Undergraduate Research Conference

HUNTER

Hunter College Undergraduate Research Conference

Proceedings

March 20-21, 2013

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Oral Presentation Abstracts

Wednesday, March 20, 2013
Oral Presentation Session #1
9:00am-10:00am

1	Presenter: **Aleksandr Michuda**, *Economics* Thomas Hunter Honors Program, Undergraduate Research Initiative Fellow Faculty Mentor: Jonathan Conning **Large Frontiers and Coercion: An Economic Perspective** Why did some countries develop bad institutions and stagnate in relative terms, whilst others thrived in vibrant democracy? One explanation, articulated most famously in Frederick Jackson Turner's influential "Frontier thesis" states that the existence of large land frontier at a country's inception created conditions for the emergence, and rewarding of rugged individualism, innovation and the development of distinctively egalitarian, competitive and democratic institutions. But the case for this hypothesis is however not always so clear. Depending on the initial distribution of land, technologies and market structures, a large land frontier could have positive or negative impacts. To explore these relationships more formally I theoretically explore, numerically simulate and analyze a general equilibrium economic model to understand the distribution of farm sizes, frontier expansion, and resource allocation under different initial assumptions about the distribution of land ownership rights and technologies. An economy with an initially equitable distribution of land is shown to be more competitive and to settle more frontier land in a more efficient and egalitarian manner compared to an otherwise similar economy where initial concentration of land begins more inegalitarian. In the latter cases a larger frontier may lead to a strengthening of market power distortions and the incentives of landlords to utilize more inegalitarian and inefficient economic mechanisms.
2	Presenter: **Lainga Tong**, *Biology* McNair (Ronald E. McNair Post-Baccalaureate Achievement Program) Co-Authors: Csaba Moskat, Miklos Ban Faculty Mentor: Mark Hauber **Spectral Analysis of the Effect of Natural and Artificial Colors on the Parasitic Egg Rejection Behavior of a Cuckoo Host** To reduce the fitness costs imposed by raising foreign young in avian brood parasitism, hosts have evolved various defenses against the parasite, including the rejection of foreign eggs. Here, we investigated the spectral differences between natural and artificial egg colors on the experimentally induced rejection of foreign eggs in the great reed warbler, Acrocephalus arundinaceus, which is a host of the parasitic common cuckoo, Cuculus canorus. We found a significant positive relationship between rejection rates of the dyed eggs and the Euclidian distances in the Principal Component scores of spectral reflectance parameters between dyed and natural host eggs. These results

	revealed that these hosts increasingly reject those foreign eggs which are physically more dissimilar from their own eggs.
3	Presenter: **Christina Marie Chaise**, *Sociology & Psychology* McNair (Ronald E. McNair Post-Baccalaureate Achievement Program) Faculty Mentor: Thomas DeGloma **Accountability or Anomie? An Analysis of No Child Left Behind on Urban Schools** Drawing on the theoretical contributions of Robert K. Merton, Pierre Bourdieu and W.E.B. Du Bois, the current paper offers a sociological analysis of the effects and implications of the No Child Left Behind Act (NCLB) on urban education. Taking a macro-level perspective, Merton's theory of social structure and anomie is expanded on to illuminate the manifest and latent functions and dysfunctions No Child Left Behind fosters. In particular, the legislation leads to dysfunctions and strains on a multi-structural level, such as disproportionate sanctions, narrowing curriculum, and social stratification in urban schools. Bourdieu's theory of social reproduction is developed to give further insight regarding these topics. On a micro-level, Du Bois's notion of "double consciousness" and Claude Steele's "stereotype threat" is used and expanded upon to explore the implications of high-stakes testing environments for students in urban schools. The case is presented for addressing these issues through comprehensive education reform.
4	Presenter: **Elisabeth Goldman**, *Anthropology* Thomas Hunter Honors Program, Undergraduate Research Initiative Fellow Faculty Mentor: Michael Steiper **An Analysis of Alpha Male Paternity in Natural and Non-Natural Cercopithecoid Populations** Members of the primate family Cercopithecoidea are distributed widely throughout the Old World, with populations living in a variety of habitats and diverse conditions from South Africa to Japan. There are also groups that range freely in non-native habitats, such as the Rhesus macaques (Macaca mulatta) on Cayo Santiago, Puerto Rico, or the garbage dump-living Hamadryas baboons (Papio hamadryas) in Arabia. Some of these free-ranging populations are provisioned, while others are not. To date, there has not been a comprehensive analysis of the possible behavioral differences between natural and non-natural populations. Here, we perform a meta-analysis of studies analyzing Old World Monkey populations to detect differences in one specific behavioral parameter: the reproductive success of high-ranking males. By comparing paternity data from nine free-ranging, nine captive, and four wild studies of primarily macaque populations using tests of independence, we attempt to discern whether non-natural living situations are markedly different from those in the wild. We chose only species that naturally live in multimale/multifemale social systems. Captive situations in which food is readily available, as compared with the wild (where foraging is a necessity), may allow for a decrease in the degree of advantage typically garnered by high rank. Alternatively, it is possible that easy access to resources allow the dominant males to become increasingly despotic. In analyzing reproductive success in captive and wild populations, we hope to better understand the extent to which captivity affects these animals' social

	structure.
5	Presenter: **Stephie-Anne Duliepre**, *Biology* HHMI (Howard Hughes Medical Institute) Faculty Mentors: Onica Le Gendre & David Foster **Targeting Cancer Cells with Glycosylated Honokiol** Glucose is the primary source of energy for mammalian cells and is involved in cell regulation and metabolism. In normal cells, glucose uptake is activated by the cell's nutritional/energy requirements. In cancerous or proliferating cells, glucose is shunted away from generating ATP therefore causing the cell to continuously uptake glucose. Otto Warburg described this phenomena as aerobic glycolysis, which is necessary to support increased cell proliferation in cancer cells. Insulin, a growth factor, is involved in the regulation of glucose uptake. Several glucose transporters (GLUTs) have been identified as regulators of glucose uptake. GLUT1 contributes to basal levels of glucose transport, while GLUT4 is responsible for insulin-stimulated glucose transport. Direct/indirect deregulation of glucose transporters can lead to constitutive activation and continuous glucose uptake. Previous reports have stated that activation of GLUT's are mediated through the PI3k/Akt/mTOR signaling pathways in cancer cells. Honokiol, a polyphenol biphenyl natural compound, has been shown to inhibit the activation of Akt signaling and induce apoptosis in cancer cells. However, high concentrations of Honokiol, micromolar doses, are required to observe cell death. In this study, we intend to develop glycosylated-honokiol derivatives to specifically target cancer cells with increased glucose uptake. We hypothesize that glucose bound to Honokiol presents as a specific guidance system which will deliver Honokiol to cancer cells at lower concentrations with similar results as higher doses. The effects of glycosylated-honokiol on GLUT1/4 and PI3k/Akt signaling will be monitored by western blot analysis in pancreatic cancer cells with normal and elevated glucose uptake.
Wednesday, March 20, 2013 **Oral Presentation Session #2** **1:15pm-2:15pm**	
6	Presenter: **Valentyna Erstenyuk**, *Behavioral Neuroscience Concentration* John P. McNulty Scholar Co-Author: Meghan Swanson Faculty Mentor: Michael Siller **Cognitive Abilities in Relation to Pupillary Responses During Social Videos** Pupillary responses are commonly interpreted as a measure of attention engagement (Hoeks & Levelt, 1993). The current study uses pupillary measures to evaluate children's attention while viewing social stimuli, aiming to investigate concurrent associations with children's performance on standardized measures of cognitive development. Fifty typically developing children aged 3-9 years (M=6.33, SD=1.63)

	viewed social videos while their pupillary behavior was recorded. In the congruent condition, the model gazes to the corners where a target appears, eliciting a joint attention experience. In the incongruent condition, the model gazes to an empty corner. Mean pupil diameter was calculated and standardized (Post –Pre) for 13 consecutive 250ms intervals. Participants' non-verbal cognitive scores (DAS-SS) were determined using Differential Abilities Scales II Special Nonverbal Composite (DAS II; Elliott 1990). The effect of non-verbal cognitive skills on pupillary behavior was evaluated by combining two consecutive Post intervals, yielding six bins. A RM-ANOVA revealed a significant condition*DAS-SS interaction effects for bins 3-6 (bin 3: $F(43, 2005) = 8.19$, $p < 0.01$; bin 4: $F(43, 1913) = 5.96$, $p < .05$; bin 5: $F(43, 1928) = 6.36$, $p < .05$, bin 6: $F(43, 1928) = 7.97$, $p<.01$). When compared to congruent condition, participants with lower DAS-SS showed a greater increase in pupil size during incongruent condition. In contrast, differences in pupil size between the two conditions were attenuated in children with higher DAS-SS. This research adds to a body of literature relating attention to cognitive skills, highlighting the importance of visual attention on cognitive development.
7	Presenter: **Clara Ng**, *Computer Science* John P. McNulty Scholar, Catalyst Scholarship Program Faculty Mentor: Lei Xie **On-line Graph Mining and Visualization of Protein-Ligand Interactome** Recent efforts in high-throughput screening of bioactive molecules have generated an enormous amount of data on protein-ligand interactions. For example, more than one million compounds are associated with the 4422 proteins in ChEMBL. It is a great challenge to mine and visualize this large protein-ligand interaction data set. Most recent works have mapped chemicals into a high-dimensional feature space, and have used dimensional reduction techniques to visualize and analyze the chemical space. Here, we propose a different approach to addressing the challenge in exploring the protein-ligand interactome efficiently, effectively, and intuitively. We link all chemicals and targets into an all-against-all chemical similarity network and target similarity network, respectively. The networks are connected as a bipartite graph through the protein-ligand interactions. Efficient graph clustering and mining algorithms are applied to identify chemical and protein patterns underlying binding promiscuity and specificity. Although the reconstruction of the chemical and protein similarity network is computationally intensive, it only needs to be done once and updated regularly. As demonstrated in our case studies for anti-infectious drug discovery, our method may facilitate drug repurposing, side effect prediction, and polypharmacology drug design.
8	Presenters: **Alcy Leyva** & **Aisha Sidibe**, *English & Film Theory* Faculty Mentor: Geri Lipschultz **Fostering the Creative Environment** Many view that the education model is not only perfect ("A professor stands and speaks, a student sits and listens") but also that it is adaptable to every single classroom regardless of student demographic and learning capabilities. This creates a divide between professor and student which negatively impacts student retention rates

	in remedial classes, such as math. The approach of Aisha Sidibe and Alcy Leyva, with research and implementation backed by Dr. Vrunda Prahbu in classes at both Bronx Community College and Hostos College, includes two specific class visits (one at the start of the semester and one towards the end) in which creative writing exercises and general discussions are explored within the realms of personal experience and expression. In two consecutive classes (Spring & Fall 2012), the students have been able not only to express themselves in ways that are conducive to learning, but are more adapted to the rigors of the subject matter. Our approach "bridges the gap" between the student and professor and this is only possible by the inclusion of Learning Partners which will serve as both coaches and tutors.
9	Presenter: **Carol Hosny**, *Biological Sciences* John P. McNulty Scholar Co-Author: Suman Mukhopadhyay Faculty Mentor: David A. Foster **Effects of Glutamine Deprivation on Cancer Cells** Cancer is a result of the uncontrolled cell growth. Finding the detailed mechanisms behind cancer for treatment purposes is a challenging target for many researchers. In cancer cells, glutamine, a conditional essential amino acid, is involved in many biosynthetic reactions. In these proliferating cells, it is converted to glutamate and α-keto-glutarate to replenish the intermediates of the Krebs cycle for anabolic synthetic reactions. We have shown that, upon glutamine starvation, cancer cells change their cellular morphology and size. The cell proliferation of different cancer cells is significantly affected upon glutamine deprivation. Moreover, we have seen that cancer cells arrest in different phases of the cell cycle profile when deprived of glutamine. The glutamine uptake by cancer cells can be targeted for a therapeutic impact on cancer treatment.
10	Presenter: **Elena Guskova**, *Chemistry & Russian* John P. McNulty Scholar, Thomas Hunter Honors Program Faculty Mentor: Charles Michael Drain **Investigating the Two-Photon Absorbance of a Novel Quadrupolar Phthalocyanine** An improved synthesis procedure of asymmetrically disubstituted phthalocyanines has been discovered. 4,5-Substituted phthalonitrile, when combined with a catalytic amount of sodium methoxide and ammonia gas, produces the desired diiminoisoindole. (Solvent: Dry methanol and THF 50:50) Another reaction of 4,5-dichlorophthalimide and phosphorus pentachloride in dry 1,2-dichlorobenzene allows the synthesis of 1,3,3,5,6-pentachloroisoindolenine. Finally, the addition of diiminoisoindole to 1,3,3,5,6-pentachloroisoindolenine, with THF as a solvent, affords the asymmetrically disubstituted ABAB phthalocyanine. We expect the resulting compound to have a quadrupolar excited state due to the complementary electron withdrawing and electron donating groups. Our goal is to investigate the two-photon absorbance of ABAB type phthalocyanines. Two-photon absorbance is useful for collecting a wider portion of the solar spectrum for solar energy conversion, as well as for biomedical applications relying on the increased tissue penetration of low energy photons.

Wednesday, March 20, 2013 **Oral Presentation Session #3** **3:45pm-5:00pm**	
11	Presenter: **Rosemery Membreno**, *Chemistry* Co-Author: Ivana Radivojevic Faculty Mentor: Lynn Francesconi **Speciation of Lower Valent Technetium-99 with Tri-substituted Keggin and Wells-Dawson polyoxometalates** Technetium-99 (99Tc) is a long-lived radioactive transition element with a half-life of 2.13 x 105 years. 99Tc emits a low energy β- particle from its nucleus. 99Tc is formed by fission of 235U in nuclear power plants and is also a product of fallout from nuclear weapons testing. As the pertechnetate (TcO4-) anion, technetium is highly mobile in the environment. We are studying the inorganic chemistry of Tc to understand how to stabilize this fascinating element in potential metal oxide materials for long-term storage. Due to the complex oxidation-reduction chemistry, 99Tc management is an issue for both waste characterization and long-term storage. In order to combat this problem it is essential to first understand the inorganic chemistry of 99Tc in metal oxides to determine its reactivity with the potential metal oxide storage materials, such as glass and ceramics. Polyoxometalates (POMs) are a subset of metal oxides that represent a diverse range of molecular clusters with an almost unmatched range of chemical properties. POMs are soluble nanomolecular materials that are excellent model systems for the metal oxide solid-state materials that are considered for storage matrices for 99Tc. We are currently investigating the chemistry of technetium and its non-radioactive congener rhenium in the +1 oxidation state, with tri-substituted Keggin POMs, specifically, PW9V3040 6-, and Wells Dawson, P2W15Nb3062 9-, ions. We wish to further the known speciation and reactivity of technetium compounds in order to increase the understanding of the composition of technetium contained in the waste storage facilities.
12	Presenter: **Victoria Quinones**, *Psychology* MBRS-RISE (Minority Biomedical Research Support-Research Initiative for Scientific Enhancement) Co-Author: Kyeisha Hodge Faculty Mentor: Regina Miranda **Active and Passive Problem Solving as Moderators between the Subtypes of Rumination and Suicidal Ideation** Rumination is described as a repetitive focus on the causes, meanings, and consequences of one's symptoms of distress and depressed mood. Research shows that rumination interferes with adaptive problem solving by leading individuals to focus on their problems and feelings about these problems without taking the actions necessary to solve them. Furthermore, previous research shows that rumination increases risk for suicidal ideation. The present study examined whether active

