ population, we analyzed GPS locations, morphometrics and environmental data collected over seven years of an on-going population study. Using environmental and morphological data, we also assessed differences in site fidelity before and after reaching adulthood, a subject that has received little attention. Our results demonstrate sex-biased movement patterns, with females traveling much longer distances than males. Individuals were also found to cluster in similar home-range areas and were recaptured together several times, indicating close associations between individuals. The results of this study have conservation implications because species with high site fidelity are often vulnerable to local extinction. Coupled with habitat loss, exploitation, and anthropogenic Injury and death, the true viability of the terrapin can only be determined by understanding the ecological ramifications of these deleterious effects.

Presenter(s): Zhou Meng
Major: Biology
Faculty Advisor: Dr. Joe Bentz

Email: zm55@drexel.edu
Academic Field: Biological Sciences
Email: bentzj@drexel.edu

Comparison of P-gp Surface Densities and P-gp Elementary Kinetic Rate (Binding and Transport) Constants in Caco-2 and MDCKII-hMDR1 Cells

Author(s): Zhou Meng, Neha Akella, Harma Ellens, Joe Bentz

P-glycoprotein (P-gp) has been extensively studied as a human multidrug resistance transporter. Using the mass action kinetic model without imposing the steady-state assumptions, previous studies have identified on-, off- and efflux rate constants (k_1 , k_r and k_2 to P-gp) in MDCKII-hMDR1 confluent cell monolayer. However, little is known whether

these rate constants can be extrapolated to human Caco-2 cell line and whether fitted efflux active Pgp surface density in these different cell lines correlate with Pgp mRNA levels. In our experiments, transport of a range of concentrations of amprenavir, quinidine and loperamide across Caco-2 confluent monolayer were measured apical to basolateral and basolateral to apical. Using a global optimization program with the mass action kinetic model, we have successfully fitted on-, off- and efflux rate constants (k_1 , k_r and k_2 to P-gp). They are very similar in magnitude (within 3 fold difference) to those obtained previously in MDCKII-hMDR1 cells (Agnani et al., PLoS-one, 2011, included for comparison). On the contrary, the fitted efflux active P-gp surface densities and measured mRNA levels are substantially different between the cell lines. Efflux active P-gp surface density was 6.7 fold and mRNA levels 8.7 fold lower in Caco-2 compared to the MDCKII-hMDR1 cells. The similarity in Pgp elementary rate constants in two different cell lines shows these can be extrapolated between systems. Fitted efflux active Pgp surface density in Caco-2 and MDCKII-hMDR1 cells correlates with Pgp mRNA levels, providing further support for fitted efflux active Pgp surface density values.

Presenter(s): Derya Meral
Major: Physics
Faculty Advisor: Dr. Brigita Urbanc

Email: dm559@drexel.edu
Academic Field: Biological Science/Physics
Email: brigita@physics.drexel.edu

Discrete Molecular Dynamics Study of Oligomer Formation by N-Terminally Truncated Amyloid β -Protein

Author(s): Derya Meral, Brigita Urbanc

In Alzheimer's disease (AD), amyloid β -protein ($A\beta$) self-assembles into toxic oligomers. Of the two predominant $A\beta$ alloforms, $A\beta$ 1-40 and $A\beta$ 1-42, the latter is particularly strongly linked to AD. N-terminally truncated and pyroglutamated $A\beta$ peptides were recently shown to seed $A\beta$ aggregation and contribute significantly to $A\beta$ -mediated toxicity, yet their folding and assembly were not explored computationally. Discrete molecular dynamics (DMD) approach previously captured in vitro-derived distinct $A\beta$ 1-40 and $A\beta$ 1-42 oligomer size distributions and predicted that the more toxic $A\beta$ 1-42 oligomers had more flexible and solvent exposed N-termini than $A\beta$ 1-40 oligomers. Here, we examined oligomer formation of $A\beta$ 3-40, $A\beta$ 3-42, $A\beta$ 11-40, and $A\beta$ 11-42 by the DMD approach. The four N-terminally truncated peptides showed increased oligomerization propensity relative to the full-length peptides, consistent with in vitro findings. Conformations formed by $A\beta$ 3-40/42 had significantly more flexible and solvent exposed N-termini than $A\beta$ 1-40/42 conformations. In contrast, in $A\beta$ 11-40/42 conformations the N-termini formed more contacts and were less accessible to the solvent. The compactness of the $A\beta$ 11-40/42 conformations was in part facilitated by Val12. Two single amino acid substitutions that reduced and abolished hydrophobicity at position 12, respectively,

resulted in a proportionally increased structural variability. Our results suggest that A β 11–40 and A β 11–42 oligomers might be less toxic than A β 1–40 and A β 1–42 oligomers and offer a plausible explanation for the experimentally observed increased toxicity of A β 3–40 and A β 3–42 and their pyroglutamated forms.

Presenter(s): Andrea Messina
Major: Biology
Faculty Advisor: Dr. Jacob Russell

Email: am888@drexel.edu
Academic Field: Environmental Science
Email: ahs55@drexel.edu

Pea Aphid, Acyrthosiphon Pisum, Symbiont Diversity over Time and Space.

Author(s): Andrea Messina, Andrew Smith, Jacob Russell

Aphids, whose populations in nature are regulated by natural enemies and abiotic conditions, are known to feed on a variety of plant species and can reach high densities on crops such as alfalfa and clover. The pea aphid can harbor one or more of seven known heritable secondary symbionts that can provide ecological benefits such as thermotolerance, defense against parasitoid wasps and fungal pathogens, and host plant utilization. Variable environmental conditions may influence symbiont frequencies and their diversity within populations. This is hypothesized to explain the high variety of secondary symbionts in the pea aphid. To better understand the relationship between biotic and abiotic seasonal changes and the prevalence and diversity of symbionts, aphids were collected from alfalfa and clover in New York and Pennsylvania over nine sampling dates. Using PCR, the infection status of over 900 pea aphid samples was determined by testing for six known secondary symbionts. It was expected that symbiont frequencies would differ in correlation to changing environmental conditions. An average of 1.7 to 2.3 symbionts per aphid was discovered on clover and alfalfa, respectively. Some co-infection frequencies (i.e. combinations of multiple symbionts in single aphids) occurred more often than expected. Also, high levels of multiple infection were observed on several dates in alfalfa. These data suggest that multiple infection status varied over time and space and may provide benefits to pea aphids under certain environmental conditions. Few studies have analyzed the fitness costs or benefits of multiple infection, suggesting a clear need for further investigation.

Presenter(s): Rickie Miglin
Major: Psychology
Faculty Advisor: Dr. James R. Spotila

Email: rlm87@drexel.edu
Academic Field: Biological Sciences
Email: spotiljr@drexel.edu

The Quantification of Spectral Reflectance in Diamondback Terrapin Skin

Author(s): Rickie Miglin, Kathy Tong, Abigail Dominy, Harold W. Avery

The coloration of many vertebrates is often thought to have evolved to serve a functional purpose. In many bird and fish species, coloration has been linked to behavioral characteristics such as thermoregulation and communication. However, it is not well understood whether coloration of turtles provides certain ecological advantages. Spectral reflectance data show that the diamondback terrapin (*Malaclemys terrapin*) reflects colors from 300-700nm, including color in the near-ultraviolet (UV) wavelengths of light. There is evidence that the terrapin has tetrachromatic color vision and is sensitive to four color channels, including UV light. In essence terrapins can see the UV colors on each other. We sought to quantify the difference in reflectance of different anatomical areas on the terrapin through the use of Principal Component Analysis (PCA). In this study, reflectance data were collected from a large sample of terrapins in Barnegat Bay, NJ. We were particularly interested in investigating whether anatomical sampling points, such as chin skin, that reflect higher amounts of UV radiation than other sampling points, would be significantly different than other sampling points in terms of reflectance. This would provide evidence that UV radiation is a source of great variation between sampling points, and that it may serve an important evolutionary purpose, such as communication. The principal components that were derived were analyzed for statistical significance using the Multivariate Analysis of Variance (MANOVA) test. Chin skin reflectance was found to be significantly different from other sampling points in terms of reflectance ($p < .05$). Understanding the difference in spectral reflectance between different areas of terrapin skin will further contribute to an understanding of the visual signals that may serve as an important biological function to this species.

Presenter(s): Owen Montgomery
Major: Physics
Faculty Advisor: Dr. Charles Lane

Email: Om49@drexel.edu
Academic Field: Physics
Email: lane@duphy4.physics.drexel.edu,

Rutherford Scattering and Improving the Gold Foil Experiment

Author(s): Owen Montgomery

Rutherford Scattering is a phenomenon first observed by Ernest Rutherford in his famous 1911 "Gold Foil" experiment. He was, however, limited by the technology of his time. In

this project, we will attempt to use modern computing techniques to design a more robust experiment than could have been built by Rutherford 100 years ago, and use it to find patterns in and enhance our understanding of Rutherford Scattering.

Presenter(s): Crystal Moorman
Major: Physics
Faculty Advisor: Dr. Michael Vogeley

Email: cmm436@drexel.edu
Academic Field: Physics
Email: msv23@drexel.edu

The Impact of Environment on HI-Selected Galaxies

Author(s): Crystal Moorman

The current cosmological model of the universe predicts an abundance of low-mass dark matter halos (DMHs) within both densely populated regions and voids. Voids are significantly under-dense regions of the universe where little visible matter exists. Assuming a linear relationship between dark matter halo mass and luminosity, we expect to see a plethora of low-mass, low-luminosity galaxies within DMHs across all environments; however, cosmological surveys fail to find the predicted number of low-luminosity galaxies in voids. Properties of galaxies within the voids should provide tests of the accuracy of our cosmological and galaxy evolution models. We select and determine the stellar properties of void galaxies using the Sloan Digital Sky Survey (SDSS) and measure the neutral hydrogen (HI) content of extragalactic gas clouds using the Arecibo Legacy Fast ALFA (ALFALFA) Survey. We cross-match these two samples and compute the Luminosity- and HI-Mass Functions of the SDSS galaxies with detectable HI clouds. We then use these functions to compare the star formation and galaxy evolution of void vs. non-void galaxies.

Presenter(s): Mohamad Nayal
Major: Biological Sciences
Faculty Advisor: Dr. Daniel Marendia

Email: mohamadnayal@gmail.com
Academic Field: Biological Sciences
Email: daniel.marendia@drexel.edu

The Role of TCF4 in Development of Pitt Hopkins Syndrome in a Drosophila Model

Author(s): Mohamad Nayal, Kaveesh Kutty

Pitt Hopkins Syndrome, a neurological disorder that causes intellectual disability, decreased motor function, hyperventilation, and seizures, has been associated with a defect in the gene for TCF 4, a basic Helix-loop-helix protein. Basic Helix loop-helix proteins

contain a domain that binds to specific DNA sequences for transcription. Daughterless, a fly homolog of TCF4, is involved in multiple processes, including sex determination, neurogenesis, somatic stem cell maintenance, and regulation of transcription. *Drosophila* is a tractable model for understanding neuronal circuitry underlying behavior. By manipulating Daughterless expression throughout the neurons as well as in targeted presynaptic and postsynaptic zones in *Drosophila* the importance of Daughterless (and homologous functions of TCF 4) in neuronal development can be better understood. Here, we describe the functions of Daughterless in the development of the neuromuscular junction in the fly. We show that Daughterless has a function in the development of synapses of this tissue. Knowledge of the Daughterless gene in *Drosophila* could provide invaluable information about the underlying causes of Pitt Hopkins Syndrome in humans.

Presenter(s): Noga Neeman
Major: BEES
Faculty Advisor: Dr. Michael P. O'Connor

Email: nn72@drexel.edu
Academic Field: Biological Sciences,
Environmental Science
Email: oconnomp@drexel.edu

Do Leatherback Turtles Shift their Nesting Seasons as a Response to Changes in Sea Surface Temperature?

Author(s): Noga Neeman, Nathan J. Robinson, Michael P. O'Connor, James R. Spotila, Frank V. Paladino

Modern species of sea turtles have survived past shifts in climate. However, current rates of increase in atmospheric greenhouse gases and associated temperature changes are very rapid and it remains unclear whether sea turtles, limited by their long generation times, will be able to adapt to new conditions. If they do, it may be by changing their nesting; either by moving to new beaches or by shifting their nesting season. The aim of this study is to determine whether the leatherback populations nesting at two Caribbean beaches (Tortuguero, Costa Rica and St. Croix, US Virgin Islands) are shifting their nesting seasons in response to changing sea surface temperatures. Correlations were made between sea surface temperatures both at nesting and foraging sites and Julian date by which certain percentiles (10th, 25th and 50th) of nests have been laid on each beach. The correlation between temperature and net primary production (NPP) was also studied for each site. The temperature at the nesting sites did not have an effect on nesting dates. However, changes in temperature (higher or lower, depending on the site) at two of the foraging sites for Tortuguero led to higher NPP and to later nesting. One of the foraging sites for St. Croix had suggestive results, consistent with those for Tortuguero. To better determine if this observed trend is real, the study will be repeated for Playa Grande, Pacific coast of Costa Rica.

Presenter(s): Allyson O'Brien
Major: Physics
Faculty Advisor: Dr. Robert Gilmore

Email: amo45@drexel.edu
Academic Field: Physics
Email: robert.gilmore@drexel.edu

The Magnetic Stadium

Author(s): Allyson O'Brien

The Schrödinger equation describes quantum states of physical systems. Using finite element analysis (FEA), we can numerically approximate solutions to the Schrödinger equation for systems that are difficult to describe in conventional coordinates.

We are investigating a quantum system involving a single, non-relativistic electron confined to a stadium geometry in a perpendicular magnetic field. Current simulations reveal possible issues with the canonical boundary conditions of the problem and interesting effects of adding 'holes' within the geometry.

Presenter(s): Epiphania Osei
Major: Psychology
Faculty Advisor: Dr. Mary Spiers

Email: eaa53@drexel.edu
Academic Field: Psychology
Email: spiersm@drexel.edu

Does Time of Puberty in Females Correlate with Performance on Verbal, Spatial and Social Cognitive Measures?

Author(s): Epiphania Osei, Mary Spiers

Although research investigating biological processes associated with sexual maturation among females has been extensive, little is known about the association between onset of puberty in females and cognitive performance. There are indications in the literature that going through puberty (i.e. age at first menstruation) early (at or before 8 years of age) or late (between 16-18 years of age) may affect cognitive performance in women. With biological and cognitive variables interwoven and interdependent it is important to examine the implications on female cognition. Across the life span females have often demonstrated more accurate performance on measures of verbal and social cognition than males, while males have shown stronger performance on spatial cognitive measures. Some studies have found that early maturers, regardless of sex, score lower on tests of spatial ability than late maturers. In other studies late maturing females have higher spatial scores than early maturing females. While there have been several studies investigating gender

differences in cognitive abilities, no available studies in relation to the time of onset of sexual maturation and social cognition among females have been found. Our predictions are that early maturing females would follow a “female typical” pattern of increased accuracy in verbal and social cognition and decreased performance in spatial measures whereas late maturers would have a more “male typical” performance of decreased accuracy in verbal and social cognition and increased accuracy in spatial measures.

Presenter(s): Jacob Owens
Major: Environmental Science
Faculty Advisor: Dr. Gail Hearn

Email: jowens102@gmail.com
Academic Field: Biological Sciences
Email: gwh26@drexel.edu

Extreme fallback foraging of the Bioko Island drill monkey (Mandrillus leucophaeus poensis) as a means of adapting to sub-optimal habitats.

Author(s): Jacob Owens, Shaya Honarvar, Gail W. Hearn

The Bioko Island drill monkey (*Mandrillus leucophaeus poensis*) is one of the most endangered and least studied primates in Africa. Intense commercial bushmeat hunting has reduced the range of this endemic subspecies to the Gran Caldera and Southern Highlands Scientific Reserve, a nominally protected area that comprises the southern third of the island (550 km²). Within their remaining habitat drills can be found at elevations ranging from sea level to more than 2200m asl and in corresponding habitats ranging from the monsoon forests of the coast to the montane forests of the Gran Caldera. We utilized the inherent variations in the available resources between these locations to investigate the dietary plasticity and foraging strategies of wild and unhabituated drill groups. During three consecutive dry seasons (January-March, 2010–2012) we obtained dietary data through opportunistic feeding observations and the collection and analysis of fecal samples. We found drills at low altitude sites to be highly frugivorous, with 95% of the mean dry mass of their fecal samples composed of fruit remains. However at high elevations, where fruit availability is low, drills consume a significantly different diet composed primarily of the pith of herbaceous vegetation (60% mean dry fecal sample mass), and with significantly more leaf, insect, and mushroom components. These dramatically different feeding strategies expand our understanding of both the dietary ecology and conservation of drills.