	problem solving would buffer against the association between brooding and reflection – two subtypes of rumination – and suicidal ideation and whether passive problem solving would exacerbate this association. College students with (n=28) and without (n=127) a suicide attempt history were recruited from a study measuring the social cognitive predictors of suicidal ideation and behavior. In the first study session, participants completed questionnaires to assess rumination and suicidal ideation. In the second study session, participants completed a measure of social problem solving. Reflection was significantly associated with suicidal ideation in non-attempters, but not in attempters. Brooding was not significantly associated with suicidal ideation in attempters or non-attempters. Linear regression analyses showed that among individuals with a history of suicide attempt, the association between brooding and suicidal ideation was strengthened by a tendency to solve problems passively. However, active problem solving did not moderate this relation. This suggests that among individuals who engage in brooding and have a history of suicide attempt, it may be beneficial for prevention and intervention programs for suicidal ideation to emphasize solving problems in a less passive way.
13	Presenter: **Tom Hart**, *Biology & Bioinformatics* Macaulay Honors College Faculty Mentor: Lei Xie **Protein Targets for the Anti-Cancer Effects of Metformin** It has been established that Metformin, a drug frequently used in treating type 2 diabetes, inhibits growth of various tumors through inhibition of the mTOR pathway. However, the precise mechanism of the drug's anti-cancer properties has not yet been determined. Elucidating this mechanism will provide valuable insight into the optimal uses, risks, and possible side effects of metformin as an anti-cancer agent. A known metformin receptor, dipeptidyl peptidase IV (DDP4), was used as a template for proteome-binding site analysis. Molecular docking simulations gave further credence to eleven highly-rated potential drug targets. From these candidates, mitogen-activated protein kinase 14, protein kinase B/Akt, and interleukin-12 are significantly related to the mTOR pathway. These proteins represent likely targets for metformin's anti-cancer effects.
14	Presenter: **Anayet Chowdhury**, *Biology* Co-Authors: Jason Plotkin & Michel Sadelain Faculty Mentor: Benjamin Ortiz **Genetic Engineering of Human T Cells to Resist PD-1 Receptor Mediated Cell Death** The Programmed Death (PD)-1 protein is known to play important roles in T cell proliferation and prevention of autoimmune diseases. However, previous studies also showed that tumor cells expressing a ligand for the PD-1 protein can trigger cell death in T cells expressing high levels of PD-1. We hypothesize that T cells with reduced PD-1 protein levels will function normally, but will also be resistant to PD-1 ligand-positive tumor-induced cell death. A retroviral vector expressing a short hairpin RNA (shRNA) that targets the PD-1 receptor mRNA was generated by transient transfection of a packaging cell line. Resultant viral particles were then used to transduce primary

	human T cells. The results show that the shRNA reduced PD-1 protein levels in the T cells by up to 70%. These modified T cells were then placed in a tumor environment in vitro and still produced normal levels of cytokines. These results support the above hypothesis. The next step is to engineer "PD-1 low" T cells in combination with a chimeric antigen receptor that can target prostate tumors. If these T cells effectively target the malignant prostate cells in mouse models, this may become a promising approach to cancer immunotherapy.
15	Presenter: **Alexander Kraljic**, *Media Studies* Macaulay Honors College, Thomas Hunter Honors Program Faculty Mentor: Christa Acampora **Pleasure in the Perverse: The Aesthetic Qualities of Torture-Horror** Horror films and violence are two concepts that have always been inextricably linked, however the past decade has produced a smattering of particularly graphic films within the genre. These new wave horror movies, which have been branded with the dubious title of 'torture porn', often showcase scenes of sadistic mutilation that many would argue border on excessive. But if these 'new' levels of violence are in fact so far beyond the boundaries of good taste, why then are the films so wildly popular? As much as these films are marketed as a challenge to the viewer to 'endure' the entire film, these spectacles of gore actually provide an intense and often pleasurable aesthetic experience that is gratifying on both a visual and emotional level, and I analyzed these possibilities for aesthetic fulfillment through the lenses of a variety of philosophical and academic ideologies. By utilizing theories on pleasure from philosophers such as Immanuel Kant and Joseph Kupfer in combination with film analysis from scholars such as Julian Hanich, I found that these films are a definitive representation of a time and culture within the context of American history, as much a reflection of cultural fears as a distraction from them. They push the boundaries of social acceptability as well as our concepts of self, and the genre's possibilities for creating aesthetic experiences provide a fascinating, revealing, and critical insight into the human nature to seek pleasure in the perverse.
16	Presenter: **Rukhinda Maqsood**, *Biology & Bioinformatics* MIND Alliance Co-Author: Marie McAnuff Faculty Mentor: Robert Dottin **Construction of a Constitutive PolIII Vector for Mediating RNA Interference of Developmental Genes in Dictyostelium discoideum** Small hairpin RNAs (shRNA) silence gene expression through RNA interference (RNAi). They target mRNAs in the region complementary to the shRNA, resulting in cleavage and degradation. Continuous transcription of DNA encoding shRNA in cells can more effectively silence targeted genes than transfecting short RNAs. We are constructing plasmids containing efficient polymerase III tRNAglu or val promoters to transcribe in Dictyostelium discoideum, shRNAs that can potentially identify genes important in development. Dictyostelium discoideum grows as unicellular eukaryotic amoebae that upon starvation can aggregate and develop into a multicellular organism. It is a unique

	model organism for studying gene expression during development because of its simple developmental cycle and haploid genome. Previously RNAi studies in Dictyostelium required expression of long inverted repeats (~1000 mers) from a polymerase II promoter. That approach suffers from low-level transcription and possible off-target effects from using long transcripts. We previously used a tetracycline inducible Pol III vector (pTRI) to express shRNAs (~30 mers) in Dictyostelium. However, the induction seems inefficient. Therefore, we demonstrate here, the construction of the first of two vectors with high efficiency promoters, Pol III RNAglu by replacing the Pol II promoter in plasmid pDXA-3H. The transcription efficiency of vectors will be compared by northern blot and by gene interference. This approach will provide tools for knocking down and identifying novel genes that are important for eukaryotic development, but cannot be studied in complex eukaryotes.
Thursday, March 21, 2013 **Oral Presentation Session #4** **9:15am-10:15am**	
17	Presenters: **Chanelle Spencer** & **Maria Vera**, *Psychology* Faculty Mentor: Tricia Striano **Tap Me If You Can: Children's Response to Familiar vs. Unfamiliar Eye Gaze** Understanding the ways that children process eye gaze of familiar and unfamiliar adults is important for optimal contexts for learning and communication. Processing eye gaze is also important in autism and understanding eye gaze processing is a first step in developing possible intervention strategies. In this study, we developed a new paradigm to test ages 4 to 6 year old children's responses to familiar and unfamiliar eye gaze. A total of 16 typically developing children participated (6 males and 10 females, age range: 4 years, 2.1 months – 6 years, 9.3 months, average age: 5 years, 6.7 months, SD = 11.2 months). The children saw photos of familiar and unfamiliar faces and were directed to touch the face that is looking at the shape in the middle. The eye gazes presented on the photos were directed towards the left or the right and one face was directing eye gaze to a shape in the middle. We found that children react significantly differently to the eye gaze of a familiar face compared to an unfamiliar face, t (15) =2.279, p= .038. Children took longer to respond to the shape in the middle when a familiar face was presented (M= 2.2347 seconds, SD= 1.024) compared to the unfamiliar eye gaze (M= 1.010 seconds, SD= .801). These data show that familiarity of faces influences eye gaze detection in a natural context.
18	Presenter: **Sally Seul Gi Lee**, *Biochemistry* Undergraduate Research Initiative Fellow Faculty Mentor: Hiroshi Matsui **Label-free Cancer Detection via Impedance Measurement Using Interdigitated Electrodes**

	Convenient, sensitive and robust cancer cell detection methods, which allow one to detect the disease easily, can be extremely helpful in arresting cancer's progress. When normal cells become cancerous, they tend to become softer and more elastic, accommodating larger swellings under strong hyposmotic stress. Incorporating this physical change of cancer cells, we developed a new sensing platform, integrating electric cancer cell sensors on polysilicon chips that can detect the change in electric property of cells upon their volume expansion. Using computational modeling, the dimensions of interdigitated electrodes were enhanced for better sensitivity at detection. By applying this new electromotive sensor chip to the impedance measurements, cancer cells were successfully detected within 30 minutes in the spike samples without using biomarkers. Our fast yet robust and label-free system can efficiently differentiate cancer cells, opening up the possibility of point-of-care testing which can easily allow for constant monitoring of patients' condition.
19	Presenter: **Marc Zwillenberg**, *Biology* Thomas Hunter Honors Program Faculty Mentor: Christa Acampora **Aesthesis: A Practical Definition** While aesthetics is often studied in relation to the formal arts, it is also a critical dimension of our everyday lives. Aesthetic qualities and experiences shape how we connect ideas in the context of education, how we are engaged as members of a community, and how we form relationships with others. From education and sport to sex, decision-making, and death, aesthetics plays a role in what we experience and who we become. In my Thomas Hunter Honors seminar last term, I was challenged to identify the core concepts of the class and my own ideas about them, setting them in relation to each other in a concept map. The map is divided into five distinctive considerations: love, purposiveness without a purpose, experience, completeness and functionality which together converge onto a practical definition of aesthesis.
20	Presenter: **Jennifer Zagelbaum**, *Biology & Women and Gender Studies* Faculty Mentor: Charlotte Glasser **Single-Molecule Observation of Human Rad51 Filament Dynamics** During its lifetime, DNA is subjected to various stress from DNA processing enzymes, DNA binding proteins, radiation and reactive chemical species that often results in various forms of DNA damage. Double stranded breaks (DSBs) are the most toxic form of damage and may lead to genetic transformation. Homologous Recombination (HR) is a major DSB repair pathway whose malfunction can lead to genome instability, premature aging, and cancer. Rad51 plays a crucial role in promoting HR with the creation of a nucleoprotein filament on single-stranded DNA (ssDNA). This filament allows for strand invasion by a homologous DNA molecule and initiates the d-loop formation, recombination, and ligation that complete the HR pathway. Despite the importance of this regulatory protein's role in HR, much is still unknown about Rad51 activity. To investigate the behavior of Rad51 and analyze the dynamics of the nucleoprotein filament we developed novel single-molecule fluorescence microscopy. Single-molecule Florescence Resonance Energy Transfer (smFRET) allowed us to extract

	the kinetics of Rad51 filament formation and activity on individual DNA molecules in real time. Experiments revealed the minimum DNA tail length needed for filament formation and mapped out subsequent filament dynamics such as dwell time and dissociation/association rates of Rad51 molecules. Our experiments not only analyze the recombinase activity of Rad51, but also pave the way for future characterization of HR regulatory proteins.
21	Presenter: **Eugene Danyo**, *Linguistics* Thomas Hunter Honors Program, Undergraduate Research Initiative Fellow Faculty Mentor: Maryam Bakht **Conversational Routines and Miscommunication in English Varieties (Australian/American English)** Expressions of gratitude and the responses that follow them such as 'Thank you' and 'You're welcome' are often thought of as highly formulaic, minute conversational routines. Conversational routines entail portions of conversation, which become habituated and culturally significant in conversation such as the exchange of 'Hello' between interlocutors. In my own cross-cultural experience as an American English speaker abroad in Australia, I was led to suspect differences in the chosen strategies between speakers of both English varieties for responses to expressions of gratitude. In this study, I investigate the previously unexplored area of Australian English speakers' responses to expressions of gratitude. I conduct a comparison of the typical responses of Australian speakers to those of the responses of speakers of American English in order to uncover potential grounds of miscommunication between the two English varieties. In the early stages of the study I first look at the typical responses given by students at the Australian National University, as well American college students. Differences in internal and external strategy choices of speakers are correlated with the event, which elicited the thanking routine and reflect the distinct preferences in linguistic strategy choice. Australian speakers, for example, employ a larger variety of utterances in their thanking and welcoming routines. These findings, the potential grounds for miscommunication and more will be discussed and compared with American datasets.
Thursday, March 21, 2013 **Oral Presentation Session #5** **2:00pm-3:15pm**	
22	Presenter: **George Kobachidze**, *Anthropology* Faculty Mentor: Maryam Bakht **Manufacturing Identity in Caucasian Social Network Groups** This anthropological research project is intended to study the construction of identity among users of social network clusters and is dedicated towards ethnic groups of the Caucasus region. Prior to social networks, ethnic groups of the Caucasus region had remained relatively isolated from each other, while interacting only through conflicts along unstable borders. Social Networks have created a potential for a broader level of

	interaction among different Caucasian ethnicities, which otherwise would remain geographically and politically remote. Social networks, like Facebook, have engineered an innovative and original way of connecting the people, where people have opportunity of interacting with each other without having deeper background profile information (which would be otherwise available in case of face-to-face interaction). Given the ethnic variety that exists among members of Caucasian origin, construction and projection of Caucasian identity by the social media users became vital during participation in heated discussions. The project will use quantitative approach in order to analyze how members of social networks (who often conceal their identities for their own protection) use their language and style to construct their identities. The research project will be mainly focused on different Facebook groups, as well as YouTube Channels. By studying the construction of identity by participants in the social network, this project will advance our sociolinguistic knowledge and expend out understanding on impact of Social Network on human interactions.
23	Presenter: **Jose Quinonez**, *Biology* Co-Authors: Patrick Moy & Victoria Russell Faculty Mentor: Mande Holford **Investigating Novel Terebrid Snail Peptide Toxins** The Conoidea family, made up of cone snails, terebrids and turrids, is a group of marine snails that produce an extensive library of natural peptide toxins. The peptide toxins produced by conoidean snails can be used as pharmaceutical agents, as they function on specific molecular targets in the nervous system to shut down their prey. Known conoidean peptide toxins are used to manipulate cell signaling via ion channels, noradrenaline transporter and nicotinic acetylcholine receptors. Ziconotide (Prialt) is the first conoidean drug approved by the FDA for use in chronic pain in HIV and cancer patients. While cone snails and their peptide toxins, conopeptides, have been investigated extensively, very little is known about terebrids and their peptides, teretoxins. This project examines the activity of two teretoxin peptides, Tv1 from Terebra 19ariegate, & Tg77 from Terebra guttata, using a polychaete worm bioassay. Polychaetes are a natural prey for terebrid snails, providing an effective assay for determining teretoxin bioactivity. Twenty micromolar solutions of Tv1 and Tg77 peptides were injected into the central nerve cord of polychaete worms. Preliminary results indicate that both Tv1 & Tg77 are bioactive. Both teretoxins indicate partial paralysis around the injection site or lethargic movements after immediate injection, followed by delayed recovery time. While the polychaete assay can provide information about bioactivity of Tv1 and Tg77, additional experiments using electrophysiology are needed to determine ion channel/receptor specificity and potency of these teretoxins. Having successfully established a viable assay for rapidly evaluating the bioactivity of teretoxins, this technique will be applied to investigate the bioactivity of additional teretoxins. With the use of the polychaete bioassay we hope to effectively screen the array of teretoxins expressed in the venom of terebrid snails.
24	Presenter: **Tyler Alterman**, *Cognitive Science & Communications Design* Macaulay Honors College Faculty Mentor: Jason Young