Presenter(s): Varun Padmanaban
Major: Biology
Faculty Advisor: Dr. Daniel Marena

Email: vp348@drexel.edu
Academic Field: Biological Sciences
Email: dm562@drexel.edu

Kismet and TGF- β 's Role in Axonal Pruning in a CHARGE Model Drosophila Fruit Fly

Author(s): Varun Padmanaban

CHARGE Syndrome is a rare autosomal dominant disorder with two thirds of all cases caused by mutations in the ATP-dependent chromatin remodeling gene Chromodomain Helicase 7 (CHD 7) (Layman et al., 2010). Kismet is the fly homolog of CHD7 with similarity to humans in both functionality and sequence identity (Srinivasan et al., 2008). Our CHARGE model fly shows significant axonal pruning defects, which could explain several of the phenotypic and morphological changes that have been noted in the fly (Melicharek et al., 2010). Furthermore, axonal pruning defects and its effects on learning and memory may provide for a pathogenesis for CHARGE syndrome. Therefore, uncovering the molecular mechanism behind Kismet mediated axon pruning and finding possible upstream targets for kismet may help to provide future drug therapy sites for CHARGE syndrome patients. The Transforming Growth Factor- β family (TGF- β) is a family of growth factors known to be involved in development and cell growth and proliferation in a wide range of organisms including Drosophila and humans. Knock down of TGF- β pathway components in mutant Drosophila shows significant axonal pruning defects (Zheng et al., 2003). We believe that TGF- β is an upstream regulator of Kismet, which then further regulates axonal pruning. We will show here the evidence we have for this.

Presenter(s): Christopher Papa
Major: Biological Sciences
Faculty Advisor: Dr. Sean O'Donnell

Email: cap87@drexel.edu
Academic Field: Biological Sciences
Email: so356@drexel.edu

Evolution of Brain Sensory Investment in Paper Wasps

Author(s): Christopher Papa, Nazaneen Zahedi, Emily Johnson, Susan Bulova, Sean O'Donnell

As in other social insects, paper wasp (Hymenoptera: Vespidae) brains are divided into two major sensory processing regions. The chemosensory (antennal input) region includes the antennal lobe and the lip of the mushroom body. The optic (compound eye input) region includes the optic lobe and the collar of the mushroom body. Our study assessed whether there were tradeoffs between chemosensory and optic brain regions, and how investment in these regions changed with overall brain size. We also asked whether castes (queens and workers) differ in their patterns of sensory brain investment.

We used volumetric analysis of these brain regions measured across ten paper wasp genera that varied in body size and behavior. We will discuss the implications of our findings for social insect brain evolution.

Presenter(s): Christina Peters
Major: Physics
Faculty Advisor: Dr. Gordon Richards

Email: cmp346@drexel.edu
Academic Field: Physics
Email: gtr@physics.drexel.edu

Bayesian Quasar Selection Using Variability and Astrometry

Author(s): Christina Peters

We used the Non-parametric Bayesian Classification Kernel Density Estimation (NBC KDE) quasar selection algorithm to classify data sets of spectroscopically confirmed quasars and non-quasars in Sloan Digital Sky Survey (SDSS) Stripe 82. Eight values were calculated to use for classification: four coadded colors (u-g, g-r, r-i, and i-z), two parameters calculated from the structure function of the object that describe the variability of the object, and two parameters that describe the positional offsets caused by differential chromatic refraction (DCR) that give information about spectral features of the object. In the parameter space of each of these methods there are distinct regions for quasars and non-quasars, but also regions where they overlap. Using these parameters in combination we hope to correctly classify a higher percentage of quasars than using any method alone. In particular, improving the selection of quasars of redshift 2.7 to 3.5.

Presenter(s): Ryan Rebozo
Major: Environmental Science
Faculty Advisor: Dr. Walter Bien

Email: rr467@drexel.edu
Academic Field: Environmental Science
Email: walter.f.bien@drexel.edu

The Influence of Land Management Practices on the Above and Below Ground Mutualisms of the Pine Barren Gentian (Gentiana Autumnalis) in New Jersey

Author(s): Ryan Rebozo

The New Jersey Pine Barrens is a fire-dependent ecosystem in which intense wildfires create a mosaic landscape that is in varying stages of succession. Additionally, landscape managers use mechanical mowing and low intensity prescribed burns to reduce fuel loads that lower the risk of catastrophic wildfire. Subsequently, fire suppression is a major

influence on the rarity of disturbance-dependent plant species such as the Pine Barren gentian (*Gentiana autumnalis*). This fall flowering perennial thrives optimally in early successional habitats. We compared sites (treatments) that were mowed, burned (PxB), and unburned (greater than 10 years) to examine the influence of disturbance (management practices) on the demography and mycorrhizae associated with *G. autumnalis*. Because certain management practices can alter the soil chemistry (e.g., nutrient amendments), management practices can also potentially alter fungal associations and ultimately the pollinator interactions of plant hosts. Thus, we compared mycorrhizae root colonization (%), pollinator visitation rates, and soil nutrient levels among treatments to elucidate differences in below and above ground interactions. A better understanding of the influence of management practices on *G. autumnalis* will be critical for the conservation of the species. Our preliminary data suggest that the Pine Barren gentian supports a high level of arbuscular mycorrhizal colonization that increases concomitantly with an increase in density and richness of conspecifics. Insect diversity and pollinator visitation rate also increased with an increase in flowering of plant associates. Survivorship, recruitment, and fecundity for this species also vary among management practices.

Presenter(s): Jessica Rodden
Major: History and Political Science
Faculty Advisor: Dr. Lloyd Ackert

Email: jsr64@drexel.edu
Academic Field: History
Email: lta24@drexel.edu

From Raw to Processed: Food Vendor Regulation in Philadelphia, 1880-1920

Author(s): Jessica Rodden

This paper gives a historical account of changes in the food market and the American diet, and more specifically in Philadelphia, during the period of 1880 to 1920. Americans during the early 20th century began purchasing less raw, unprocessed food products and more processed and ready-made meals. This shift provided a new market for street vendors to sell hot, prepared meals in urban areas. Reasons for this change and the emergence of street food vendors include the needs of industrial workers, immigrants and their cultures, the development and growth of American cities, and emerging science regarding food safety. All of these accounts support the notion that street food vending became an economically viable venture during this time period because of the failure of public food markets to adapt to urban expansion and its consequences.

Presenter(s): Shravan Savant
Major: BS/MD
Faculty Advisor: Dr. John D. Houle

Email: sv48@drexel.edu
Academic Field: Biological Sciences
Email: John.Houle@DrexelMed.edu

Characterization of Regenerating Thoracic Propriospinal Neurons after Spinal-Cord Injury

Author(s): Shravan Savant, Arthi A. Amin, John D. Houle

Propriospinal neurons are responsible for the relay of motor and sensory information between the arms and legs to help with coordination of movement. Spinal cord injury disrupts this transfer of information but regeneration of nerve fibers (axons) occurs if an appropriate substrate is provided. After complete spinal transection of adult rats (n=8) half received a graft of peripheral nerve (PN) to support regrowth of injured axons. Four additional rats served as uninjured controls. Four weeks later the PN was exposed and labeled with a fluorescent tracer to retrogradely label neurons that had regenerated into the graft. Animals were euthanized 2 days later, tissue sections through the thoracic and lumbar spinal cord prepared and processed by immunocytochemical techniques for the presence of glutamic acid decarboxylase (GAD 67), glycine transporter 2, calbindin, choline acetyl transferase or Eph 4 receptor. Quantitative assessment of the neurotransmitter phenotype of injured and regenerating propriospinal neurons was performed to characterize strong regenerating vs. poor regenerating neurons. This information may be useful for targeting specific types of neurons to promote structural and functional repair after spinal cord injury.

Presenter(s): Elenas Schroeter
Major: Biology
Faculty Advisor: Dr. Kenneth Lacovara

Email: es389@drexel.edu
Academic Field: Biological Sciences
Email: kjl24@drexel.edu

Histology of Normal and Deformed Argentinean Titanosaur Femora

Author(s): Elenas Schroeter, Lacovara, K. J.

We conducted a histological examination of a femur (length = 1.95 m) from a new species of sauropod dinosaur. Transverse sections showed well-vascularized, laminar fibrolamellar bone in the outer cortex that extends to the periosteal surface. Lines of arrested growth (LAGS) and annuli, if present, are not well defined. Secondary remodeling is less extensive than observed in the humerus, with isolated secondary osteons appearing deep to the periosteal surface. Though remodeled tissue becomes increasingly dense towards the medullary cavity, large areas of primary bone are retained between the secondary osteons throughout the middle cortex. The absence of an external fundamental system (EFS) or avascular, lamellar-zonal, or parallel-fibered bone at the periosteal margin suggests this

individual was as a young adult. A second, shorter femur (length = 1.29 m) with an elongated femoral head was recovered from the same locality. To test the hypothesis that this bone is from a younger individual that has been diagenetically altered, a transverse section of this specimen was examined and compared with MPM PV1156. It exhibits tissue development not observed in its larger counterpart, including indicators of advanced age. The presence of more mature tissues in a smaller femur may be an osteological response to compensate for an injury sustained during life, or may indicate it is a member of a species distinct from MPM PV1156. While additional investigation is necessary to determine the origin of the histological differences, the hypothesis that the smaller femur represents a conspecific juvenile appears less likely given these data.

Presenter(s): Melinda Sebastian
Major: Culture & Communication
Faculty Advisor: Dr. Wes Shumar

Email: mjs426@drexel.edu
Academic Field: Communication
Email: shumarw@drexel.edu

Hegemony, The Ulmer Scale, and Blind Item Reveals

Author(s): Melinda Sebastian

A “blind item” is a term for a print item of gossip in a newspaper that never uses the real name of the subject of the story. William d’Alton Mann used it as a way to write scandalous bits of gossip, in his American paper Town Topics, in the 1890s, to avoid legal retribution. His method of “revealing” the subject of his blind item was often to place another flattering story about the subject with their name on the reverse side of the paper as a “hint”. Since that time others in gossip have used blind items, about wealthy socialites, politicians, and celebrities, in print form, and most recently online. Since 2007 one pop culture/gossip website, has been consistently naming and “revealing” the subjects of blind items although the blogger remains anonymous. Blind items have been relatively ignored in the scholarly literature, so there is sufficient room for exploration. Using Gramsci’s notion of cultural hegemony and the “Ulmer Scale” which rates celebrities’ social and financial value and status as “A” “B” “C” or “D List” as a frame, this poster presents a critical discourse analysis of the rhetoric and assumptions made about age race and gender.

Presenter(s): Andrea G. Segal
Major: Psychology
Faculty Advisor: Dr. Christine Nezu

Email: andrea.segal@gmail.com
Academic Field: Psychology
Email: cmnezu@verizon.net

Predictors of Attitudes Towards Seeking Medical Care and Psychological Care Among Veterans

Author(s): Andrea G. Segal, Christopher E. Diaz, Lauren M. Greenberg, MS, Christine Maguth Nezu, PhD, ABPP, Arthur M. Nezu, PhD, ABPP

Introduction: Research has shown that increased levels of stigma contribute to more negative attitudes about seeking healthcare, and less willingness to seek care. Stigma surrounding mental healthcare is a particularly poignant issue for military Veterans surrounded by a culture encouraging self-sufficiency. Components of social problem solving (i.e., problem orientation and problem solving style) have significantly mediated the stress-distress relationship. The present study aims to investigate whether social problem solving plays a role in perceptions of stigma and attitudes towards seeking healthcare among Veterans. Hypotheses: It is predicted that adaptive social problem solving will be associated with less stigma and greater willingness to seek medical and psychological care, and maladaptive social problem solving will be associated with greater stigma and less willingness to seek both types of healthcare. Methods: Participants were recruited at Drexel University and at Veterans organizations throughout the Philadelphia area. Participants completed a series of questionnaires online via Qualtrics survey software: a demographic questionnaire, the Social Problem-Solving Inventory – Revised (SPSI-R), Inventory of Attitudes toward Seeking Mental Health Services (IASMHS), Military Stigma Scale (MSS), and Attitudes toward Seeking Medical Care Scale (ASMCS). A hierarchical multiple regression analysis will be used to analyze the data. Results: Data collection is currently underway with an expected total of 60 participants. Conclusion: If social problem solving is found to predict attitudes toward seeking healthcare, then programs incorporating components of Problem-Solving Therapy may be helpful in aiding Veterans to seek necessary care, in turn reducing levels of distress.

Presenter(s): Elizabeth Segelken
Major: Physics
Faculty Advisor: Dr. Luis R. Cruz Cruz

Email: eks55@drexel.edu
Academic Field: Physics
Email: lrc42@drexel.edu

Study of the Dynamics of Fluids and Particle Suspensions Using the Lattice-Boltzmann Method

Author(s): Elizabeth Segelken

The nature of the dynamics of particle suspensions in a flow has important implications to

problems ranging from arterial flow to cosmetics. A direct understanding of these problems, however, is complicated by external factors such as flow under confining geometries. Here, we examine a particle suspended in a solvent, as well as the solvent itself, using a simple computer model. The model consists of a solvent, using the Lattice-Boltzmann method, and a solid particle, which uses Newtonian dynamics. The challenge is the interaction between the solid and fluid at the boundaries between them. We are looking to explore the behavior of the fluid and the solid particle when they are constrained by different geometries and eventually to replace the solid particle with a polymer. We have found that our fluid simulation matches previous results and are still testing the solid particle dynamics. Our results will be quantitatively compared to existing experiments and theory to check the accuracy of our model.

Presenter(s): Anne Sekley
Major: Psychology
Faculty Advisor: Dr. Pamela Geller

Email: annesekley@gmail.com
Academic Field: Psychology
Email: pg27@drexel.edu

Posttraumatic Growth as a New Perspective in the Aftermath of Sexual Assault

Author(s): Anne Sekley, Pamela Geller

Sexual assault is viewed as one of the most distressing events an individual can experience (Kessler, Sonnega, Bromet, Hughes & Nelson, 1995). In the United States, nearly 1 in 5 women and 1 in 71 men have been sexually assaulted in their lifetimes (NSIVS, 2011). Extensive research has documented negative outcomes such as Posttraumatic Stress Disorder (PTSD), depression, and increased anxiety; however, recent research indicates that many sexual assault survivors also endorse positive life changes following their assault (Frazier & Berman, 2008). Tedeschi and Calhoun (2004) have labeled these positive psychological changes Posttraumatic Growth (PTG). This poster presents results of a comprehensive literature review regarding PTG in the aftermath of sexual assault. With prevalence of PTG among sexual assault survivors ranging from 50% to 95%, (Burt & Katz, 1987; Thompson, 2000), various research efforts have identified specific domains and correlates involved in PTG, and defined the trajectory of PTG and distress as they present in survivors. While the breadth of this research holds promising clinical implications in fostering growth among sexual assault survivors, several limitations, such as a lack of construct validity in existing PTG measures and contradictions in the trajectory of PTG, must first be addressed by future research initiatives.

Presenter(s): Diva Shetty
Major: Communication
Faculty Advisor: Dr Eva Thury

Email: das422@drexel.edu
Academic Field: Communication
Email: thury@drexel.edu

Role of Women in Rap Music

Author(s): Diva Shetty

There is plentiful research on the themes of violence and exaggerated masculinity that are inseparable from the rap genre, but the projected role of black women in contemporary hip-hop merits more consideration. Traditional rap is seen as misogynistic and hypersexual (Shaw). These notions have been traced to images of black women in colonial times when the duties and beauty ideals of black women formulated stereotypes (Darnell, Keyes) The present study looks at the role of black women in contemporary rap music. Given the pressures of commercialization, hip-hop provides a highly sexed image of the black woman and creates a disconnection between artists and morality. A content analysis was conducted of 25 rap videos released between 2002-2012 based on the categories developed by Weitzer. Naming and Shaming trumped the other four with 'Bitch,' 'Hoe,' 'Bopper,' and 'Broad,' the most frequent terms. Sexual Objectification was second highest, with frequent images of scantily clad women, and fragmented bodies. Distrust of Women was very subtle, with references to valorizing a man's career over wasting time with women, 'Money over Bitches.' Legitimation of Violence against women was not recorded. The increased vulgarity, objectification and sexuality are very telling of the commerce involved. There is a demand for "hard" music and themes supposed to represent the ghetto (Darnell). Society is now more open to expressing sexuality, and mainstream Hip-hop reflects that craving. The study has implications for negotiating the morals of women for commerce, given the large audience accepting the degeneration of women.