	The Think Tank: Cognitive Science on Wheels The Think Tank will be a literal and metaphorical vehicle which will empower the public with cognitive science. Built out of a renovated box truck with a glowing brain on top, The Think Tank will also be a fully-functioning laboratory-on-wheels. Upon hitting the streets, it will drive to elementary and high schools where mobile researchers will teach students about the science of the mind. It will also invite citizens aboard to participate in studies and teach them how cognitive science can improve lives. Finally, The Think Tank will team up with world-renowned psychologists and neuroscientists to deliver sidewalk talks, taking citizens on their explorations into human thought and behavior.
25	Presenter: **Aleksandr Itskovich**, *German Language and Literature & Chemistry* Undergraduate Research Fellow Faculty Mentor: Lisa Anderson **Rendering Rilke: Research and the Art of Literary Translation** The focus of this research project, a collaboration with Dr. Lisa Anderson of the German Department, is on the poetry of one of the most renowned writers of the 20th century, Rainer Maria Rilke. It is supported by the Undergraduate Research Fellowship, which has recently approved our proposal for a second semester. The project's ultimate goal is to create an accurate and artistic translation of one of Rilke's first poetry collections, which has never been fully rendered into English. Some research questions guiding our work are: "Why has relatively little of Rilke's early poetry been translated?" and "Does it merit translation, and if so, what kind?" One conclusion drawn is that this collection represents a key turning point in Rilke's artistic development, offering the first indications of what would eventually become his mature voice. The research component of this project has focused, among other things, on compiling an annotated bibliography of all previous translations of Rilke into English, discovering continuities in language and imagery throughout Rilke's complete works, and tracing biographical influences on the poems. Whether exploring the particular meaning of a word, consulting secondary literature, or referencing letters and diary-entries, research accompanies every step of the translation process. My presentation will illustrate the essential role that research plays in producing a better and more engaging literary translation. The finished project will give English readers access to a new work of world-literature, an important piece of scholarship, and poetry in which they will find both pleasure and enrichment.
26	Presenter: **Michael Fattouh**, *Chemistry* Faculty Mentor: Dixie Goss **Barley Yellow Dwarf Virus Translation Initiation** The barley yellow dwarf virus (BYDV) is a widespread, RNA-based plant virus, infecting economically viable cereals, such as corn, rice, and wheat. Understanding this virus at the molecular level, would allow regulation and increased plant yields worldwide. Though RNA translation initiation usually occurs at the 5'-cap, something different seems to be happening in BYDV. Binding of eIF4F, which is responsible for complexing with the 40S ribosomal subunit, seems to be occurring somewhere on the 3' end of the

	virus, independent of the 5'-cap. It is hypothesized that once 4F is recruited onto the 3' end, "long distance," intra-RNA interactions between the 3' end and the 5' untranslated region (UTR) help cue initiation. Fluorescence anisotropy is a spectroscopic analysis technique that focuses on the emitted light having unequal intensities along different directions. The faster a solute molecule rotates ("tumbles"), which depends on the molecular weight, the more depolarized the emitted light will be. Therefore, if there is binding (between protein and RNA), the complex will tumble slower, causing the degree of polarization to increase. Anisotropic experiments, complementary to those run by W. Allen Miller's lab (at Iowa State University), showed that, in solution, eIF4F and it's subunits do not bind to the 5' UTR segment of the BYDV mRNA. This information is consistent with the hypothesis that BYDV's eIF4F recruitment, and therefore the virus' translation initiation, requires more than the 5' UTR RNA, as is usually observed in nature.
27	Presenter: **Renaldo Alexander**, *Sociology* Faculty Mentor: John Andrews **Neurolaw: The Brain from Lab to the Courtroom** The human brain is the essential part of the body, which many people identify with the coordination of how we think and behave. Depending on who you ask however, the ownership of one's brain and the relation of one's behavior, sometimes criminal, are up for debate. From the ancient Greeks to modern neuroscientists, the behavior which the brain makes us exert engages an important question. Can criminal behavior which is coordinated by the brain, be held to the same responsibility if the brain in question, has a defect? Recently, brain research and the justice system have created a new subfield called Neurolaw. Neurolaw weighs the thoughts and actions behind criminal behavior. Research and qualitative analysis which was conducted, indicate a connection between brain defects and criminal behavior. Ultimately, it was highlighted that individuals who have a brain defect and commit crimes, should be subject to prison time (responsibility) but with reduced sentences. Therapy, mental help, both medical and psychological should be provided during and after a sentence is served. The research methods that were used incorporated information which extend into (i)philosophical, (ii)sociological, (iii)medical and ultimately (iv)social realms.

Poster Presentation Abstracts

Wednesday, March 20, 2013

Poster Session #1

9:00 am – 12:00 pm

1	Presenter: **Earth Systems Science II** , *Earth and Environmental Science* Catalyst Scholarship Program Co-Authors: Bridgit Boulahanis, Erik Breitenbach, Jose Cleofas, Christian Delgado, John Ferrara, Lucas Gomez, Camila Montes De Oca, Jason Ocana,Danny Ovryn, Christopher Robertson, Kin Yam Tsoi, Irina Ashman, Nicole Avento, Diane Casner, Irene D'Angelo, Andres Leung, Anthony Margulies, Naeemah Maynard, Volha, Melianets Faculty Mentor: Haydee Salmun **The Great Pacific Garbage Patch** The Great Pacific Garbage Patch is one of today's environmental hazards and the main objective of this presentation is to provide an understanding of its scale, its importance to the public and its potential threat to Earth's ecosystems. The Great Pacific Garbage Patch is unique amongst environmental problems because of both uncertainty of its concise origin and a viable solution. Plastic material composes most of the garbage patch. It is not a garbage island that can be seen floating on the ocean from space, instead, most of the plastics are photodegraded and floating in the top layer of the ocean. The North Pacific Gyre creates a circular motion of ocean currents, which draw debris in towards its center, off the western coast of North America. These plastic pieces can be harmful to marine wildlife, on both a macro and micro scale. Larger animals and fish can consume the harmful plastics, and plastic accumulation blocks sunlight from reaching photosynthesizing plankton. Plastic accumulation that leads to the Patch's formation is caused by improperly disposed waste from both North American and Asian shores, in addition to plastics dumped by marine vessels. Many cleanup ideas exist, although they are all problematic due to the massive scale of the Garbage Patch. For example, trawling the ocean surface with nets to filter out the plastic would be time consuming and expensive, but also would disturb the life on the ocean's surface. However, a solution must be reached swiftly, because the Garbage Patch is growing steadily.
2	Presenter: **Amanda Rincon,** *Psychology and English* BP-ENDURE (Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Authors: Sarah Babkirk & Victor Rios Faculty Mentor: Tracy Dennis **Longitudinal Associations between the Late Positive Potential and the use of Adaptive and Maladaptive Emotion Regulation Strategies**

	The late positive potential (LPP) has been used to measure the ability to use cognitive emotion regulation strategies, like reappraisal, to decrease negative emotional responses. Specifically, while viewing unpleasant pictures, directions to reappraise the pictures in a more positive light result in smaller LPP amplitudes (relative to viewing the pictures in a negative light). This reduction of LPP amplitudes is thought to reflect more effective emotion regulation. The present study examined a rarely studied question: whether the ability to decrease LPP amplitudes via reappraisal is related to the use of adaptive and maladaptive emotion regulation strategies. The present study included 18 children who, in Phase 1, ranged from 5-7 years of age, and in Phase 2 ranged from 6-9 years. During Phase 1, child emotion regulation strategies were observed during a delay of gratification task. Distraction is an effective strategy which promotes the ability to wait, whereas focusing on the prohibited object is ineffective. During Phase 2, EEG was recorded while children viewed unpleasant emotional pictures which were randomly accompanied by either a reappraisal or negative story. Greater use of distraction was associated with greater reductions in LPP amplitudes due to reappraisal ($r = .63$, $p < .05$). In contrast, greater focusing on the prohibited object was associated with smaller reductions in LPP amplitudes due to reappraisal ($r = -.74$, $p < .01$). Results suggest that the use of adaptive and maladaptive emotion regulation strategies predict LPP measures of reappraisal over time. The potential of the LPP as a clinically-relevant biomarker for emotion regulation is discussed.
3	Presenter: **Anibelky Almanzar**, Biology HHMI (Howard Hughes Medical Institute) Faculty Mentor: Jayne Raper **Antimicrobial high density lipoprotein: the good cholesterol** Humans and some primates are resistant to certain subspecies of African Trypanosomes because of an innate immunity that provides protection against the disease. This barrier is known as trypanosome lytic factor (TLF), which is approximately one percent of human high-density lipoprotein (HDL). TLF is composed of lipids and three proteins, which are apolipoprotein A-I (Apo A-I), haptoglobin related protein (Hpr), and apolipoprotein L-I (Apo L-I). However, the main proteins involved in the lysis of parasites are Hpr, which enhances the endocytosis of TLF via a trypanosome receptor, and Apo L-I that is the pore-forming protein. TLF binds in the Fagellar pocket of the parasite and it's taken up by the endosomes. It is then delivered and activated in the acidic lysosome within the parasite, causing the release of the pore forming protein, Apo L-I, and the lysis of the parasite. Besides killing parasites, we want to test if TLF can also kill other pathogens that grow in acidic environments such as Bacillus anthracis, which germinates in the lysosomes of macrophages. This bacterium has a capsule that protects it against phagocytosis. There have been experiments that show that TLF can kill the Sterne strain Bacillus anthracis, which does not posses the capsule. Our aim is to study a non-pathogenic bacterium that is genetically similar to Bacillus anthracis known as Bacillus cereus. Based on past experiments, we anticipate that TLF will lyse Bacillus cereus without the capsule. However, what is yet to discover is whether TLF can kill Bacillus cereus with the capsule.

4	Presenter: **Anna Chang**, *Neural Science* BP-ENDURE (Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Authors: Anthony Klambatsen & Shirzad Jenab Faculty Mentor: Shirzab Jenab **Sex differences in novel object recognition following acute methamphetamine administration in rats** Acute methamphetamine administration in male rats has been shown to cause impairments in learning and memory, such as in the novel object recognition task. However, while the effects of acute methamphetamine administration on male rats have been documented, little is known about the difference in learning and memory between males and females. To investigate the sex difference in the novel object recognition, male and female Sprague-Dawley rats were subjected to acute methamphetamine administration, and their performance was measured.
5	Presenter: **Beryl Teitelbaum**, *Psychology* Co-Author: Benjamin Ruisch Faculty Mentor: Jason Young Undergraduate Research Initiative **Trust, Arousal and Sensation Seeking in Couples' Reasoning about Safer-Sex** Previous research has explored the role of trust, arousal, and sensation seeking in single homosexual males' decisions to engage in unsafe-sex. However, much research implicates the couple as a major source of HIV transmission (Davidovich et al, 2000). Previous research has tended to focus overwhelmingly on self-report measures of sexual behavior, which are vulnerable to social desirability motivations. In this study, homosexual male couples were asked to reason about safer-sex in a role-play scenario in order to obtain more active, affective responses. Conversations were transcribed and recorded in order to explore the role of interpersonal communication and couple dynamics in participants' reasoning about safer-sex. Variables such as perceived level of commitment, trust, communication characteristics, and concerns about STD transmission were considered. Implications for the development of safe-sex intervention strategies are discussed.
6	Presenter: **Esther Goldstein**, *Psychology* Co-Author: Jason Young Faculty Mentor: Jason Young **Effect of Mood and Arousal on Young Heterosexual Couples' Safer Sex Negotiations: A Qualitative Analysis Approach** In recent years, there has been an increased popularity among social and behavioral researchers to use qualitative data analysis software (QSR) in order to facilitate

	theoretical constructs. This qualitative hypothesis-generating study stemmed from a larger research project that investigated how mood affects the decision to engage in risky sexual behavior. Research involving couples sexual communication is important because the decision to use condoms involves two people coming to a mutual agreement. Fifty-two heterosexual couples between the ages of 18 and 24, who were dating for less than nine months, were randomly assigned to a positive, negative, or aroused mood condition. Couples were given open-end questions and asked to discuss what advice they would give to a fictitious couple who were about to have unsafe sex. The interview procedure allowed couples to speak for themselves while they confronted the sexual dilemma of a decision to practice un/safe sex. This study is examining and determining themes within these dating couple's conversations using NVivo and the grounded theory methods in order to develop hypotheses about the participant's cognitive processes and social judgments. Themes in the following domains are being examined: (a) differences in concerns expressed by couples regarding un/safe sex in the three mood conditions; (b) what are the elements that lead to un/safe sex in the couple's discussions; and (c) whether gender difference influence patterns in safe sex negotiation. The objective of this study is to create a theoretical model that will provide insight on couple's sexual communication and condom use negotiation.
7	Presenter: **Franklin Lema**, *Psychology* MBRS-RISE (Minority Biomedical Research Support-Research Initiative for Scientific Enhancement) Co-Author: Frederick Hitti, Steven Siegelbaum Faculty Mentor: Victoria Luine **Immuno-staining of Targeted Hippocampus CA2 Neurons** The hippocampus is a limbic structure associated with learning and memory. Major circuits within the hippocampus include the tri-synaptic and mono-synaptic pathways. The tri-synaptic pathway, associated with one-trial spatial and contextual learning, consists of neurons in the entorhinal cortex (LII), dentate gyrus (DG), hippocampus CA3 and CA1. The mono-synaptic pathway, associated with repeated exposure spatial learning, involves neurons in the entorhinal cortex (LIII), hippocampus CA1 and Entorhinal Cortex deeper levels. Lesion studies suggest that when the CA3 is damaged, the CA1 of the mono-synaptic pathway compensates. Notably, the hippocampus CA2 region, anatomically labeled 70-years ago, has been excluded from hippocampal circuitry because its function remains unknown. However, a recent study found that CA2 neurons receive strong input from the entorhinal cortex and stimulates CA1 neurons. The current study tests the hypothesis that CA2, rather than CA1 compensates for the absence of CA3. Cell-type specific knockout of the CA2 region was achieved by first generating a transgenic mouse line to express Cre-recombinase exclusively in CA2 neurons. Then an adeno-associated virus (AAV) was developed to express GFP-tetanus toxin protein in Cre-positive neurons. To verify the ablation, brain slices were stained for RGS14 (native particularly in CA2 neurons) and imaged for GFP expression in virus infected neurons. Microscopy revealed that CA2 neurons simultaneously portrayed RGS14 staining and expressed GFP, suggesting that ablation was successful and limited to the CA2. Behavioral testing and additional electrophysiology will further assess the role of the CA2. Compared to controls, CA2 deficient mice should display greater impairment in spatial learning.

8	Presenter: **Galina Glazman**, *Psychology & Neuroscience* Presidential Leadership Scholar Co-Author: Cheryl Harding Faculty Mentor: Cheryl Harding **The relation between body weight, brain inflammation, and memory loss** Over the past few years, researchers documented that mold exposure has adverse effect on health, including causing neurological and cognitive deficits. We hypothesize that mold inhalation causes problems by activating microglia, immune cells in the brain, the same way bacteria and viruses can. Immune activation may lead to symptoms of sickness behavior such as, fever, pain, cognitive deficits, and anorexia. To understand the effects of mold exposure, Stachybotrys, a toxic mold commonly found in moldy buildings, was used. To determine whether cognitive deficits were caused by chemicals inside the spores or the spore skeletons, animals were split as follows: 1)intact Stachybotrys spores with all of their contents (IN), 2) extracted Stachybotrys spores that had their toxins removed and proteins denatured (EX), or 3) vehicle (VEH). Mice were treated 3 times a week for 6 weeks. It was found that mice from the IN and EX groups had significant memory losses compared to the VEH group. However, we only saw significant correlations between memory loss and numbers of activated microglia in the brain area responsible for memory in the IN group. Weight at the mid-point of treatment and on the final day of treatment was positively correlated with numbers of activated microglia in this same brain region in the IN group only. This demonstrates that while both EX and IN mice show sickness behavior, the mechanisms by which this behavior comes about must be different.
9	Presenter: **Hameda Khandaker** , *Psychology* BP-ENDURE (Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Author: Diego Buenaventura, Saranna Belgrave, Juan Gomez, Kim Kwiersi, & Victoria Luine Faculty Mentor: Victoria Luine **Chronic stress effects on depression and anxiety: Development of a gender-based translational model for depression** Depression is a widespread disorder, and the lifetime prevalence of depressive or anxiety disorders in women is approximately twice that of men. Yet, current treatments are based on research and clinical trials conducted mainly in male subjects. Thus, there is a compelling need for new treatments and for sex to be considered in this translational research. Since most episodes of major depression are preceded by stressful life events and are often associated with altered levels of cortisol, stress models are useful for depression research. In the current study, 2 cohorts of Sprague-Dawley rats, 8 males and 12 females each, served as control or received daily restraint stress (6 h/day) for 21 days. It was hypothesized that stressed females would become affected earlier than males and/or show greater symptomology. Anhedonia was measured using the sucrose preference test on days 7, 14 and 21, and anxiety was measured on the elevated plus maze on day 22. In Cohort 1, females (M=9.25)

	exhibited less anxiety with more open arm entries than males (M=6.50) on the EPM test, $p < 0.01$, but no stress effects were found. There was a significant stress effect on depression with stressed rats of both sexes showing less preference for sucrose than water (sucrose/sucrose + H20; M=0.84) than the control group (M=0.93), $p < 0.04$). Thus, this restraint regimen led to depressive-like behavior, but the effect does not appear to be sexually differentiated. In a second cohort, no behavioral changes were found, but it appears that these subjects may have been stressed due to housing with Cohort I during stress and disruptions due to Hurricane Sandy. Current work is measuring corticosterone levels and neural changes in both cohorts to determine possible stress effects. In conclusion, our preliminary results suggest that restraint stress may be useful in developing a gender based model of depression.
10	Presenter: **Kelissa Shillingford**, *Biochemistry* MARC (Minority Access to Research Centers) Co-Authors: Xioakan Zhang Faculty Mentor: Frida Kleiman **Mammalian Argonaute (Ago) regulates nuclear-PARN dependent deadenylation** mRNA polyadenylation plays an important role in regulating gene expression in different cellular conditions by controlling mRNA stability, mRNA transport and/or translation initiation. In mammalian cells, the earliest and rate-limiting step in mRNA decay is the removal of the poly(A) tail. Changes in the length of the poly(A) tail by the activation of deadenylation have been described in different cellular conditions such as development, mRNA surveillance, DNA damage response, cell differentiation and cancer. Deadenylation is often under the control of cis-acting regulatory elements, which includes AU-rich elements (AREs) and microRNA (miRNA) target sites, within the 3' untranslated region (3'UTRs) of eukaryotic mRNAs. miRNAs are involved in the regulation of deadenylation by base pairing to the 3'UTR of target mRNAs and consequently initiating poly(A) tail shortening and mRNA destabilization. Cytoplasmic deadenylases CAF1-CCR4-NOT1 and Pan2-Pan3 have been shown to promote miRNA-induced mRNA decay through their interaction with miRNA-induced silencing complex (miRISC), which contains the proteins Ago and GW182. Recent studies have indicated that miRNA might play a role in the nucleus. However, the identity of the nuclear miRNA-controlling deadenylase activity has not been elucidated. The studies presented here indicate that nuclear PARN deadenylase is involved in the miRNA-dependent deadenylation. Our cellular fractionation and pull-down assays show that Ago 2 can locate in both cytoplasmic and nuclear fractions and can directly interact with nuclear deadenylase PARN. Co-immunoprecipitation assays indicate that Ago can coexist in complexes with PARN in nuclear extracts from cells in non-stress conditions and after UV treatment, suggesting a role for Ago in the induction of PARN-dependent deadenylation. Extending these results, we found that the PARN/Ago complex formation strongly activates deadenylation by PARN in vitro, indicating that this activation is independent of miRISC formation. Our future work is to determine which miRNAs recruit PARN through Ago-associated miRISC to target genes regulated by PARN pathway in response to DNA damage.
11	Presenter: **Leah Gerlach** Co-Authors: Kate Redsecker

	Faculty Mentor: Maryam Bakht **A Quantitative Examination of Discursive Practices Across Speech Context in Reality TV Shows** The sociolinguistic interview is the standard data collection method in the examination of vernacular speech. However, ***speech context*** is not considered a relevant factor group in most variationist literature. In this study, we examine sentence-headed discourse markers in American English to determine whether speech context is a salient feature for linguistic variability. Focusing on sentence-initial discourse markers, as in, "***So***, where are we going tonight?" and "***Well***, I think I can come," we hypothesize that different speech contexts drive different lexical choices and frequencies across discourse markers.
12	Presenter: **Panda Selsey** , *Media Studies & Sociology* Co-Author: Isabel Pinedo Faculty Mentor: Isabel Pinedo **Remembering the Terror** A random sample of ten publications commemorating the tenth anniversary of the September 11th attacks was selected based on availability for purchase, decoded and subsequently categorized accordingly, as a dominant (hegemonic) reading, negotiated reading, or oppositional (counter-hegemonic) reading. Analysis sought to determine if the political tenor of print coverage was predominately swayed toward liberal, critical, or conservative positioning by decoding its thematic focus and narrative framing. Categorization was based on a combined analysis of thematic focus, narrative framing, and decoding for the overt or subtle political tone of each publication. Ethnographic methodology was utilized to decode text and visual images. Political tenor was classified as either left-wing (liberal), critical, or right-wing (conservative). Coding was assessed as oppositional, negotiated, or dominant reading. Thematic focus was determined according to the primary tone and political inflections of the text, and narrative framing was categorized by reliance on confessional mode, critique, or a balance of both approaches. Stuart Hall and Michael Foucault's theories were applied to the analysis. This research involved a reappropriation of Hall's theory about decoding news meaning in order to focus on the ways in which various publications' filtration of their own values, and previous coverage respectively informed their interpretation of 9/11, and shaped the framing and coding of their tenth anniversary coverage. Foucault's theory of modern western society's reliance on confession in the construction of truth was also utilized in the analysis.
13	Presenter: **Steven Cajamarca**, *Biochemistry* MBRS-RISE (Minority Biomedical Research Support-Research Initiative for Scientific Enhancement) Faculty Mentor: Victoria Luine **Role of Neuronal Ryanodine Receptor in Alzheimer's Disease Pathology** Our laboratory has shown Ryanodine Receptor 2 (RyR2) PKA hyperphosphorylation,

	oxidation, and nitrosylation, in the brains of murine stress model leads to depletion of calstabin2 (FKBP12.6) causing Ca+2 to leak out of the endoplasmic reticulum (ER) and may be associated with cognitive deficits. Treatment with drug (S107) improved their cognitive function. Extracellular aggregations of amyloid-beta (Aβ), responsible for plaque formation, a hallmark of Alzheimer's Disease, may be linked to Ca+2 influx resulting in ER Ca+2 release through RyRs. To bridge RyR2 function and the cognitive deficits associated with AD, we studied a Alzheimer's Disease model consisting of a heterozygous double knock-in (APP/PS1) C57BL/6 mice. Wild type C57BL/6 mice, APP/PS1 mice without S107 treatment, and APP/PS1 mice treated with S107 were assesed. Immunoprecipitation (IP) revealed RyR2 oxidation, nitrosylation, PKA hyperphosphorylation, and depletion of calstabin2 from cortical brain of APP/PS1 mice. Novel Object Recognition (NOR) revealed APP/PS1 mice without drug were deficient in short-term memory. Morris Water Maze (MWM) revealed impaired learning and a deficit in long-term spatial working memory. Elevated Plus Maze (EMP) showed a significant increase in anxiety in the APP/PS1 mice without drug. Electrophysiology recordings of hippocampal CA3-CA1 connections revealed a significant decrease in long-term potentiation in APP/PS1 mice. The depression of LTP found in APP/PS1 mice was prevented by treatment with S107. The drug also led to reduced depletion of calstabin2 in the APP/PS1 mice. Our data suggest that RyR2 Ca+2 leakage plays a key role in Aβ-dependent cognitive dysfunction and may be a pharmaceutical target for the treatment of AD.
14	Presenter: **Vincent Anguiano**, *Biochemistry* MARC (Minority Access to Research Centers) Co-Author: Alla Polotskaia Faculty Mentor: Jill Bargonetti **Investigating the Role of MdmX in Estrogen-Induced Breast Cancers** In the next year, the American Cancer Society estimates that 220,000 women will be diagnosed with breast cancer and 40,000 will die from the disease. The inactivation of p53 is a major contributor in breast cancer pathogenesis. The tumor suppressor p53 plays a vital role in the maintenance of genomic integrity and its inactivation contributes to tumorigenesis. Mdm2 and MdmX are two negative regulators of p53 and modulate its stability and transcriptional activity. Over-expression of p53 negative regulators occur in 25% of breast cancers, making Mdm2 and MdmX attractive targets for restoring p53 activity and inducing apoptosis. The Bargonetti lab has created a MCF-7 cell line containing an inducible MdmX knockdown construct to analyze MdmX's proliferative properties in MCF-7 cells. MCF-7 cells are a human breast cancer cell line where Mdm2 and MdmX are up-regulated. Mdm2 up-regulation is due to a SNP at position 309 (T ->G) in the P2 promoter region of the mdm2 gene. This SNP causes an increased affinity for the transcription factor, SP1, and this causes amplified transcription of mdm2 gene. The Bargonetti lab recently elucidated Mdm2's role in estrogen receptor positive cells and concluded that Mdm2 contributed to cell proliferation in a p53-independent, non-canonical, manner. Considering previous studies, our goals are to analyze if MdmX facilitates proliferation in estrogen receptor positive breast cancers in a p53-independent path and to determine if MdmX knockdown causes decreased MCF-7 cell proliferation.

Wednesday March 20, 2013

Poster Session #2

12:30 pm – 3:30 pm

15	Presenter: **Aleksandra Zviaguine**, *Psychology* John P. McNulty Scholar Faculty Mentor: Chris Braun **Do the copulatory behaviors of male Gambusia affinis depend on their lateral line systems?** Gambusia affinis – or Western mosquitofish - males engage in precise and rapid behaviors during copulation, which only lasts a few milliseconds. This behavior is interesting in that the necessary sensory components are not yet known. Prior research has demonstrated that the lateral line system is very effective at detecting hydrodynamic stimuli at close-range, and may be involved in behaviors such as predation and escape. It is therefore hypothesized that Gambusia males will rely on their lateral lines to provide them with the spatial information necessary to pursue their target female during copulation, and that, if the lateral line were deactivated, behaviors associated with copulation will be impaired. Gambusia males were treated with CoCl2, which temporarily deactivates the lateral line, and exposed to females while filmed using high-speed video equipment. The footage of their behaviors was then examined. The hypothesis was not supported: the deactivation of the lateral line with CoCl2 did not hinder or prevent copulation in 100% of the males tested, and did not produce any noticeable behavioral impairment.
16	Presenter: **Alla Akselrod** , *Biology* John P. McNulty Scholar Faculty Mentor: David Foster **Alternative Pathways of Phosphatidic Acid Generation as Possible Targets of Cancer Therapy** The consideration of the alternative pathways of Phosphatidic acid (PA) generation is important as it relates to the proliferation of cells in many human cancers. Mammalian Target of Rapamycin (mTOR), a nutrient-sensing complex thought to provide signals which help cancer cells overcome default apoptotic mechanisms, has been found to require PA for its stabilization and activation. A major PA-generation pathway is through the hydrolysis of Phosphatidylcholine (PC) by Phospholipase D (PLD). Research has shown that PLD-generated PA plays an important role in activating the mTOR complex. However, while mTOR-null mice are embryonic lethal, PLD knockouts are viable and fertile. This suggests that cells are able to modify their metabolic pathways in order to switch to alternate sources of PA production and provide the signals necessary for mTOR activation. Two other pathways of PA generation are known: 1) Diacylglycerol Kinase (DGK) converts Diacylglycerol (DG) to PA, 2) Lysophosphatidic Acid Acyltransferase (LPAAT) adds a fatty acyl group to a Lysophosphatidic Acid molecule to generate PA. Cancer cells lines which carry Ras mutations have been shown to have high basal PLD activity; nutrient deprivation of the cells causes an increase in PLD

	activity. Furthermore, DGK inhibition has been shown to lead to an even further PLD activity increase, suggesting that DGK is contributing to the total pool of PA in the cells. The study of basal-low PLD activity cell lines such as MCF-7 may reveal that DGK inhibition leads to a decrease in mTOR activity, thus supporting the hypothesis that cells are able to modify the metabolic pathways used for PA generation and mTOR activation. This may be an important consideration in cancer therapeutic targets.
17	Presenter: **Andrew Marcus** , *Physics and Mathematics* Macaulay Honors College Co-Authors: Steve Greenbaum,Phil Stallworth,Stephen Boyd, Paul Sideris, Ian Nieves, Brittany Johnson Faculty Mentor: Steve Greenbaum **Structural studies of SiOx-doped Diamond-like Carbon (SiOx-DLC)** In recent years there has been a large growth in interest in diamond-like carbon (DLC) films due to their broad application capabilities. DLC films have extremely smooth surfaces, very low friction coefficients, and high strength, which allow them to be used as coatings to prevent wear or corrosion on metals, as well as machine, optical and electronic components. SiOx-doped diamond-like carbon (SiOx-DLC) has exhibited even more optimal properties than general amorphous DLC's. A specific sample of SiOx-DLC was grown at the University of Pennsylvania using plasma immersion ion-implantation and deposition (PIIID) process, and is the focus of this study. The sp2:sp3 carbon hybridization ratio and the hydrogen content are the two most critical factors that affect the mechanical properties of a DLC. Solid state 13C, 1H, and 29Si nuclear magnetic resonance (NMR) spectroscopies were employed, at Hunter College, in order to investigate these factors and characterize the bonding structure of this particular SiOx-DLC sample. In addition, electron paramagnetic resonance (EPR) spectroscopy was used to detect and identify dangling bond defects in this sample. The direct polarization 13C NMR spectra exhibit a diamond signature at the chemical shift position of around 30 ppm as a part of the broader sp3 carbon peak centered around 57 ppm, and a peak associated with the sp2 carbons was observed at 140 ppm, in agreement with previous studies. The carbon sp2:sp3 ratio, hydrogen content, and dangling bond densities were determined and will be correlated with mechanical property measurements performed by our collaborators at U. Penn.
18	Presenter: **Brittany Johnson** , *Mathematics* MARC (Minority Access to Research Centers) Co-Authors: Steve Greenbaum, Phil Stallworth, Andrew Marcus, Stephen Boyd, Paul Sideris, Ian Nieves Faculty Mentor: Steve Greenbaum **Effect of thermal treatment on local structure of SiOx – doped diamond-like carbon.** In a companion poster, we describe the local atomic level structure of diamond-like carbon (DLC) containing several percent SiOx as determined by multinuclear NMR (nuclear magnetic resonance) measurements. One important application of these materials is for thin and robust protective coatings of magnetic hard drives and read/write heads. With increasing demand for higher density information storage and

	higher speed retrieval, new magnetic storage media with higher coercivity have been developed, but these must be rapidly heated by laser pulses during the rewrite phase. The effect of heating on the atomic-level structure of the protective coating itself is currently unknown and is the subject of this investigation. Beginning with as-prepared materials described in the companion poster, several samples were annealed at different temperature, 150o, 250o, and 350oC, and then subjected to multinuclear (1H, 13C, 29Si) NMR as well as electron paramagnetic resonance (EPR) measurements. The effect of thermal annealing on carbon sp2:sp3 ratio, hydrogen content, and dangling bond density and, in short, on the local structure of the DLC will be described.
19	Presenter: **Clara Ng**, *Computer Science* John P. McNulty Scholar, Catalyst Scholarship Program, Co-Presenter: Saad Mneimneh Faculty Mentor: Saad Mneimneh **How to measure the evolution of closely related species** A typical method for measuring evolution is based on counting substitutions. The ratio of non-synonymous to synonymous substitutions (often referred to as Ka/Ks) has been used by biologist to indicate positive (Ka/Ks > 1), purifying (< 1), or neutral (= 1) selection. Counting substitutions can be tricky. When sequences have few observed substitutions, Ka/Ks is almost zero or infinity. The absence of an evolutionary tree makes counting substitutions even harder. To get around these issues, most approaches rely on: 1) Pseudocounts and 2) an initial "most likely" tree provided by the "expert" biologist; when absent, substitutions are counted in a pairwise manner by considering all pairs of sequences. We seek to replace these heuristics by a statistically rigorous method based on Bayesian inference. The goal is to find a posterior density for the probability of a synonymous substitution, given all observed sequences. With the tree being unknown, it becomes difficult to find this posterior density analytically by going through all possible trees: the number of possible trees is exponential in the number of sequences. We present an Expectation Maximization (EM) algorithm that finds the posterior mode p, the value of the probability at which the posterior density is maximized. We then use (1-p)/p as a substitute for Ka/Ks. Through the use of combinatorial techniques, our EM algorithm accounts for all trees (not just the most likely) without explicitly enumerating them. The running time of our EM algorithm is quadratic in the number of sequences, which is comparable to most heuristics.
20	Presenter: **Elen Gusman** *Biology* John P. McNulty Scholar, Thomas Hunter Honors College Co-Presenter: Anna Di Gregorio Faculty Mentor: Derrick Brazill **Genes Controlled by the Transcription Factor XBP1 in the Notochord of the Ascidian Ciona intestinalis** In all members of the Chordate phylum, including humans, the notochord plays a major role in providing structural support and patterning surrounding tissues. Since disruption of notochord development leads to defects in embryogenesis, we are interested in