Presenter(s): Ava Skolnik
Major: Psychology
Faculty Advisor: Dr. Karol Osipowicz

Email: ams582@drexel.edu
Academic Field: Psychology
Email: Dr.O@drexel.edu

A Little Compliment Goes A Long Way: The Influence of Compliments on Perception of Character

Author(s): Ava Skolnik, Jessica Madej, Julia Wisniweski

Previous research has examined the prevalence and types of compliments used. However, there has not been sufficient research conducted about how compliments effect the perception of the complimentor's character. This study examines complimenting and the influence compliments have on the perception of the character of the complimentor. 32

college students were surveyed (18 Females, 14 Males) inside a campus coffee shop. In phase one of the experiment the complimenter approached subjects and complimented the individual on an item of apparel. Then, the subjects were approached by other members of the research team and asked to complete a survey. The survey consisted of demographic questions and asked questions about likeability of the complimenter, perceived kindness of the complimenter, and willingness to interact with the complimenter again on a likert scale of 1-5 scale (1 being positive, 5 being negative). In phase two the subjects were not approached by the complimenter, instead the research members pointed out the confederate and asked the subjects to answer the same survey questions with no contact with the confederate. The subjects that were complimented differed significantly from those who were not complemented ($t(30) = 4.0$ $p < 0.05$, one-tailed). No difference was found between gender and reaction to compliments.

Presenter(s): Kevin Smith
Major: BEES
Faculty Advisor: Dr. Walter F. Bien

Email: kevinpwsmith@gmail.com
Academic Field: Environmental Science
Email: wbien205@comcast.net

Radio telemetry and the neonate ecology of the Northern Pinesnake (Pituophis melanoleucus)

Author(s): Kevin Smith, Walter F. Bien

Due to the cryptic and fossorial nature of Northern pinesnakes (*Pituophis melanoleucus*), there is a lack of data on their early life behavior and dispersal. An understanding of first season life history traits from hatching to ingress is particularly difficult to monitor. Without field observations, it is difficult to elucidate key developmental processes, such as shedding rate, feeding rate, diet preference, habitat preference, dispersal patterns, and the spatial ecology after leaving the nest. These life history factors could have pronounced effects on land management concerning this species, State Threatened in New Jersey. Until recently, the use of radio telemetry was only applicable for adult pinesnakes. External transmitters are not appropriate for semi-fossorial constrictors as they interfere with normal snake behaviors such as prey handling and excavation. However, we surgically implanted eight *P. melanoleucus* neonates with small transmitters, less than 3% body weight, and radio-tracked them after leaving their nests to fall ingress. We monitored neonate activity daily and recorded environmental and behavioral data. Neonates preyed on small adult rodents and shed multiple times over the first season. Radio telemetry helped confirm black racers (*Coluber constrictor*) as a predator of neonate pinesnakes. Neonates traveled distances from the nest ranging from 30m to 300m. Neonates with pit-tags only were observed within 70m of the nest throughout the field season. Our data suggest that the use of radio-implanted transmitters in neonate pinesnakes does not negatively impact normal snake activity, behavior, and movement patterns and may be applicable to other cryptic species.

Presenter(s): Andrew Smith
Major: Environmental Science
Faculty Advisor: Dr. Jacob Russell

Email: ahs55@drexel.edu
Academic Field: Environmental Science
Email: jar337@drexel.edu

The Association between Pea Aphid Defensive Symbionts and Fungal Mortality under Natural Conditions

Author(s): Andrew Smith, Amanda Lee, Garrett Mayo, Andrea Messina

Aphids are sap feeding herbivores that are ubiquitous in all temperate regions and are susceptible to the fungal pathogen, *Pandora neoaphidis*, which is favored by cool and humid conditions. Mortality from *P. neoaphidis* in pea aphid, *Acyrtosiphon pisum*, populations in the United States varies seasonally and is highest in fall. Pea aphids can possess one or more of four different facultative bacterial endosymbionts that confer some level of resistance to *P. neoaphidis*. These symbionts are maternally transmitted and therefore sources of heritable genetic variation that can be acted upon by natural selection. If phenotypic selection is occurring under natural conditions, we would expect the proportion of aphids possessing these symbionts to increase during periods of high fungal mortality and be higher in northern locations where abiotic conditions favor fungal infection. To test this hypothesis we collected aphids in Pennsylvania and New York, in three alfalfa and three clover fields per location, over nine dates from spring through fall in 2011. We measured within canopy temperature, fungal mortality and screened aphids for three of the four defensive symbionts using diagnostic PCR. Symbiont frequencies differed between states and by crop for some but not all of the symbionts and at least one of the symbionts varied seasonally and in association with changes in fungal mortality. Further analysis will be done to calculate the response differential between symbionts to understand the extent to which each contributes to defense under natural environmental conditions.

Presenter(s): Minx Smith
Major: Psychology
Faculty Advisor: Dr. Dorothy Charbonnier

Email: mms334@drexel.edu
Academic Field: Psychology
Email: drc73@drexel.edu

Psychological Digital Dependence and Anxiety in College Students

Author(s): Minx Smith, Hela Saidi

Previous research suggests that post-90s generations are becoming 'addicted' to technology to such a degree that somatic symptoms indicative of anxiety may be experienced when they become separated or 'cut off' from their technology for even short periods of time. This study aimed to evaluate the validity of these claims and the change, if any, in physical symptoms typically associated with anxiety when technologic devices were made unavailable for a short duration of time. Participants (n=20) were a convenience sample of Psychology students from Drexel University. Participants' heart rates were measured and recorded prior to being briefed. All technologic devices were then removed from their person, labeled, and stored in the back of the room. Heart rate was measured again after 5 minutes of separation. Participants then filled out a modified version of the Beck Anxiety Inventory. Heart rate was then measured and recorded once more 5 minutes after the devices were returned. It was predicted that students would experience separation anxiety from being away from their devices and experience symptoms of withdrawal associated with "technology addiction". The research hypothesis was partially supported but may have been confounded by time constraints, sample size and researcher error. Further study into the link between anxiety and technology dependence is required in order for solid conclusions to be drawn.

Presenter(s): Erica Smith
Major: Physics
Faculty Advisor: Dr. Michelle Dolinski

Email: esmith227@gmail.com
Academic Field: Physics
Email: mjd396@drexel.edu

Gain Calibration of Avalanche Photodiodes in EXO-200

Author(s): Erica Smith, Delia Tosi

Double beta decay is a rare nuclear decay in which two electrons and two anti-neutrinos are emitted. The neutrinoless decay mode, in which only electrons are emitted, is forbidden by the Standard Model and can occur only if neutrinos are massive Majorana particles; that is, neutrinos must have mass and must also be identical to anti-neutrinos. Detection of this mode is extremely important as it is the most sensitive probe of the neutrino mass scale, as well as confirmation that Majorana particles exist in nature. EXO-200 aims to detect neutrinoless double beta decay using liquid xenon enriched in xenon-136 as both the

source of the decay and detector of the produced electrons. A successful measurement relies on several factors: large exposure, high efficiency, low background, and good energy resolution. In order to improve our energy resolution, we must perform calibrations to provide corrections to the data to account for variations in our detector response. The work herein deals with the characterization of the time variation of the response of Large Area Avalanche Photodiodes (LAAPDs) and how this variation may affect the overall energy resolution.