	improving our understanding of the gene regulatory network involved in this process. To this aim, we are using the ascidian Ciona intestinalis (a member of the Chordate phylum, subphylum Urochordates) as an investigational model since it has a small, fully sequenced genome, and its embryos develop quickly and display an easily recognizable notochord. In Chordates, the transcription factor Brachyury is required for notochord development. Brachyury activates expression of numerous other genes, including transcription factor, XBP-1 (X-Box Binding Protein 1), which is necessary for proper intercalation of the notochord in Ciona. Homologs of XBP1 are present in most organisms, including humans. However, the role of this gene in notochord intercalation in humans is yet to be determined. To fill this gap in knowledge, a microarray screen was performed to identify putative genes controlled by XBP1. To validate the results of the screen, whole-mount in situ hybridization was performed on Ciona embryos at various developmental stages to identify which target genes of XBP1 are expressed in the notochord. The results indicate that XBP1 controls expression of several notochord genes and is likely involved in feedback on transcription of Brachyury itself. Since this interesting connection may be evolutionarily conserved, our findings bring us closer to an increased understanding of notochord development in other chordates.
21	Presenter: **Jane Selegean**, *Psychology* John P. McNulty Scholar, Thomas Hunter Honors College Co-Presenters: J. Bryan Iorgulescu, Nadeem Riaz, Eva Katsoulakis, Eric Lis, Josh Yamada Faculty Mentor: Victoria Luine **Local tumor control for spinal metastases following definitive radiotherapy** The vertebral column represents one of the most common sites for tumor metastasis. The aims of therapy in the treatment of metastatic spine tumors are the palliation of symptoms, improvement of neurologic function, achieving spine stability, providing durable tumor control, and expediting return to systemic therapy. Improvements in systemic chemotherapeutics have allowed patients suffering from a number of tumor types to live longer, emphasizing the need for providing durable symptomatic relief for metastatic disease. Decompressive surgery is indicated in instances of compromised vertebral column stability, radioresistant tumor histologies, or high-grade compression of the spinal cord, in which a limited tumor resection decompresses the spinal cord and enables safe delivery of higher radiation doses. The remainder of spinal metastases may be amenable to radiotherapy as a definitive therapy, even in the instances of radioresistant histology. Recent advances in image-guided stereotactic radiosurgery have demonstrated durable tumor control with high doses of radiation precisely delivered in 1-5 fractions. However, the role of radiotherapy as a definitive treatment for spinal metastases remains unclear. We review our experience over the last decade in order to optimize therapeutic strategies for patients with spinal metastases.
22	Presenter: **Jane Selegean**, *Psychology* John P. McNulty Scholar, Thomas Hunter Honors College Co-Presenters: Teresa Milner & Andreina Gonzalez Faculty Mentor: Victoria Luine **The Relationship Between Drug Relapse Vulnerability Through The Lens of Stress, Sex**

	and Estrous Cycle In The Hippocampal Formation The treatment of drug addiction is threatened by the possibility of relapse. The understanding of learning and memory in the hippocampal formation (HF) are vital for the prevention of relapse. Imaging studies show human addicts respond to drug-related cues in the HF, and other areas, which warrants further investigation. The sexual dimorphism of the HF's learning circuitry indicates that women are more likely to experience cravings following exposure to drug-associated cues due to stressful events or depression. The estrus phase, which is when peak estrogen levels fall, is when females prefer higher doses and are more vulnerable for relapse breaking points than with females in other phases of the estrous cycle and with males. Delta opioid receptors (DOR) are found in the corticotropin releasing factor (CRF) interneuron's in the hilus, CA1 and CA3 regions of the hippocampus. The CA3 region contains more recurrent connections than CA1; hippocampal sections were taken from adult Sprague-Dawley male and cycling female rats and processed for immunolabelling using antisera against DOR. Results show that chronic stress leads to adaptive changes in the opioid system to promote CA3 Long Term Potentiation (LTP) and other processes that support drug-related learning.
23	Presenter: **Jane Selegean**, *Psychology* John P. McNulty Scholar, Thomas Hunter Honors College Co-Authors: Madelon L. Finkel, Jake Hays, Nitin Kondamudi Faculty Mentor: Victoria Luine **Marcellus Shale Drilling's Impact on the Dairy Industry in Pennsylvania: What Do the Numbers Show?** Unconventional drilling for natural gas in Pennsylvania has accelerated over the past 5 years, and, based on the number of permits already issued, drilling will not abate in the near future. Agricultural activity in Pennsylvania is important to its economy, and dairy farming is a large component of the state's agricultural economy. This study focuses on comparing milk production (in thousand pounds), number of cows, average milk production per cow in counties with significant unconventional drilling activity to neighboring counties with little or no unconventional drilling activity from 1996 through 2011, with particular focus on the years 2007 through 2011 when unconventional drilling in this state increased substantially. Further, the study seeks to lay the basis for observing trends in a longitudinal approach and to raise questions that can be tested in a more analytic manner. Findings, based on data obtained from the United States Department of Agriculture's National Agricultural Statistics Service (NASS) and the Pennsylvania Department of Environmental Protection, showed a decrease in milk production (in thousand pounds) and milk cows in counties with drilling commencing in 1996, but accelerating from 2007 through 2011 even though the number of farms stayed constant. In comparison, the data showed mixed findings in counties with limited or no drilling. This descriptive study cannot explain a causal association between well drilling and decline in cow numbers or milk production. Many factors probably influence the number of cows, milk production, and even milk prices. But, given the importance of the dairy industry in Pennsylvania and given that unconventional drilling for natural gas continues unabated, there needs to be further research to assess the impact of a downsized dairy industry on the state's economy.

24	Presenter: **Katarzyna Golec,** *Mathetmatics & Quantitative Biology* John P. McNulty Scholar Faculty Mentor: Rob Thompson **Probability Theory and its applications** Probability theory is a portion of mathematics that consists of analysis of uncertainty. This idea of random phenomenon can be applied to simple problems such as probability of getting a specific number while rolling the dice, however probability theory has evolved to the extend where it is widely used in research labs by scientists from different fields to help solve multidimensional problems. Probability theory consists of many methods and approaches to find out the likelihood of an event. Each one of those methods has been precisely justified with proofs. Some of the most revolutionary ideas of probability theory will be presented and introduced in the presentation as well as some applications and examples that will show how relevant probability theory is to everyone.
25	Presenter: **Kathleen McGovern**, *Physics* John P. McNulty Scholar Co-Presenters: Ilya Korsunskky & Bud Mishra Faculty Mentor: Noel Goddard **Multivariate regression of external apoptosis reaction model reveals key proteins in programmed cell death** Programmed cell death, or apoptosis, is crucial in the development and maintenance of a multicellular organism, but also provides a critical ingredient to the character of cancer progression, its dominant phenotypes and heterogeneity. Once certain apoptotic proteins are triggered in a cell, whether from intrinsic or environmental signals, the cell commits to the program and kills itself. Changes in the cell's ability to respond to apoptotic signals and the timing behind its response can cause major disturbances in cellular population homeostasis. Naturally, it is important to understand how robust this response is to changes in the cell's machinery, namely to genetic mutations. For this purpose, we analyzed extrinsic apoptosis signal transduction pathway models using tools designed for sensitivity analysis, with the aim of identifying the key proteins that may be rate-limiting. These proteins are postulated to have the greatest effect on the apoptotic response and thus suggest important mutations responsible for diseases in which this response is diminished. We started with a well established model for TRAIL induced apoptosis and performed a partial least squares regression (PLSR) to find the key reactions responsible for the time (Td) it takes for the effector protein (cPARP) to attain its half saturation. In the ODE model, cleavage of the effector protein PARP into cPARP is the indicator of apoptosis. Td, the time from ligand-receptor binding to the point at which half of all PARP is cleaved, represents the response time of the cell to the apoptosis-inducing signal. Our sensitivity analysis of Td to all the kinetic rate parameters is based on a linear regression that performed very well. Each kinetic rate parameter is assigned a regression coefficient; a low coefficient denotes little correlation between the parameter and Td, a strongly positive ones denotes a positive correlation, and a strongly negative one denotes a strongly negative correlation. We found that the most important reactions are those that precede the permeabilization of

	the mitochondrial membrane. These results suggest that the flood of mitochondrial proteins into the cytoplasm are difficult to control, and that the most effective drugs would target reactions upstream in the cascade.
26	Presenter: **Ksenia Denisova**, *Neuroscience* John P. McNulty Scholar Faculty Mentor: Cheryl Harding **Stachybotrys Exposure and Hippocampal-Dependent Memory Deficits in the Morris Water Maze** Multiple health problems have been linked to mold exposure, including cognitive problems, chronic fatigue, and increased depression and anxiety. It is estimated that about 40% of American homes are moldy, with damp conditions and certain building materials sustaining the problem. Mold-exposed participants in previous studies have shown deficits in performance on attention, memory, and intelligence tests similar to people with mild traumatic brain injury and those exposed to certain chemicals. Our aim is to determine how mold affects learning and memory in mice, with the goal of developing a model that can be applied to humans. Previous studies showed that exposure to Stachybotrys, a strain of toxic mold, caused brain inflammation in mice. We believe that this inflammation can cause memory impairments, and mice exposed to Stachybotrys spores will perform worse than control mice on behavioral tests specific for spatial memory. We tested mice on the Morris Water Maze, a popular spatial memory task for rodents, before and after mold treatment. Past groups of mice treated with spores showed some reduction in performance on the MWM. We hope to further investigate these findings with additional cohorts and additional probe measures.
27	Presenter: **Rose Kann**, *Chemistry* RAISE-W (Resource Assisted Initiatives in Science Empowerment for Women), Thomas Hunter Honors College Faculty Mentor: Joseph Dannenberg **Solvation of Ions in Water Clusters of Various Sizes** In this study we address the problem of simple ions in small water clusters, and their proclivity to be either in the middle or the periphery of the cluster. We looked at these ions in water clusters ranging from seventeen to one hundred waters. For the smaller water clusters the ions unanimously favored the positions on the periphery of the clusters, while as the water clusters became larger we observed that the ions began to favor the middle of the cluster. This trend tells us both about the solvation of ions and about the nature of the hydrogen bond. We used density functional theoretical methods in Gaussian for these calculations. We did all of our calculations both without counterpoise correction and with counterpoise correction, which corrects for basis set superposition errors (BSSE).
28	Presenter: **Shajoti Rahman**, *Biology* John P. McNulty Scholar Faculty Mentors: Katharine Hsu & Shirley Raps

	Investigation of interactions between KIR3DL1 and HLA-B alleles in determining outcomes for patients with AML following HLA-matched and mismatched hematopoietic stem cell transplantation Specific combinations between allotypes of the natural killer (NK) cell receptor KIR3DL1 and allotypes of its ligand HLA-Bw4 lead to responses of strong inhibition to weak inhibition, or no inhibition at all. High-inhibition combinations of donor HLA-Bw4 and KIR3DL1 alleles have been found to be associated with increased rates of acute myelogenous leukemia (AML) relapse compared with low inhibition pairs in patients receiving a bone marrow transplant. AML patients receive hematopoietic cell transplants (HCT) to prevent leukemic relapse, which is achieved using HLA-matched donors. Whether HLA-B ligand allelic mismatch between donors and recipients impacts the outcomes of HCT has not been determined. We predict that allelic combinations of donor KIR3DL1 and recipient HLA-Bw4 that provide a low inhibitory NK response will decrease relapse and mortality of HCT recipients. We will perform a retrospective analysis on 211 DNA samples from HCT donors with known HLA genotypes, comparing HLA-matched and mismatched donors among patients from the National Marrow Donor Program. 90 of HCT recipients were fully HLA-matched and 120 patients were HLA-mismatched at one loci (9/10 matched). Our lab has developed a multiplex PCR assay which allows for the distinction of functional KIR3DL1 allelic subgroups. We will compare the interactions between donor KIR3DL1 and recipient HLA-B subgroups to determine the compound effects of both genes. The current investigation is ongoing and analysis of relapse and mortality results will be obtained on a later date. These data will aid in HCT donor and recipient matching for more successful immune control of AML.
29	Presenter: **Steven Hall,** *Chemistry* MBRS-RISE (Minority Biomedical Research Support-Research Initiative for Scientific Enhancement) Co-Presenter: Akira Kawamura Faculty Mentor: Akira Kawamura **Discovering Off-Targets of Drugs Using Photoaffinity Labeling** PURPOSE: There are more than 100 pharmacologically active molecules that share structural similarities with a benzophenone framework. Ketoprofen (analgesic, targets: COX 1, 2), fenofibrate (lipid-lowering, target: PPARAlpha), and doxorubicin (anti-cancer, target: DNA) have different intended targets. But our recent study discovered that they share a common off-target, Glyoxalase 1 (GLO1). Therefore, GLO1 could possibly be the source of the beneficial or detrimental side-effects of various drugs. Other molecules, such as phytochemicals or antioxidants, with a similar structure to benzophenone could hypothetically bind to GLO1. We hypothesized that these molecules can be identified by a photoaffinity-labeling method, which was developed in our group. DESIGN METHODS: GLO1 was photo-crosslinked with our benzophenone-biotin conjugated photoprobe in the presence of various aromatic compounds as competitive binders. Samples were blotted on a membrane. Photolabeled GLO1 was quantified through the biotin moiety using chemiluminescence detection. RESULTS: Glyoxalase 1 bound to competitor molecules with various affinities. Most notably, resveratrol (phytoalexin and antioxidant) had the highest affinity for GLO1, followed by doxorubicin, fenofibrate, and ketoprofen. This analysis showed that GLO1 binds to molecules with two aromatic groups bridged by

	a short length functional group (e.g. ethylene group in resveratrol). CONCLUSION: Photoaffinity labeling has allowed us to identify other types of molecules, such as resveratrol, that can bind to GLO1.
30	Presenter: **Daniel Packer,** *Biology* Catalyst Scholarship Program, QuBi (The Quantitative Biology Project) Co-Presenters: Dylan Sun, Melanie Balmick, Clara Ng, Ephrayim Kishko, Mark Rukhman, Anna Feitzinger, Henna Ahmen, Yaroslav Melnyk, Victoria Tarasov, Svitlana Tchumek, David Reeves, PhD, Weigang Qiu, Derrick Brazill Faculty Mentor: Weigang Qiu **Developing a Bacterial XOR Gate and Hash Function** Our goal was to build a XOR hash functions using e-coli. We evaluated existing designs and identified possible improvements and fixes as well as new designs. Existing gate designs work but are cumbersome. Alvin Tamsir, et al., have designed a working XOR gate using multiple NOR gates and a buffer requiring the coordination of multiple colonies for a single gate. We identified a simple XOR design with a flaw. Researchers at Davidson University had tested a promoter design utilizing the principle that promoters on opposing strands would interfere with each others transcriptional activity. In this way transcriptional control would have the exclusive expression found in a XOR gate. The data published by Davidson suggested that the promoter was likely subject to backwards transcription. We looked at some potential solutions for this promoter design as it is simpler and uses a novel principle for control that could be useful in other designs. Ultimately though we were able to replicate some published results in the cloned XOR cassette via fluorescent reporter assay. We were unable to produce conclusive evidence of promoter efficacy for XOR applications due to numerous stumbling blocks in our cloning process. We were however able to make apparently novel observations about the Lux operon as a signaling component in higher order circuits using consensus searches in the cassette sequence with published consensus sequence data. Using this data we designed a PCR primer for site directed mutagenesis with the aim of creating more predictable pLux promoter behavior. Our research was fairly limited in scope as a summer project, but the potential for combinatorial circuits in cell culture mediums of various kinds is exciting and will undoubtedly continue to see great innovation from synthetic biologists seeking to engineer complex trascriptional regulatory behaviors.
31	Presenter: **Ivan Cohen,** *Biology* MBRS-RISE (Minority Biomedical Research Support-Research Initiative for Scientific Enhancement) Co-Authors: Tianhui Zhu, Hao Wu, Jason Dictenberg Faculty Mentor: Jason Dictenberg **Dendritic localization and translation of plasticity-related transcripts is mediated by their 3'-untranslated regions** Activity-dependent forms of synaptic plasticity, or the strengthening and weakening of synapses, are thought to be cellular mechanisms for information storage and essential for learning and memory. Synapses in the hippocampus are strengthened through long-

	term potentiation (LTP) and weakened through long-term depression (LTD) in response to distinct stimuli. Various plasticity-related proteins (PRPs) play key roles at the synapse during synaptic remodeling, including Calcium/calmodulin-dependent protein kinase 2 alpha (CaMKIIα), Fragile-X Mental Retardation Protein (FMRP), and Neuroligin-1 (NLGN1). We hypothesized that mRNAs coding for PRPs such as those mentioned above would be dendritically localized and targeted to distant synapses in hippocampal neurons via their 3'-untranslated regions (3'-UTRs). This localization would allow for both spatial and temporal translational regulation, ensuring that these mRNAs will be translated only at the appropriate synapses at the appropriate time. To test our hypothesis, we performed live-cell imaging experiments in combination with GFP fusion proteins and microinjection of fluorescently-labeled RNAs. Our experiments identified the 3'-UTRs of Fmr1 (which codes for FMRP) and NLGN1 as targets for FMRP binding and confirmed the interaction between FMRP and the 3'-UTR of CaMKIIα. Furthermore, our data revealed that these 3'-UTRs were sufficient to localize the reporter mRNAs to dendrites and functional synapses, as evidenced by their co-localization with both pre- and post-synaptic markers. In addition, transfection of a GFP-based translation reporter showed that the 3'-UTRs of Fmr1 and NLGN1 were sufficient to allow for local translation in distal dendrites following synaptic stimulation. Overall, our data support a model wherein mRNAs are bound by RNA-binding proteins (such as FMRP), transported to dendrites and targeted to synapses, where they may be translationally repressed until synaptic activity triggers their translation.
32	Presenter: **Maha Alsubai,** *Psychology* John P. McNulty Scholar, Thomas Hunter Honors Program Co-Authors: C.E.Daly, A. Toussaint, S. Jenab, and V.Quinones-Jenab Faculty Mentor: Shirzad Jenab **Sex differences in FosB Expression after administration of cocaine, methamphetamine, and cannabinoids** Female rats have a more robust behavioral and cellular response to the psychostimulant cocaine than males. This may be due in part to a heightened expression of transcription factors such as FosB in areas that are involved in reward and reinforcement of behavior, such as the nucleus accumbens. The aim of this study was to determine if after cocaine, methamphetamine, or cannabinoids, expression of FosB is sexually dimorphic. To this end, female and male rats were injected with cocaine (30 mg/kg), methamphetamine (3 mg/kg), cannabinoids (0.15 mg/kg), saline (1 cc) or DMSO (1 cc). FosB was measured via western blot techniques. Female rats in both the cocaine and methamphetamine groups showed higher levels of FosB expression when compared to control; however, no sex differences were found. Treatment with cannabinoids significantly increased FosB expression when compared to control only in males. Furthermore, males displayed a higher expression of FosB than did females. Taken together, our results suggest a sexually dimorphic response of FosB in reward associated areas, which could account for previously reported behavioral differences to stimulants.
33	Presenter: **Jason Macias**, *Biology* Co-Presenters: Karim Sharif & Weigang Qiu Faculty Mentor: Karim Sharif