Presenter(s): Marilyn Sobel
Major: Environmental Science
Faculty Advisor: Dr. Walter F. Bien

Email: mcs57@drexel.edu
Academic Field: Environmental Science
Email: wfb22@drexel.edu

Earth, Fire and Water: Resource Allocation in Rhynchospora knieskernii (Cyperaceae)

Author(s): Marilyn Sobel, Dennis M. Gray, Walter F. Bien

Many ecosystems are under increasing threats from development, fragmentation, and climate change. Rare plants are especially vulnerable to habitat changes, due to restricted ranges and/or low population densities. Developing conservation plans to protect these rare species can be challenging when there is insufficient autecological data. *Rhynchospora knieskernii* is a federally-threatened sedge that occurs only in the New Jersey Pine Barrens. To better understand how *R. knieskernii* may respond to disturbance, we examined how this species allocates key resources (N and P) to growth and reproduction throughout its life cycle. We collected soil and plant samples during flowering, fruiting and senescence and divided plants into three parts: reproductive (achenes, bracts, receptacle), stem/leaf, and storage (root/winterbud). Nitrogen allocation to reproduction declined from 54% of total plant nitrogen at flowering to 24% at senescence, while allocation to storage increased. Paradoxically, allocation of phosphorus to storage remained unchanged, while allocation to reproduction increased, from 49% at flowering and fruiting to 57% at senescence, even though achenes declined by 90% and *R. knieskernii* grows in a nutrient-poor habitat with limited phosphorus availability. These data suggest that phosphorus was retained primarily in the non-fruiting reproductive structures at senescence and after die back. In addition, there were no differences in phosphorus allocation among sites ($p=0.5197$) or throughout the growing season ($p=0.7516$). When nutrient resources are limited this strategy could provide phosphorus essential for germinating seedlings and survivorship. A better understanding of how *R. knieskernii* allocates and utilizes soil nutrients will be essential for developing a conservation site plan for the species.

Presenter(s): Gianna Spigonardo
Major: Environmental Science
Faculty Advisor: Dr. Steven Pearson

Email: gfs28@drexel.edu
Academic Field: Environmental Science
Email: shp36@drexel.edu

Changes in Seasonal and Annual Vegetation Indicate Sedimentation Changes

Author(s): Gianna Spigonardo, Jason Haque, Steven H. Pearson, Dr. James R. Spotila

Vegetation is an important component of an aquatic ecosystem because it establishes the basis for ecosystem productivity. Vegetation density impacts productivity, sedimentation rates, and overall function of the ecosystem. The focus of this research was to determine differences in seasonal and annual vegetation coverage in two wetlands: Silver Lake and Mill Creek, located in Bristol, Bucks County, Pennsylvania. From April through October, in 2010 and 2012, we mapped vegetation bed perimeters for each month using handheld GPS systems from kayaks. We imported data to ArcMap 10.0 and determined the total aquatic vegetation coverage for each wetland per month. Within a year, total vegetative cover increased between April and October and usually peaked in July. Between 2010 and 2012, average vegetative cover increased in Silver Lake by approximately 30% and in Mill Creek by approximately 9%. Given the increase in percent area, Silver Lake may be becoming more eutrophic. Eutrophic lakes are characterized by high amounts of aquatic vegetation which tend to deplete water of its dissolved oxygen content, leading to increases in plant productivity and decreases in the productivity of other organisms. These results can be used to predict how organisms use the wetland, sedimentation rate, and the future of the reservoir. If this trend continues, then it is likely that Silver Lake will be completely covered by vegetation by the year 2021 and significant changes in habitat type and quality will occur.

Presenter(s): Jessica Stern
Major: Clinical Psychology PhD
Faculty Advisor: Dr. Arthur Nezu

Email: jessicastern01@gmail.com
Academic Field: Psychology
Email: arthur.nezu@verizon.net

Problem Solving: How We Think, Feel and Act

Author(s): Jessica Stern

Social problem solving (SPS) is the process by which individuals attempt to identify ways to adapt to or cope with everyday problems (D’Zurilla & Nezu, 2007). We plan to determine differing ways in which individuals respond to interpersonal versus achievement oriented scenarios. Following Mischel and Shoda’s (1995) “if X, then Y” formulation, it is possible that a person can have a positive orientation towards one type of problem, yet a negative orientation towards a differing type. Moreover, as previous research has identified overall

sex differences in SPS (e.g., D’Zurilla et al., 1998; Morera et al., 2006), we plan to evaluate whether gender interacts with this sociotropy-autonomy distinction. To achieve these aims, 250 undergraduate students (125 women and 125 men) will participate in a study where each is provided with one scenario involving an interpersonal problem and another involving a problem related to academic and professional achievement. Participants complete the Social Problem-Solving Inventory-Revised (SPSI-R; D’Zurilla, Nezu, & Maydeu-Olivares, 2002) in response to each problem. Additionally, prior to reading the scenarios, each participant completes the Positive and Negative Affect Schedule (PANAS) to control for the effects of mood. We predict that a significant interaction will occur between type of problem and sex. Both inter- and intra-individual differences will be analyzed using an ANCOVA design. Results of this study will have implications for a more complete understanding of SPS regarding subtypes, as well as how Problem-Solving Therapy should be conducted by virtue of such subtype (sociotropy vs. autonomy).

Presenter(s): Phillip Sylvester
Major: Psychology
Faculty Advisor: Dr. Maria Schultheis

Email: pes44@drexel.edu
Academic Field: Psychology
Email: sg94g745@drexel.edu

Examining the Relationships between Academic Excellence and Anxiety, Depression, and Intelligence

Author(s): Phillip Sylvester, Preeti Sunderaramen, Maria Schultheis

The purpose of this research is to determine whether aspiring academic achievement (AAS) has a relationship with levels of intelligence, depression or anxiety. AAS is a self-reported measure where participants stated the grade they hope to average, using a scale of A through F. The prevalence of student achievement research is focused on alcohol and drug consumption rates. Observing a trend in generalized anxiety and depression related to daily living would provide insight into obstacles faced by students with a desire to increase their academic performance. Intelligence’s relationship to AAS was used to observe correlations between current academic standing and AAS. The participants for this study were students, mean age = 23.28. Demographically, of 50 participants, there were 42 females and 8 males. Students completed a questionnaire containing demographic information, the Beck Anxiety Inventory (BAI), and the Beck Depression Inventory II (BDI-II). Data from the questionnaires was self-reported. Intelligence was measured by the Weschler’s Adult Intelligence Scale, using the FSIQ calculated from their performance. The data was analyzed by tests of correlation for Pearson’s r and using two-tailed significance. The results of this study found no correlation between AAS and rates of anxiety, $r = -0.186$ ($p = 0.195$), or depression, $r = 0.134$ ($p = 0.358$). Correlation was significant between FSIQ and current academic standing, $r = 0.321$ ($p = 0.023$), implying a mild relationship between intellect and academic achievement. Therefore, student anxiety or depression cannot be

concluded to affect current academic performance and AAS is not correlated with increased rates of anxiety, depression or intelligence.

Presenter(s): Nathan Thiem
Major: Physics
Faculty Advisor: Dr. Dolinski

Email: nt335@drexel.edu
Academic Field: Physics
Email: mjdolinski@gmail.com

Building a Liquid Xenon Time Projection Chamber for Xenon Purification Tests

Author(s): Nathan Thiem

If the neutrino is its own antiparticle, then the neutrino mass scale can be fixed by measuring the decay rate of zero neutrino double beta decay. A liquid xenon-136 time projection chamber with a high energy resolution provides a promising way to determine the zero neutrino double beta decay rate. For the liquid xenon time projection chamber to have a high energy resolution, it needs to be free of other gas impurities. I am constructing a prototype liquid xenon time projection chamber so different liquid xenon purification methods can be tested.

Presenter(s): Matthew Thiesse
Major: Physics
Faculty Advisor: Dr. Chuck Lane

Email: mdt59@drexel.edu
Academic Field: Physics
Email: lane@duphy4.physics.drexel.edu

Simulating Optical Photons in a Water Cerenkov Detector

Author(s): Matthew Thiesse

The simulation of optical photons ($E < 100\text{eV}$, $\lambda > 10\text{nm}$) in a water Cerenkov detector is vital to the design of many major particle physics experiments. WCSim (used at the Long Baseline Neutrino Experiment) and SDSim (used at the Pierre Auger Observatory) accurately model physics processes like the Cerenkov effect, Rayleigh scattering, and absorption in a volume of water on the kiloton and ton scale, respectively. In developing stopped muon monitors for LBNE, not only must optical photon processes be correctly simulated, diffuse boundary reflection and absorption must also be accurately modeled in a volume of water on the order of one liter. The purpose of this research was to investigate the production and interactions of optical photons in various simulations to get an accurate picture of how detector response scales with detector size. There were relatively few

differences found in number of photons produced, actual phototube hits, and detector response to wavelength between WCSim and SDSim despite completely different simulation frameworks.