	Comparative Genomics as a Tool to Resolve Incongruities of Phylogenetic Relationships Among Closely Related Drosophila Species Drosophila melanogaster (Dmel), commonly known as the fruit fly, has been extensively used as a model organism in a wide variety of biological investigations. However, the genus Drosophila, has over 2,000 different species that are vastly distributed all over the globe with extremely different habitats. These species have evolved over a period of 50 million years. Traditional methods of determining phylogenies have resulted in conflicting phylogenetic relationships among them. Fortunately, genome sequencing of twelve Drosophila species has already been completed and annotation of their genes is currently underway, which has offered new methods to resolve incongruities of phylogeny among closely related species. While annotating genes of D. erecta (Dere) we came across a gene which showed a striking divergence from its orthologous gene called Sfp77F, found in Dmel. The Sfp77F gene encodes a protein expressed primarily in male reproductive organs. It is well known that genes specific to male reproductive organs exhibit accelerated rates of molecular evolution. Therefore, we considered utilizing the Sfp77F

Thursday, March 21, 2013
Poster Session #3
9:00 am -12:00 pm

34	Presenter: **Aja Crim-Logan**, *Psychology* MBRS-RISE (Minority Biomedical Research Support-Research Initiative for Scientific Enhancement) Co-Authors: N. Traore, D. Dordulaw, Z. Baranov, M. Perkowski, H. Neumeister, T. Preuss Faculty Mentor: Thomas Preuss **Quantifying Social behavior in African Cichlid Fish** Male African cichlid fish (Astatotilapia burtoni) form a social hierarchy switching between two social states, i.e. dominant (DOM) and submissive (SUB) while expressing distinct phenotypic characteristics. To determine social status, DOM and SUB behaviors are quantified using a Dominancy Index (DI), which essentially subdivides fish into the two groups. However, recent behavioral experiments indicate that such a subdivision does not sufficiently reflect the observed behavioral complexity. Here we test novel social categorizations that, distinguish not only DOMs and SUBs, but also take into account social interactivity. Derived from focal observation ethograms, DOM and SUB behaviors in a fish community were scored over a period of two months. From these observations, we derived the Interaction Index (II), which is the sum of all DOM and SUB behaviors, and the Interaction Ratio (IR), defined as all DOM behaviors divided by the II-distinguishing three groups, namely highly, intermediate and low interactive males. This categorization reveals differences in trait expression in an anxiety-related open field experiment analyzing swimming activity, specifically a significant ($p < 0.05$) reduction in distance traveled ($p < 0.05$) and center field visits in low interactive males. Taken together, the results suggest that social inactivity and/or social avoidance correlates with behavioral measures of anxiety. Furthermore, results indicate that SUB behavior resulting from lost fights with rivals does not necessarily predict socially induced anxiety. Ongoing research explores the plasticity of the aforementioned behavioral traits in experiments where the social categories are in flux.
35	Presenter: **Alexandra Fitzpatrick**, *Classical Archaeology & Anthropology* Thomas Hunter Honors Program, Jenny Hunter Scholar Faculty Mentor: Christa Acampora **The Aesthetics of the Video Game** Are video games art? Traditional art exhibits felt qualities such that aesthetic experiences and values can be derived from them. Can we say the same for modern video games? In this research project, I argue that video games can be considered art, using the possibilities of aesthetic experiences during gaming as evidence. I engage the current critical discussion surrounding this topic, specifically those who argue that video games do not uphold the aesthetic standards of traditional art. By incorporating the recent work of Tavinor and others into my research, I argue that video games have the

	capability to provide distinct aesthetic experiences that can vary with the wide variety of video game types. I illustrate this argument by providing specific examples from recent video games, placing an emphasis on the role their highly realistic environments, interactivity-based gameplay, and emotionally-engaging writing play in creating these aesthetic experiences.
36	Presenter: **Charles Paszkowski**, *Biochemistry* Arts Across the Curriculum Co-Authors: Paul Kozlowski, Paul Tewfik, Regina Yankelevich Faculty Mentor: Donna McGregor **An Olfactory Self Portrait: A Combined Project in Chemistry and Art** The objective of this project was to investigate methods by which the human essence could be extracted and preserved for an artistic olfactory exhibition. In order to proceed with the extraction of the human essence, various samples of human sweat, hair, and tears were obtained. A presoaking process to decontaminate the medium into which the sweat or tears would be extracted into was done with ethanol. Accordingly, testing provided the proper technique for scent extraction, thus using solvent extraction for hair scent isolation with a combination of dichloromethane and hexane. Additionally, scent isolation was performed using the techniques of ethanol extraction, dehydration, filtration, rotary evaporation and reconstitution to preserve the concentrated scented sample. Enfleurage was also employed using a 2:1 mixture of paraffin to mineral oilthat was later used to coat the body, furthercovered with presoaked bandages. This essentially was a less efficient method of human scent extraction but was further incorporated into a candle made of steric acid and paraffin. In the end various samples of concentrated human essence were obtained as well as a candle that would release the odorous volatiles trapped in a waxy coating when ignited with a flame.
37	Presenter: **Crismeldy Veloz**, *Psychology* Faculty Mentor: James Gordon **Sex Differences in Cortical Lateral Interactions** The human visual system undergoes major early developmental changes that lead to differences between males and females in cortical brain structure. Behavioral tests show that females tend to have better color vision while males tend to have better spatial vision. This study was designed to investigate neural mechanisms underlying the visual spatial differences. In particular it looks at long and short range lateral interaction in males and females. It is hypothesized that sex differences exist in these long and short range lateral interactions in the brain. Our lab will test this hypothesis using the visual evoked potential (VEP) with visual patterns that enable the examination of long and short lateral range inhibitory processes. We will observe at least 30 participants, 15 males and 15 females, within the ages of 18-30. The stimuli consist of windmill dartboard or partial windmill patterns presented at 6 Hz, 10 times each for 2 second periods. The electrical activity of the brain is recorded and signal averaged to yield VEPs. A Fourier analysis is done for each response, and the significance measured with magnitude-squared coherence (MSC). Previous studies showed that, for both males and females, responses to windmill dartboards compared with responses to

	partial windmills yield 2nd harmonic response suppression (long range lateral interactions) and an increase in fundamental response (short range lateral interactions). Our current data support the previous studies and now we will look at a population of males and females to see if there are quantitative differences between them in lateral interactions.
38	Presenter: **Elina Shtridler**, *Psychology & Neuroscience* Macaulay Honors College Co-Author: Cheryl Harding Faculty Mentor: Cheryl Harding **Physiological Correlates of Mold-Induced Cognitive Deficits** People who live or work in moldy environments often complain of flu-like symptoms, such as fever, body aches, depressed appetite, loss of pleasure, and decreased cognitive functioning. Our research aims to develop a mouse model for the physiological and cognitive problems caused by mold. If mold can cause cognitive deficits, it is important to discern what characteristic(s) of the mold cause problems, toxins or the spore skeleton. The current study used three treatment groups: (1) extracted spores, with toxins removed and proteins denatured, (2) intact spores, and (3) vehicle controls. The extracted spore group allowed us to determine effects specific to the spore skeleton components that are separate from the effects of mold toxins. Both extracted and intact spores caused mice to forget a context in 30 minutes that they would normally remember for weeks. Breath rate, heart rate, and weight were correlated to memory deficits on the contextual fear task to see if there were any easily available markers that might predict neural changes and cognitive deficits. Interestingly, higher breath rate prior to treatment predicted greater contextual memory impairment at both the 30-minute and 24-hour context tests. Correlation analysis revealed that animals that had greater contextual memory impairments tended to lose weight throughout the experiment, and especially throughout weeks 3-6. Furthermore, the heart rate and breath rate of these animals decreased throughout treatment as well.
39	Presenter: **Gaddiel Rodriguez Jr.**, *Biochemistry* MARC (Minority Access to Research Centers) Faculty Mentor: Nancy Greenbaum **Structural Effects of a Single Nucleotied Polymorphism in Noncoding Regions of β-globin mRNA** Beta-thalassemia is an inherited blood disorder characterized by decreased production of hemoglobin, a tetramer of two α-globin and two β-globin chains. Mutations, among them single nucleotide polymorphisms (SNPs), in β-globin mRNA produce aberrant β-globin chains or greatly decreased quantities of normal chains, resulting in severe anemia. The presence of some SNPs in noncoding regions of mRNA transcripts, including the 5′ and 3′ untranslated regions (UTR) of the mRNA, suggests a regulatory role of these noncoding regions in expression of the gene. However, the relationship between these mutations and the resulting phenotype is not yet understood. We hypothesize that these SNPs in the 5′ and 3′ UTR of β-globin mRNA associated with β-Thalassemia result in perturbation of RNA regulatory signals within these sequences

	that are important for mRNA stability or translational control.Computational studies of human β-globin mRNA identified five SNPs associated with β-thalassemia that significantly alter the ensemble of secondary structures of the mRNA as compared to that of the wild type mRNA. One of these, C33G, occurs in the 5′ UTR. A measurable amount of mRNA decay is associated with the C33G mutation in the 5′ UTR, but there may also be an effect on translation or other steps in gene expression. The goal of this project is to investigate the effects of the C33G mutation on the structure of the 5′ UTR of β-globin mRNA and its relation to protein synthesis. We have characterized the 50-nucleotide 5′ UTR of wild type and mutant β-globin mRNA using enzymatic structure probing, NMR, and thermal melting analysis. The data are consistent with formation of a single stable stem-loop structure for the wild type RNA. In contrast, the mutant RNA is less thermally stable and may adopt several structures. We are currently evaluating the relative efficiency of translation of the mRNA with wild type and mutant 5′ UTR in vitro.
40	Presenter: **Jennifer Garraway**, *Psychology & Sociology* BP-ENDURE (Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Faculty Mentor: James Gordon **Mechanisms of PTSD and TBI Examined with Visual Evoked Potentials (VEPs)** Post-traumatic stress disorder (PTSD) involves the repetitive recall of a traumatic event or memory. Traumatic brain injury (TBI) encompasses mild to severe head trauma resulting in loss of consciousness, seizures and/or penetrating skull fractures. Studies using real time imaging such as positron emission tomography (PET) have shown that patients diagnosed with PTSD and TBI are known to have increased regional cerebral blood flow, edema or hemorrhaging. This increase in blood flow and cerebral fluids is related to neurological deficits which may produce changes in the inhibitory and excitatory processing in wide areas of the brain. Using the visual evoked potential (VEP) to examine the frequency components of the transient response to contrast reversing checkerboards, we are exploring the mechanisms that underlie PTSD and TBI. Specifically we are studying whether these frequency bands increase or decrease in individuals who have been clinically diagnosed with PTSD or TBI. We will recruit (n=10) age matched 20 – 40 year old male participants and (n=10) controls. Participants will be administered a set of visual stimuli, that will be repeated ten times. These stimuli allow us to examine the cortical response bands that underlie visual processing. We have shown in the past that these measures elucidate other pathologies such as epilepsy, schizophrenia and autism.
41	Presenter: **Jessie Chen**, *Biochemistry* Macaulay Honors College Faculty Mentor: Dixie Goss **Induction of IPTG for Optimal Purification of eIF4G for Prospective Crystallization** Proteins do not exist naturally as crystals. Therefore, the protein must be optimized and tested in various conditions for crystallization. This project investigates the crystallization of eukaryotic translation initiation factor 4-gamma (eIF4G) protein. The eIF4G is responsible for transporting mRNA to the ribosome for translation. The initial

	purification of the eIF4G protein was performed by the transformation of BL21 cells. Single colonies were taken for overnight culture. Then cultured again to a specific optical density value of 0.6-0.8 in order to test which colony has the highest yield of expression. Induction was performed with 0.8 mM isopropyl β-D-1-thiogalactopyranoside or IPTG, overnight at a low temperature. In order to verify which colony had the highest level of expression, an SDS-PAGE was utilized. However, all of the colonies were equally induced. Therefore, induction needed to be performed again. Two separate temperature conditions were tested, room and cold, at four concentrations of IPTG, 0.5 mM, 1 mM, 1.5 mM, and 2 mM. The concentration of IPTG and temperature with the highest level of expression will be cultured at a larger volume to continue through the purification process. The eIF4G protein will be isolated, eluted, and concentrated to a goal amount of 10 mg, in order to optimize the amount of protein to be tested for crystallization.
42	Presenter: **Lashawn Peña**, *Neuroscience* BP-ENDURE (Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Author: Hameda Khandaker Faculty Mentor: Vanya Quinones-Jenab **Memory Consolidation Impairments through Optogenetic Stimulation of Locus Coeruleus** Under normal sleep conditions, stages such as REM (Rapid Eye Movement) provide an extracellular environment free of norepinephrine, which is hypothesized to allow the hippocampus to rewire the memory network by recycling, strengthening, or weakening synapses. For our project, we focused on the optogenetic stimulation of the locus coeruleus (LC), the major source of NE, in a rat model to probe how it disrupts memory consolidation. We hypothesized that the natural release of NE through optogenetic stimulation of the LC during the transition to REM (TR) and REM sleep will impede depotentiation of hippocampal synapses and hinder reversal learning and extinction. By incorporating a natural release of NE, we hoped to provide a more accurate and realistic model of the dynamic mechanisms that appear in PTSD.
43	Presenter: **Marc Zwillenberg**, *Biology* Thomas Hunter Honors Program Faculty Mentor: Christa Acampora **The Aesthetics of Screaming** Over the years, a unique sort of vocal has pervaded a large portion of aggressive music: the scream. Screaming in any musical capacity appears to be little more than noise which serves as a detriment to the piece. However, contrary to popular belief, there is a universal appeal to screaming as a crucial component of the music, offering an aesthetically complete catharsis at the level of the individual and a sense of community at the level of the masses. A scream is distinct from other musical components in that it can be free of cognitive content and thus, can be most intuitively understood by virtue of the scream itself. Other forms of music are not intuitively understood in this way because their components can be individuated into notes and conceptualized into

	musical theory. Because screams can be free of cognitive content, they can make the listener aware of the irrational properties of the world which provides the individual with catharsis. However, the scream as an individual and cathartic mechanism does not explain the communities that form around the scream. The performance of the scream in concert creates an "aesthetic community," consisting of the audience, the performer(s) and the scream which together echo the non-rational sentiment of the scream at the communal level. All three of these components become a part of the music and hence, the audience is not simply observing the manifestation of a holistic non-rational entity, i.e. the scream. Instead, he or she becomes part of the entity itself.
44	Presenter: **Mimiko Watanabe**, *Psychology* Thomas Hunter Honors Program Faculty Mentor: Christa Acampora **Gentrification: (An)aesthetic Experience in New York City** Gentrification, on a basic level, consists of changes in the aesthetics of a given physical environment. However, there are many layers to the process of gentrification, which affects individuals, communities, and ultimately, society. Joseph A. Kupfer elaborates on the ways in which each of these can be aesthetic or anaesthetic in his book, Experience as Art: Aesthetics in Everyday Life. This project builds on Kupfer's ideas and chronicles the experiences of five different individuals, in an exploration of the aesthetics of gentrification. Kupfer defines an aesthetic experience as one in which disparate elements overcome tension to achieve ultimate consummation. This can occur in any number of forms, one of which is conversation. Thus, the project consisted of in depth discussion regarding personal experiences of gentrification with Ben Sherry in the Lower East Side, Nazomi Watanabe in South Slope, Don Julien on the Upper West Side, Morgane Richardson in DUMBO, and Kyle Soto-Mayor in Lefferts Gardens. Each gave the author a neighborhood tour, pointing out personally significant places. The author created portrait photographs in these locations to supplement their stories, and stimulated discussion by explaining the ideas presented by Kupfer. For example, Kupfer describes aesthetic community as one in which each member can exercise political agency and create change, but does not exploit or oppress other community members. Each individual expressed whether or not they had a sense of agency within their neighborhood community, and further explored their personal aesthetic (or anaesthetic) experience of gentrification.
45	Presenter: **Mirjana Persaud**, *Biochemistry* MARC (Minority Access to Research Centers) Co-Author: Emral Devany & Frida Kleiman Faculty Mentor: Frida Kleiman **Involvement of HuR in PARN- and microRNA-mediated regulation of p53 mRNA under DNA damaging conditions** The addition of a poly(A) tail to pre-mRNA transcripts is an important process in gene regulation. Located at the 3' end of all eukaryotic mRNA, the poly(A) tail is required for nuclear export, translation and stability of mRNA. If the poly(A) tail is removed from the 3' mRNA, or deadenylation, then the mRNA is no longer protected from degradation.