Presenter(s): Molly Tiedeken
Major: Psychology
Faculty Advisor: Dr. Naomi Goldstein

Email: met72@drexel.edu
Academic Field: Psychology
Email: neg23@drexel.edu

Alcohol Consumption and Perception in University Students

Author(s): Molly Tiedeken, Leah Brogan, Rachel Hirst, Heather Schwartz, Sadia Rharbite, Naomi Goldstein

Previous studies find that Greek affiliations (i.e. fraternity and sorority involvement) are associated with increased levels of overall satisfaction and continued persistence in college as well as a higher probability of degree completion (Pascarella, et al., 2001). However, Greek affiliated college men are three times more likely to consume alcohol at higher rates following high school and consume more alcohol per occasion in comparison to non-Greek affiliated males (Danielson, et al 2001). Additionally, Greek affiliated college females are five times more likely than non-Greek affiliated females to consume alcohol at higher rates (Danielson, et al., 2001). The current study looks to investigate the relationship between collegiate social involvement and alcohol consumption and perceptions. Research is limited in examining if socialization and conformity are related not only to being affiliated with Greek life, but in relation to alcohol as well. Participants in the current study were 242 university students (36.4% male and 63.2% female) who responded to an online survey regarding personal alcohol consumption and involvement in extracurricular activities. Data were collected using an online self-report survey. Participants were asked about personal alcohol use and perceived alcohol consumption for the general college population. Participants were also asked about extracurricular involvement in social, athletic, and honors organizations. Using a chi-square test of independence, results show that there was a significant relationship between college student affiliation statuses (Greek vs. non Greek) and frequency of personal alcohol consumption, [χ^2 (4, n = 242) = 35.15, p < .01, r = .38].

Presenter(s): Paul Ullmann
Major: Paleontology
Faculty Advisor: Dr. Ken Lacovara

Email: pvu23@drexel.edu
Academic Field: Biological Sciences
Email: kjl24@drexel.edu

*Morphometric Exploration of the Evolution of Wide Gauge Features in Stylopodial Limb
Elements of Titanosauriform Sauropods*

Author(s): Paul Ullmann, Matthew F. Bonnan, Kenneth J. Lacovara

Titanosauriform sauropods were a diverse group of Cretaceous herbivores, including both the largest terrestrial vertebrates that have ever existed and clear examples of insular dwarfism. Despite their great range in body size, all titanosauriforms shared a suite of appendicular specializations collectively termed wide gauge posture. Qualitative summaries of this novel morphology have previously been noted, such as possession of a widened sacrum and laterally flared ilia, but no attempts have yet been made to quantify patterns in shape differences. Here, we have used two-dimensional geometric morphometrics and thin plate splines analyses to quantitatively analyze differences in shape among sauropodomorph humeri (N=89) and femora (N=73). Thus far, analyses of the humeri dataset have identified multiple statistically significant trends. In summation, these results demonstrate that titanosauriforms possess proportionately gracile humeri in comparison to other sauropods, with relatively more medially oriented humeral heads and proximally located deltopectoral crests. Canonical variates analyses, which identify shape differences that define a priori assigned groups, concur by finding a pattern which characterizes long term titanosauriform evolution as involving increasing medial displacement of the humeral head and proximal migration of the deltopectoral crest. Linear regression of maximum shape change against humerus length fails to identify any deviation from isometry among sauropodomorph humeri, consistent with previous reports. Interpretation of myological and biomechanical repercussions of these osteological modifications are underway.

Presenter(s): Kirsten Vannix
Major: Biological Sciences
Faculty Advisor: Dr. Lydia Pyne

Email: knv26@drexel.edu
Academic Field: History
Email: lvp34@drexel.edu

*Questioning Authority: The Pursuit of Medical Knowledge Through Instrumentation and
Illustrations*

Author(s): Kirsten Vannix

During the Early Modern Era, medical practitioners engaged with previously held textual sources of authority. In the fields of anatomy and chemical medicine, two key proponents

of this new approach were Philip von Hohenheim (Paracelsus) and Andreas Vesalius. Both adopted an empirical approach to their work, in which they conducted their own “hands-on experiments” to make observations about phenomena in order to disprove inaccurate information and to corroborate their conclusions. To perform these experiments, both Vesalius and Paracelsus relied upon instruments; Vesalius relied upon surgical instruments to perform his dissections, whereas Paracelsus relied more upon alchemical instruments to analyze elements and medicinal compounds. While they relied upon different tools and experiments to conduct their work, both Vesalius and Paracelsus were able to challenge preexisting medical knowledge in order to provide accurate and groundbreaking new information in the subjects of human anatomy and medicine. In order to gather resources and information for this project, I drew from the textual works of Paracelsus and Vesalius found online, and physical copies of their works stored in the Drexel University Archives. Based on my research, I was able to conclude that the use of instrumentation and illustrations allowed physicians such as Vesalius and Paracelsus to delve further into the field of medicine in order to more accurately describe the world around them, and to make these descriptions and revelations more easily accessible to the scientific community.

Presenter(s): Kristyn Voegelé
Major: Paleontology
Faculty Advisor: Dr. Ken Lacovara

Email: kkv27@drexel.edu
Academic Field: Biological Sciences
Email: kjl24@drexel.edu

Reconstructions from Well-defined Muscle Scars in a Super-massive Titanosaurian Sauropod

Author(s): Kristyn Voegelé, Paul Ullmann, Kenneth Lacovara

Study of extinct vertebrate organisms is dependent on which skeletal elements are preserved, frequently only a portion of the skeleton. In addition, the vast majority of soft tissues (i.e. organs and muscle) are not normally preserved. These factors make anatomical reconstructions challenging. One specimen of a super-massive titanosaurian sauropod (MPM-PV-1156) is nearly complete and excellently preserved with well-developed muscle scars. This is unusual for very large terrestrial vertebrate fossils, making it ideal for a myological study. Some soft tissues, such as muscle, leave osteological correlates (e.g. muscle scars) on bone when the bone remodels into ridges and pits in response to stress applied by the soft tissue. By using osteological correlates and an extant phylogenetically bracketing (EPB) dissection, we have reconstructed the limb and girdle muscles of this extinct dinosaur. EPB is a common paleontological method that draws comparisons between fossils and their phylogenetically closest living relatives to increase accuracy of inferences about extinct organisms. The well defined muscle attachment sites of MPM-PV-1156, with EPB support, provide a more complete and informative understanding of the anatomy of these large organisms than has been previously available. We have also drawn comparisons with other titanosaurian species to improve our understanding of osteological evolutionary trends within this group. For example, MPM-PV-1156 shares a textured raised

knob on the medial side of the scapula for attachment of the M. subscapularis with several more derived titanosaurs (e.g. Aeolosaurus and Saltasaurus), suggesting an increase in stress applied by this muscle over the evolution of this group.

Presenter(s): Matthew Voelker
Major: Physics
Faculty Advisor: Dr. Brigita Urbanc

Email: mjvoelke@gmail.com
Academic Field: Physics
Email: brigita@physics.drexel.edu

Oligomerization of Amyloid b-Protein in Crowded Environments: A Discrete Molecular Dynamics Study

Author(s): Matthew Voelker

Alzheimer's disease is strongly associated with small oligomeric assemblies formed by amyloid b-protein (Ab), in particular with the 42 amino acids-long Ab42. Recently, Ab42 oligomer structure has been characterized computationally by discrete molecular dynamics (DMD) combined with an implicit-solvent intermediate-resolution protein model. DMD-derived Ab42 oligomers exhibited flexible and solvent exposed N-termini, a feature hypothesized to be associated with oligomer toxicity. In vivo, Ab42 coexists with other proteins and biomolecules in a crowded environment. To understand the effect of crowding on Ab42 assembly, we studied Ab42 oligomer formation in the presence of crowders using the DMD approach described above. Preliminary results show that in the presence of crowders, Ab42 forms smaller-order oligomers. Surprisingly, the N-termini of the resulting oligomers are more disordered than in the absence of crowders, suggesting they are potentially more toxic in nature. These results provide insights into the effect of crowding on both Ab42 assembly, oligomer structure, and toxicity.