	Two important cis-acting elements, AU-rich elements (AREs) and microRNA (miRNA) seed sequences, present in the 3' untranslated region (3'UTR) are utilized in the mammalian RNAs to regulate mRNA transcripts stability and/or deadenylation. The RNA induced silencing complex (RISC) incorporates miRNA as a template for recognizing complementary mRNA. Differential binding of ARE-binding proteins and the RISC complex to the cis-acting elements play a key role in regulating mRNA stability. Previous studies from Dr. Kleiman's lab have shown that HuR, an ubiquitously expressed ARE-binding protein, and poly(A) ribonuclease PARN, a decay enzyme, bind the same region in the p53 3'UTR. Our current work investigates the association of PARN, RISC and HuR to the ARE of the p53 mRNA in different cellular conditions. Our pull-down assays have shown that HuR competes with PARN and Ago2, one of the major components of RISC complex, for binding to an ARE present in p53 3'UTR in vitro. Luciferase assays were also performed using the firefly luciferase gene under control of p53 3'UTR in different cellular conditions. Under normal conditions, Ago2-associated PARN is involved in miRNA-mediated deadenylation resulting in the destabilization of p53 mRNA. However, after stress treatment, HuR binds the ARE present in p53 3'UTR stabilizing p53 mRNA. Together these results suggest that HuR might cause the dissociation of PARN and/or RISC complex from p53 mRNA regulating the progression of the DNA damage response. Our future work will be focused on determining the effect of these dynamic interactions on PARN-mediated deadenylation of p53 mRNA.
46	Presenter: **Munazza Alam**, *Physics & Astronomy* Macaulay Honors College Faculty Mentor: Kelle Cruz **Spectroscopic Analysis of Blue L Dwarfs** The astronomical spectral class of L dwarfs includes the least massive stars and the most massive brown dwarfs. Whereas stars are powered by nuclear fusion in their cores, brown dwarfs are cooler objects that do not sustain fusion. Brown dwarfs cool and fade with time to resemble gas giant planets; such commonalities arise because the temperatures and spectral features of brown dwarfs and gas giants overlap. L dwarfs range in temperature from 1300 K to 2500 K and are typically the size of Jupiter. A problem arises in the study of L dwarfs because researchers are not yet able to infer physical and atmospheric properties from their spectral features. Although such inferences can be made for stars, L dwarf atmospheres are more complex, and their spectral features depend on multiple properties at once. Parameters such as temperature, gravity, and metallicity, influence the spectra of these objects. Metallicity measures the presence of elements in objects heavier than hydrogen and helium and can indicate an object's age. L subdwarfs are known to have low metallicity and old ages, and have bluer than average color for their spectral type. Other L dwarfs, however, are blue for unknown reasons, thus hindering the ability of researchers to reliably infer their atmospheric properties. My approach to this issue involves comparing a variety of observations of subdwarfs, blue L dwarfs, and normal objects at different wavelengths and spectral resolutions to understand their physical properties.
47	Presenter: **Pavel Isakov**, *Physics* Macaulay Honors College Co-Authors: Jacob Oppenheim & Marcelo Magnasco

	Faculty Mentor: Noel Goddard **Natural Adaptation of the Human Ear: Psychophysical Measurements of Temporal Direction & Nonlinearity in Auditory Processing** Time-reversal symmetry breaking is a key feature of nearly all natural sounds, inherent in the physics of sound production. While attention has been paid to the response of the auditory system to “natural stimuli," very few psychophysical tests have been performed. Conducting psychophysical measurements of time-frequency acuity for both “natural" notes (sharp attack, long decay) and those reversed in time demonstrate significantly enhanced temporal acuity in pulses with a sharp attack and a long decay, without a tradeoff in frequency perception. Calculating a theoretical minimal bound for nonlinearity in parsing transient sounds, we rule out models of auditory processing that obey a modified “uncertainty principle" between temporal and frequency acuity. Likewise, the data suggests the existence of statistical priors for naturalistic stimuli, as well as an order of non-linearity akin only to models such as the reassigned spectrogram, matching pursuit and spectral derivatives.
48	Presenter: **Sara Camnasio**, *Physics & Astronomy* Macaulay Honors College Faculty Mentor: Kelle Cruz **Brown dwarfs, the cool neighbors** Brown dwarfs are celestial bodies that form like stars, but are too small in mass to sustain hydrogen fusion, so they cool and fade to resemble gas giant planets. These substellar objects are thought to be a link between stars and planets and they are analyzed through spectroscopy, the study of the light emitted by a certain body as a function of wavelengths. Brown dwarfs are important because studying the differences between the younger and older objects, and the different spectral types they are divided into, can allow for a detailed comparison with the evolution and formation of similar bodies such as stars and planets. One of the challenges that emerges in studying brown dwarfs is determining their ages; in fact, these objects become fainter, cooler and smaller with time, causing a degeneracy between mass, luminosity and age. Our research group (BDNYC) has been investigating this problem with the guidance of professors Kelle Cruz, Emily Rice and Jacqueline Faherty. How we study brown dwarfs gives an insight to a way of doing science that is particular to astronomy, which is the use of public catalogues (2MASS, CMC14...etc) of data that astronomers upload on a service called Vizier. Astronomy is the only field that has such a widely used and available database for the public to employ, which is a very efficient way to use the resources offered by the Internet.
49	Presenter: **Slavisa Djukic**, *Computer Science* Thomas Hunter Honors Program Faculty Mentor: Christa Acampora **Platonic Solid and Aesthetic of Our Lives** When faced with the task of making the concept map for the subject of Aesthetics of

	Everyday Life, I wanted to make it in such a way as to emphasize its main theme: aesthetics. The more I thought about the artistic approach to the task, the more it revealed a contradiction between the subject matter: philosophy, which demands exact wording and logical thinking, and the method: using art with its multiplicity of interpretations and subjectivity. I decided to use that tension and create a solid 3D object that would convey the full scope of the topic at hand. Dodecahedron one of five Platonic solids is closely related to aesthetics both because it is considered beautiful and because it is named after Plato, which we consider father of philosophy and aesthetic theory. Using it as a foundation for my concept map I wanted to give it immediate association to the roots of the discipline. The ordering of themes and terms was hierarchical. Bottom half was reserved for negative experiences while positive were placed on the upper half. On top I placed symbol for the Linux operating system called Ubuntu, named after South African philosophy which means "humanity towards others". I think that to be the essence of our class and should be one of our priorities in life.
50	Presenter: **Saima Ishaq**, *Psychology* BP-ENDURE (Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Authors: Saima Machlovi, Dalila Ordonez, Carolyn Diaz, Kai-Yvonne Shivers, Maria Figueiredo-Pereira Faculty Mentor: Maria Figueiredo-Pereira **Nigrostriatal Dopaminergic Neurodegeneration and Motor Dysfunction in a Progressive Mouse Model of Parkinson's Disease** Parkinson disease (PD) is a neurodegenerative disorder associated with the loss of dopaminergic neurons in the substantia nigra pars compacta (SNpc). Dopamine depletion in this area of the brain leads to motor as well as cognitive deficits. We are developing a progressive model of PD in mice using the endogenous product of inflammation prostaglandin J2 (PGJ2). Male FVB mice (13 weeks of age) received 1, 2 or 4 microinjections of 16.7µg PGJ2/DMSO/PBS or DMSO/PBS (control) into the substantia nigra on the right side of the brain. Animals were sacrificed four weeks following the last injection. Brains were sectioned (30µM slices) and immunostained for tyrosine hydroxylase (TH+, dopaminergic marker) and NeuN (neuronal nuclear marker). The pole test was used to assess parkinsonian-like behavioral deficits. Immunohistochemical analysis showed a dose-dependent decline in TH+ staining in the dopaminergic neurons of the ipsilateral SNpc. The decrease in TH staining was caused by degeneration of dopaminergic neurons and not by TH down regulation. NeuN staining validated the loss of dopaminergic neurons in the SNpc of PGJ2-injected mice. The latter exhibited motor deficits when compared to controls. Developing a progressive PD model will provide for a better model system to understand and combat the pathogenesis of PD.
Thursday, March 21, 2013 **Poster Presentation Session #4** **12:30pm-3:30pm**	
51	Presenters: **Elena Pires** & **Olga Melnychenko**, *Chemistry*

	MBRS-RISE (Minority Biomedical Research Support-Research Initiative for Scientific Enhancement) Co-Authors: Srinivas Chakravartula, Mandë Holford Faculty Mentor: Mandë Holford **Three Ways to Crack a N.U.T. (Nanocontainer Used for Transfer): Synthesis and Crosslinking of Norbornene Analogues for Targeted Drug Delivery of a Peptide Cargo Using P22 Capsid** The disulfide-rich peptides found in the venom of Conoidea snails are a promising resource for pharmaceutical therapies. One example of a conoidean drug, Prialt (ziconotide), discovered from Conus magus snail venom, is used to treat chronic pain in HIV and cancer patients. Ziconotide is a 23 amino acid peptide that cannot cross the blood brain barrier and has to be administered by intrathecal injection. The discomfort and severe invasion accompanied with administering ziconotide prevents its widespread application for pain relief. Presented here is an alternative approach to encapsulate ziconotide into a P22 nanocontainer capsid for delivery across the blood brain barrier. The P22 capsid is a viral protein shell made of multiple subunits that self-assemble to form a nanocage, whose interior cavity serves as an ideal container for cargo encapsulation. The exterior of the capsid can be functionalized to release the ziconotide peptide cargo upon a chemical signal. A ROMP (Ring Opening Methathesis Polyermization) reaction using norbornene as a monomer trigger is used to initiate disassembly of the P22 nanocontainer. Three norbornene moieties containing carboxylic and amine groups were synthesized. These norbornene derivatives were cross linked to lysine, aspartic or glutamic acid residues on the exterior of P22 capsid with EDC-NHS coupling reaction, which was then extensively analyzed and characterized by mass spectrometry and NMR. Future experiments will investigate the activity of norbornene functionalized P22 capsids in presence of Hoveyda-Grubbs catalyst for opening and releasing the cargo ziconotide drug across the blood brain barrier.
52	Presenter: **Aleksandra Walasek**, *Art History & Pre-Medicine* Faculty Mentor: David Foster **The Role of PLD in Cellular Translocation of mTOR in Response to Amino Acids and Glucose** The mammalian target of rapamycin (mTOR) is a protein kinase that plays a crucial role in cell growth regulation in response to nutrient availability. Phospholipase D (PLD), an enzyme involved in phospholipid metabolism that produces phosphatidic acid (PA), has been shown to contribute to mTOR activation in response to amino acids and glucose. Importantly, both mTOR and PLD are deregulated in many different cancer types and cancer cells have altered nutrient metabolism, highlighted by glucose addiction even in the presence of oxygen. Recent findings in literature show that PLD-generated PA binds to and activates mTOR. In addition, recent studies show that mTOR translocates from the cytoplasm to the lysosome upon amino acid and glucose stimulation. Although some molecules and mechanisms leading to mTOR activation have been identified, there are still some questions that should be addressed to fully understand mTOR activation in response to nutrients. Our goal is to further investigate and explain the connection between PLD and mTOR in response to nutrients and show how such

	connection can be deranged in cancer cells. We ask whether inhibition or ablation of PLD prevents mTOR activity and whether it stops the cellular translocation of mTOR to the lysosome in response to amino acids, glucose and possibly other nutrients, such as lipids. Understanding the relationship between PLD, mTOR and nutrients may lead to the identification of novel cancer treatment methods.
53	Presenter: **Ariela Hazan**, *Biology* HHMI (Howard Hughes Medical Institute), Macaulay Honors College Co-Author: Astrid Musnier Faculty Mentor: Jason Dictenberg **FMRP Regulates NL1 mRNA Translation in Hippocampus** Fragile-X Syndrome (FXS) is a leading monogenetic cause of autism and a major form of intellectual disability in humans. FXS is caused by a trinucleotide repeat expansion in the X chromosome, which leads to loss of the Fragile-X Mental Retardation Protein (FMRP) expression. FMRP is an RNA-binding protein that plays a significant role in the regulation of mRNA expression and has been shown to control many genes, such as those functioning at synapses. One mRNA that may potentially interact with FMRP is neuroligin 1 (NL1). Its novelty lies in the fact that it plays an important role in synapse formation and function, which is known to be altered in FXS. Our hypothesis is that FMRP regulates NL1 mRNA translation. To test this hypothesis, we ran cytoplasmic extractions from hippocampal neurons isolated from wild-type and Fmr1 knockout mice through sucrose gradients to analyze the polysomes which contain actively translating mRNAs. We pooled the fractions into three main samples: 80s (monosomes), LP (light polysomes) and HP (heavy polysomes) and extracted the RNA from each sample, performed reverse transcriptase and then PCR to amplify the products. We found that in WT neurons 31% more NL1 mRNA was found in the HP fractions, while in the KO neurons, 34% more NL1 mRNA was found in the 80s fractions. This means that a significant amount of NL1 mRNA is shifted from actively translating to stalled polysome complexes in KO neurons. From these results we conclude that FMRP positively regulates the expression of NL1 mRNA in hippocampal neurons, and speculate that a decrease in NL1 protein in KO neurons may contribute to the structural and synaptic defects observed in FXS.
54	Presenter: **Girish Ramrattan**, *Biology and Bioinformatics* HHMI (Howard Hughes Medical Institute) Co-Authors: Weigang Qiu & Pedro Pegan Faculty Mentor: Weigang Qiu **An Innovation in Web-based Genome Browser** The inference of information from sequenced genomes is the cornerstone of modern biological research. With recent technological advances and reduced costs of DNA sequencing, it is nosurprise we now have an abundance of genome sequence data available from a wide range of organisms. Currently most researchers access sequence data through online databases. These databases, however, are slow and difficult to maneuver with an overwhelming number of options. This usually results in inefficiency in the access and usage of available data. One solution is to utilize graphical interfaces

	where most of the navigation is done within an image. In our implementation of a web-based graphic user interface, we incorporated the use of a free software called CIRCOS to create a graphic representation of the cp26 plasmid of Borrelia burgdorferi, the Lyme disease pathogen. Using the SVG file produced by CIRCOS and adding a JAVASCRIPT program, we were able to create a lightweight and visually appealing interface for the Borrelia Ortholog Retriever. Navigation of the genome is done within the image by hovering over segments of the graph and clicking. By using an image instead of text-based forms, we expect improveduser experience and more efficient retrieval of comparative genome information such as sequences of virulence-associated genes.
55	Presenter: **Karina Perlaza**, *Biology* MARC (Minority Access to Research Centers) Co-Author: Marlon Jansen Faculty Mentor: Thomas Schmidt-Glenewinkel **Investigating the Relationship Between Age Associated Decline in Proteasome Activity and Cellular Levels of ATP and its Effects on Protein Aggregation** Aging is an important factor in most neurodegenerative diseases. A prominent characteristic of many neurodegenerative diseases is formation of protein aggregates. Lewy bodies in Parkinson disease and neurofibrillary tangles and plaques in Alzheimer disease suggest that the inability to degrade proteins in an orderly fashion plays a major role in the pathology of these disorders. Impairment of ubiquitin proteasome pathway can contribute to the etiology of these diseases. The overall aim of the project is to use Drosophila melanogaster to investigate the role of impaired energy metabolism on protein degradation and aggregation by the ubiquitin proteasome pathway (UPP). We are utilizing the binary inducible GeneSwitch system to express an RNAi that targets mitochondrial RNA polymerase (mt RNAPol) via an actin promoter. mtRNA pol is encoded by the nuclear genome, imported into the mitochondria via the TIM/TOM complex, where it is involved in the transcription of the 13 mitochondrial protein encoding genes. Our working hypothesis states that reduced expression of mtRNA Pol will decrease the efficiency of transcription in the mitochondria and could potentially disrupt the function of the respiratory complexes, thereby decreasing ATP synthesis and increasing free radical (ROS) production. We will test our hypothesis by measuring ATP levels and proteasome activity. We will also do in-vivo imaging of the both control and experimental fly brains targeting neuronal cells in order to visualize whether neurons are undergoing necrosis. We are currently in the process of obtaining results.
56	Presenter: **Keroles Saleh**, *Biological Sciences* MARC (Minority Access to Research Centers) Co-Author: Derrick Brazill Faculty Mentor: Derrick Brazill **Cytoskeleton Regulation in Dictyostelium Discoideum** One of the biggest problems in treating cancer is cancer metastasis, where cells leave the tumor, enter the blood stream and spread to other organs where they form multiple tumors. which This involves movement of the cytoskeleton, a dynamic structure that maintains the cell shape, and enables cellular motion. of the cells, which allows the

	cells to move and enter the blood stream and spread to other organs where they form multiple tumors. The cytoskeleton is a dynamic structure that maintains the cell shape, and enables cellular motion. Investigating cytoskeleton regulation in mammalian cells is challenging due to their complexity. Using simpler model organisms such as Dictyostelium Discoideum discoideum, a species of soil-living amoeba allows scientists to identify some of the key components in cytoskeleton regulation. D. discoideum is a species of soil-living amoeba and its life cycle is relatively short. The cells undergo movement, chemical signaling, and development, much like mammalian cells, which makes D.discoideum a valuable model organism to study biochemical processes. In Dr. Brazill's lab, Wwe investigate the mechanism of cytoskeleton regulation in D. dDiscoideum cells. Specifically, I study the regulation interaction of two proteins PaxB and PldLDB, both of which are known to be involved in cytoskeleton regulationtheir localization in the cell. Investigations indicate that both PaxB and PLDB are individually involved in cytoskeleton regulation. The lab has shown that PaxB and PLDB PldB can co-immunoprecipitate and co-localizeion in -vivo. However, the specifics of The results did not reveal the relationship between the two proteins remain unclear. Since both PaxB and PLDB are involved in cytoskeleton regulation, Wwe hypothesize that the two proteins directly bind each other and that one or bothof the proteins could regulate the localization of each other in the cell. To showaddress this two proteins directly bind each other, we are performing an in -vitro binding assay with bacterially expressed proteins as well as immunofluorescence microscopy in cells lacking either PldB or PaxB. To show one protein regulates the localization of the other, we look at localization of one protein in cells mutated for the other. Preliminary results have indicated that PldB localization depends upon PaxB does affect the localization of PLDB.
57	Presenter: **Michael Sideris**, *Biology* HHMI Faculty Mentor: Paul Feinstein **Generating Induced Pluripotent Stem Cells by Cell Fusion** Nuclear reprogramming of a differentiated cell to a pluripotent state has been achieved through cell fusion with an embryonic stem cell. While reprogramming by transcription-factor transduction is also achievable and cells acquired this way are clinically useful, the speed of reprogramming and the efficiency at which reprogramming proceeds is much higher when accomplished through cell fusion. However, cells successfully reprogrammed by cell fusion are tetraploid and, therefore, useless for practical applications. Our approach for remedying this shortcoming and generating reprogrammed diploid cells that are advantageous for clinical and therapeutic purposes involves elimination of the stem cell's nucleus prior to the fusion event. By using a DNA agglutinating protein, we showed that forced nuclear collapse could be induced. We hope that by inducing this protein at an optimal point of the fusion event, we can compromise the nucleus of the stem cell while maintaining the stability of the somatic cell nucleus, yielding a reprogrammed diploid cell.
58	Presenter: **Pascal Maguin**, *Biology* HHMI Co-Author: Sampada Kalan & Diego Loayza Faculty Mentor: Diego Loayza

	Interaction Between the LIM Protein Ajuba, and the OB Fold Proteins POT1 and RPA Telomeres are essential chromosomal elements necessary for chromosome protection and maintenance. They are constituted of TTAGGG repeats running 5' to 3' towards the end of the chromosome and present a single stranded overhang. A complex of 6 proteins called shelterin binds to telomeres and represses unwanted DNA damage responses. POT1, a component of the shelterin complex, binds the single stranded overhang through OB fold domains and is known for repressing the DNA damage response pathway dependent on ATR. Our laboratory has described the interactions of LIM-proteins, TRIP6 and LPP, with shelterin. These proteins are important for telomere protection. Specifically, TRIP6 interacts with the POT1 OB folds in a yeast two-hybrid system. Here, we show that another LIM-protein from the same family, Ajuba, interacts with RPA, another OB fold protein related to POT1, and important for DNA replication. Depletion of Ajuba led to ATR activation and cell cycle arrest in S-phase. Our studies so far suggest that specific LIM domains are OB fold docking domains important for repressing an unscheduled ATR activation. We are currently using purified recombinant proteins to determine the nature of the molecular interactions between the LIM proteins (TRIP6, LPP, Ajuba) and the OB fold proteins (POT1 and RPA). Our results are expected to improve our understanding of the regulation of the DNA damage response in human cells, which itself is implicated in early events in cellular transformation and cancer.
59	Presenter: **Saul Penaranda**, *Biology* Co-Authors: Scott Brady, Gerardo Morfini, Reddy Sam, Daryl Bosco Faculty Mentor: Scott Brady **Evaluating the Effects of Mutant FUS in Axonal Transport** Amyotrophic Lateral Sclerosis (ALS) is a disease that affects motor neurons in the brain and spinal cord that control voluntary muscle movement. Approximately 5-10% of ALS cases are due to genetic defects that are transmitted as a dominant trait with variable age of onset. One of the recently discovered genes harboring mutations that cause ALS is FUS (Fused in Sarcoma), which encodes a nuclear polypeptide. In healthy individuals FUS is found in the nucleus and is involved in DNA repair, RNA splicing, and transcription. In people affected by the disease the mutant forms are enriched in the cytoplasm, where mutant FUS has been shown to be involved in the recruitment of other proteins and aberrant aggregation. Cytoplasmic FUS and FUS aggregates are thought to contribute to ALS by activating or deregulating different pathways. Here, we investigated the effects of a variety of FUS mutations on fast axonal transport (FAT) using axoplasm extracted from squid giant axon. The effects of different mutations were evaluated in Anterograde and Retrograde directions using differential interference contrast microscopy. It was found that all ALS-related FUS proteins decreased vesicular transport in both directions. Pharmacological approaches were tested using diverse kinases inhibitors, and some of these agents rescued both anterograde and retrograde transport. It is thought that mutant FUS can lead to the direct or secondary activation of protein kinase p38, which phosphorylates kinesin and other motors involved in transport resulting in the detachment of motor proteins carrying vesicles from microtubules.

60	Presenter: **Saymon Akther**, *Biology* HHMI Faculty Mentor: Weigang Qiu **A new method for estimating frequency distribution of clonal groups in natural populations of *Borrelia burgdorferi,* the Lyme disease pathogen** "Lyme disease, the most prevalent vector-borne infectious disease in the United States, is caused by the spirochete *Borrelia burgdorferi*. The outer surface protein C gene (*ospC*), one of most heterogeneous antigenic gene in the *B. burgdorferi* genome, is expressed by the spirochete during host invasion. The Lyme disease pathogens are classified into over twenty *ospC* major sequence groups, fifteen of which are found in the United States. It has been suggested that pathogenicity of Lyme disease is correlated with *ospC* groups. To assess most prevalent variants among *ospC* groups in northeast United States, we collected ticks from the wild, amplified and sequenced *ospC* sequences from processed individual ticks samples by quantitative PCR and 454 sequencing technology. In order to estimate relative ospC type frequencies, alignment tool BLAST was used to compare sequenced *ospC* types with sequences of major *ospC* groups that present in our database. Preliminary results from our frequency distribution analysis revealed that groups B and K have relatively higher frequencies than other *ospC* groups in one geographic location, while distribution is more even in another location. The statistical significance of between-tick differences is evaluated via chi-square tests. This qPCR-sequencing technology improves over the traditional method based on reverse-line blotting and has the potential for accurately detecting and measuring *ospC* groups present in individual ticks or patients. Our finding of most prevalent *ospC* groups in natural populations could be used to predict Lyme disease risks in northeastern Unites States."
61	Presenter: **Stephanie Cevallos**, *Biology* MARC (Minority Access to Research Centers) Co-Authors: Martina Kucerova-Levisohn, Armin Lahiji, Benjamin Ortiz Faculty Mentor: Benjamin Ortiz **Investigating Two Potential Gene Regulatory Sites of the T- Cell Receptor Alpha Gene Locus in Vivo** Gene therapy can treat genetic disorders by providing the correct form of a malfunctioning gene into a patients' genome. However, once the therapeutic gene is introduced it can be silenced if integrated into an area of inactive chromatin. Therapeutic genes can be introduced into stem cells to provide a patient with a self-renewing supply of healthy cells. However, adult stem cells can differentiate into a number of cell types, including some that gene should not express the transferred gene. Current gene therapy vectors lack tissue type specificity. This limits the employment of this treatment. One way to resolve these problems is by including in vectors certain areas of DNA from a Locus Control Region (LCR). In our lab, we study the LCR from the T-cell receptor α gene that directs consistent high expression of a linked transgene to T-cells. This LCR is a cis-acting element that contains nine DNase hypersensitive sites (HS). We have characterized the activity of some segments of the TCRα LCR including the regions that provide tissue specificity and site of integration independence. However, there are areas whose functions are not yet known. Here we try to identify the

	function of two specific areas of the TCRα gene locus. To do this we have created constructs that remove two areas of interest to determine the impact on gene expression. Our goal with these studies is to learn more about the regulatory regions of the TCRα locus and eventually apply them to gene therapy in the future.
62	Presenter: **Vangie Carrillo**, *Clinical Lab Sciences* Undergraduate Research Fellow Co-Authors: Zarina Yelskaya, Ewa Dubisz, Hira Gulzar, Devon Morgan, Shahana Mahajan Faculty Mentor: Shahana Mahajan **Synergistic Inhibition of Survival, Proliferation and Migration of U87 Cells with a Combination of LY341495 and Iressa** Glioblastomas exploit various molecular pathways to promote glutamate dependent growth by activating the AMPA (2-amino-3-(3-hydroxy-5-methyl-isoxazol-4-yl) propanoic acid) receptor, metabotropic glutamate receptor, mGluR receptor and epidermal growth factor receptor, EGFR. We hypothesized that targeting more than one of these pathways would be more effective in inhibiting glutamate dependent growth. Using a model of U87 cell line, we show that blocking glutamate release by riluzole inhibits cell proliferation. Glutamate-dependent growth is effectively inhibited by a combination of iressa, an inhibitor of EGFR activation and LY341495, a group II mGluR inhibitor. Treatment of U87 cells with a combination of iressa and LY341495 inhibits proliferation as indicated by Ki-67 staining, induces apoptosis and inhibits migration of U87 cells more effectively than the treatment by iressa or LY341495 alone. These results demonstrate that a combinatorial therapy with iressa and LY341495 is more effective due to synergistic effects of these drugs in inhibiting the growth of glioblastoma.
63	Presenter: **Barukh Rohde**, *Biology, Chemistry & Statistics* MIND Alliance, QUBI Co-Authors: Thomson Paris, Richard Mankin, Elizabeth Heatherington Faculty Mentor: Richard Mankin **Responses of Diaphorina citri (Hemiptera: Psyllidae) to Conspecific Vibrational Signals and Synthetic Mimics** The Asian Citrus Psyllid, Diaphorina citri, the vector of the citrus greening disease Huanglongbing, has in previous work been found to communicate using plant-borne vibrations. This form of communication is used by the psyllids in order to facilitate mating. The male emits a vibrational “call”, and the female responds with her own vibrational “response”, which elicits the male to move toward the female. It is believed that this vibrational communication can be manipulated, and possibly eventually used in the creation of an effective psyllid trap. Male recorded and synthetic calls were played back to females, eliciting response calls. Female recorded and synthetic calls were played back to males, eliciting further calling and movement toward the source of the calls on the part of the males. It is possible that this principle, eliciting movement from males toward vibration by playing female calls in response, can be used in an eventual automated psyllid trap.

64	Presenter: **Beryl Teitelbaum**, *Psychology* Undergraduate Research Fellow Co-Author: Benjamin Ruisch Faculty Mentor: Jason Young **Trust, Arousal and Sensation Seeking in Couples' Reasoning about Safer-Sex** Previous research has explored the role of trust, arousal, and sensation seeking in single homosexual males' decisions to engage in unsafe-sex. However, much research implicates the couple as a major source of HIV transmission (Davidovich et al, 2000). Previous research has tended to focus overwhelmingly on self-report measures of sexual behavior, which are vulnerable to social desirability motivations. In this study, homosexual male couples were asked to reason about safer-sex in a role-play scenario in order to obtain more active, affective responses. Conversations were transcribed and recorded in order to explore the role of interpersonal communication and couple dynamics in participants' reasoning about safer-sex. Variables such as perceived level of commitment, trust, communication characteristics, and concerns about STD transmission were considered. Implications for the development of safe-sex intervention strategies are discussed.
65	Presenter: **Mariel B. Rios**, *Neural Science* BP-ENDURE (Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Authors: Tara Chowdury, Adriana Schuster, Chiye Aoki Faculty Mentors: Vanya Quinones-Jenab & Chiye Aoki **The Effects of Activity Based Anorexia in Hippocampal CA1 of Male Pubertal Rats** Anorexia nervosa (AN) is a psychiatric illness with no accepted pharmacological treatment, despite having one of the highest mortality rates of psychiatric illnesses. AN occurs especially in individuals with a history of anxiety disorders, and most commonly begins during puberty. This suggests that onset is triggered by hormonal modulation during puberty, causing changes in the way the brain handles stressful input. Activity based anorexia (ABA) is an animal model of AN in which rats at pubertal onset are given restricted food access and are given free access to a running wheel. Wheel running activity increases significantly once food restriction begins, and the animals die unless removed from the ABA-inducing environment. While the overwhelming majority of people affected by AN are female, little is known about the effects of sex in experiencing AN. Previously, [in studying ABA] in pubertal female rats, we showed that undergoing ABA results in an increase in arborization of apical dendrites of pyramidal cells in the CA1 region of caudal ventral hippocampus. In order to test whether a sex-difference exists, we studied the morphological changes to pyramidal apical dendrites that occur in caudal ventral CA1 of male rats that experienced ABA for 4 days at pubertal onset and compared the effect of ABA between male and female rats.