Presenter(s): Ryan Wasson
Major: Mathematics
Faculty Advisor: Dr. Hugo Woerdeman

Email: rdw42@drexel.edu
Academic Field: Mathematics
Email: hugo@math.drexel.edu

The Normal Defect of Some Classes of Matrices

Author(s): Ryan Wasson, Hugo Woerdeman

An n by n matrix A has a normal defect of k if there exists an $(n+k)$ by $(n+k)$ normal matrix A_{ext} with A as a leading principal submatrix and k minimal. In this paper we compute

the normal defect of a special class of 4 by 4 matrices, namely matrices whose only nonzero entries lie on the superdiagonal, and we provide details for constructing minimal normal completion matrices A_{ext} . We also prove a result for a related class of n by n matrices. Finally, we present an example of a 6 by 6 block diagonal matrix having the property that its normal defect is strictly less than the sum of the normal defects of each of its blocks, and we provide sufficient conditions for when the normal defect of a block diagonal matrix is equal to the sum of the normal defects of each of its blocks.

Presenter(s): Stephen Wolfe
Major: Electrical Engineering
Faculty Advisor: Dr. Anatolii Grinshpan

Email: saw335@drexel.edu
Academic Field: Mathematics
Email: tolya@math.drexel.edu

Determinant Distributions of Integer Matrices

Author(s): Stephen Wolfe

Each square matrix has an associated value called the determinant. While there are many applications of determinants that are well understood, there is little known about of the distribution of all possible determinants of particular sets of matrices. This problem is further complicated by the fact that the calculation of determinants is a computationally exhaustive process. I will present my findings regarding the determinant distribution of n -by- n binary matrices and some other classes of integer matrices.

Presenter(s): Songjun Xu
Major: Biological Science
Faculty Advisor: Dr. Felice Elefant

Email: sx38@drexel.edu
Academic Field: Biological Sciences
Email: fe22@drexel.edu

An Epigenetic Role for Tip60 in Learning and Memory

Author(s): Songjun Xu

Tip60 is an essential histone acetyltransferase enzyme that plays important roles in multiple chromatin-mediated biological processes. Previous research from our lab shows that Tip60 regulates genes enriched in neuronal function and functionally mediates neuronal processes including synaptic plasticity, axonal outgrowth and circadian rhythm, axonal vesicle transport, and apoptosis-mediated neurodegeneration. Thus, my project is focusing on understanding the epigenetic mechanism of Tip60 in regulating learning and

memory process. To facilitate this goal, I am utilizing the *Drosophila melanogaster* multicellular system, *Drosophila* central nervous cell line, and Rat hippocampus cells to explore the role and mechanism of Tip60 in learning and memory.

Presenter(s): Peter Yager
Major: Anthropology
Faculty Advisor: Dr. Eva Thury

Email: pay38@drexel.edu
Academic Field: History
Email: thury@drexel.edu

Neighborhood Attitudes and White Flight in Two Philadelphia Neighborhoods

Author(s): Peter Yager

The white flight phenomenon of the post-WWII years, has been widely studied as a sociological phenomenon. While the number of black arrivals could predict the number of white departures and pull effects from the suburbs were more significant than push effects from the city, the attitudes of white neighborhood residents towards nonwhite arrivals varied strongly from neighborhood to neighborhood. Two Philadelphia neighborhoods stand out in their reaction to ethnic succession, West Oak Lane and Fishtown/Kensington. For a current perspective, I reviewed contemporary news, information sources provided by neighborhood associations, and visited the neighborhoods. For historical perspective, I reviewed secondary sources as well as articles from the Philadelphia Bulletin. West Oak Lane turned from a majority Jewish white neighborhood to a majority African-American neighborhood in the 1960's while Fishtown remained a majority Irish-Catholic white neighborhood. The response of white Philadelphians to neighborhood change varied based on socioeconomic class. Middle-class Jewish West Oak Lane accommodated new arrivals because of the Jewish community's historical receptiveness to upward socioeconomic mobility, and West Oak Lane residents welcomed upwardly mobile African-Americans as their own upward mobility moved them to the suburbs. White Kensington's resentment of newcomers was motivated by the Irish Catholic community's perception of itself as competing in a zero-sum game with African-American and Hispanic communities. The varying reaction of white Philadelphians to ethnic change can therefore be understood based on historical factors. A similar ethnohistorical approach could also be used to understand the challenges of changing urban communities today.

Presenter(s): Jacob Zettlemoyer
Major: Physics
Faculty Advisor: Dr. Charles Lane

Email: jcz33@drexel.edu
Academic Field: Physics
Email: lane@duphy4.physics.drexel.edu

Develop and Evaluate the Use of Gated Photomultipliers for Muon Beam Composition Monitoring

Author(s): Jacob Zettlemoyer

Gated photomultiplier tubes can be activated and deactivated when certain conditions are met. These conditions are to activate the photomultiplier tube immediately after a muon beam pulse and to deactivate it approximately 100 microseconds later. This property of shutting off the photomultiplier tubes which are the direct light capturing devices used in neutrino oscillation experiments can be used to control the composition of the muon beam, which corresponds to the energy or intensity of the muon beam.

Presenter(s): Andrew Zigerelli
Major: Mathematics
Faculty Advisor: Dr. Thomas P.Y. Yu

Email: adz24@drexel.edu
Academic Field: Mathematics
Email: yut@drexel.edu

A Computational Application of Subdivision Surfaces to Biophysics

Author(s): Andrew Zigerelli, Jingmin Chen, Sara Grundel, Robert Kusner, Thomas Yu

The Helfrich model has been used to explain the shape of biological membranes. To explore this model, we numerically approximate the membrane using subdivision surfaces, which are more commonly used in the computer aided geometric design community. This novel approach enables us to accurately compute certain functions and their gradients, allowing for an accurate computer simulation of the Helfrich model.

CoAS Research Day 2013 - Oral Presentation Schedule

Natural and Physical Sciences

Session 1 – 11:00-12:30

MacAlister Hall 2020

Talk Order	Level	First Name	Last Name	Advisor Name	Academic Field of Presentation
11:00	GS	Vishal	Kasliwal	Dr. Michael Vogeley	Physics
11:15	GS	Dane	Ward	Dr. Walter Bien	Environmental Science
11:30	US	Pareshkumar	Brahmbhatt	Dr. Luis Cruz Cruz	Physics
11:45	US	Elliott	Chiu	Dr. Gail Hearn	Biological Sciences, Environmental Science
12:00	US	Robert	Wexler	Dr. Karl Sohlberg	Chemistry

Session 2 – 12:30-2:00

MacAlister Hall 2020

Talk Order	Level	First Name	Last Name	Advisor Name	Academic Field of Presentation
12:30	GS	Mitchell	D'Rozario	Dr. Daniel Marenda	Biological Sciences
12:45	GS	Ashley	Johnson	Dr. Felice Elefant	Biological Sciences
1:00	GS	Patrick	McLaughlin	Dr. Gail Hearn	Environmental Science
1:15	US	Matthew	McBride	Dr. Jean-Claude Bradley	Chemistry
1:30	US	Vivek	Satyasi	Dr. Daniel Marenda	Biological Sciences

**Humanities and Social Sciences
Session 1 – 11:00-12:30
MacAlister Hall 2019**

Talk Order	Level	First Name	Last Name	Advisor Name	Academic Field of Presentation
11:00	UH	Brogan	Piecara	Dr. Eva Thury	Communication
11:15	UH	Jessica	Coulon	Dr. Gabriella Ibieta	English
11:30	GH	Mitra	Khaksari	Dr. Pamela Geller	Psychology
11:45	GH	Amanda	NeMoyer	Dr. Naomi Goldstein	Psychology
12:00	GH	Emily	Haney-Caron	Dr. Naomi Goldstein	Psychology

**Session 2 – 12:30-2:00
MacAlister Hall 2019**

Talk Order	Level	First Name	Last Name	Advisor Name	Academic Field of Presentation
12:30	UH	Ariel	Pollak	Dr. Meghan Marsac	Psychology
12:45	UH	Khushbu	Patel	Dr. Rachel Wenrick	English
1:00	UH	Douglas	Hammond	Dr. Eva Thury	Political Science
1:15	GH	Steve	O'Connor	Dr. Christian Hunold	Science, Technology and Society; Ethnography, Public Health, Public Policy
1:30	GH	Alison	Novak	Dr. Ernest Hakanen	Communication

Row A	Row B	Row C	Row D	Row E	Row F	Row G		Row H	Row I	Row J
	18	28	38	48			stage			86
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7	16	26	36	46	54	61		68	75	84
6	15	25	35	45	53	60	chairs	67	74	83
5	14	24	34	44	52	59		66	73	82
4	13	23	33	43	51	58		65	72	81
3	12	22	32	42	50	57	food	64	71	80
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