Undergraduate Research Conference

Proceedings

March 5-6, 2014

HUNTER

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Oral Presentation Abstracts

Wednesday, March 5th, 2014
Oral Presentation Session #1
9:00am-11:30am

1	Presenter: **Alex Teachey**, *Physics and Astronomy* Raab Presidential Fellow, Undergraduate Research Fellow Faculty Mentor: Kelle Cruz **Mapping Our Galaxy's Giant Dust Clouds Through an Analysis of Star Colors** The Milky Way Galaxy is permeated by enormous clouds of gas and dust, sometimes several light years across. When one of these clouds lies between a star and our vantage point here on Earth, the light from that star can be reddened and dimmed significantly as it passes through the cloud. This phenomenon is known as extinction, and it must be accounted for in structural studies of the Milky Way. Maps of extinction clouds are therefore important tools for investigating star formation and distribution – particularly since these clouds are often stellar nurseries – but to date these maps have been generated with a variety of techniques, each suffering from their own limitations and thus contributing to a good deal of uncertainty between them. In this work we have analyzed star colors in very large samples (1-2 million stars at a time) to generate new high-resolution maps of these clouds. Our maps are able to provide import clues as to the strengths and limitations of various mapping techniques, and will be used in an upcoming study of cosmic ray density and so-called dark gas regions in the galaxy. In addition, by combining these maps with molecular emission line data from the recent MALT90 survey, we will be able to better understand the composition, mass, and structure of these clouds.
2	Presenter: **Dilek Genc**, *Anthropology* Faculty Mentor: Herman Pontzer **Locomotion of the Northern Tree Shrew *Tupaia belangeri* and the Evolution of Primate Locomotor Capabilities** Bipedalism is a common feature in apes' locomotive capabilities but it is not known exactly why it has become the primary and only feasible locomotive adaptation for humans. Studying non-human primates and other mammals' locomotion may help us to understand and trace down the evolutionary history of different gaits. In this study, I used high-speed digital video to record the gait mechanics of the Northern tree shrew to test whether locomotion on branches was associated with differences in gait. Lateral sequence gaits are characterized by same-side foot touchdowns, whereas diagonal sequence gaits follow opposite-side, criss-cross touchdowns. Most primates use diagonal sequence gaits in addition to having greater limb excursion angles. This is thought to be a key adaptation for surviving and balancing on fine branches, and the presence of a highly arboreal forest environment during a long evolutionary history may

	help to explain the wide distribution of diagonal sequence (DS) gaits in non-human primates and some mammals like squirrels. High speed videos of the Northern tree shrew, Tupaia belangeri, were taken at the Philadelphia Zoo and compared to those of non-human primates and other mammals observed at the Bronx Zoo. Gait sequences and limb excursion angles were recorded using the angle and clock tools in Kinovea. Tupaia belangeri showed a high rate of arboreality, DS gaits and large limb protraction and retraction angles. This suggests that diagonal sequence gaits evolved out of an arboreal environment and further comparative study may help us to understand differences in gait in primates.
3	Presenter: **Taejha Richardson**, *Sociology/AFPRL* Mellon Mays Fellow Faculty Mentor: Hank Williams **Marginalized in The Movement** This research explores the marginalization of Black women in Black led social movements through an analysis of activist and poetess Sonia Sanchez's 1968 play "The Bronx is Next". The misogyny, and sexism prevalent in "The Bronx is Next" serves as a basis for highlighting the hypocrisy of fighting to overthrow the systemic socio-economic and political oppression of Black bodies fueled by racist ideology without realizing that paternalism and patriarchy had hegemonically infiltrated the social movement era of the 1950's-1970's. This research draws upon primary and secondary sources including journal articles and investigative government reports in order to authenticate the thesis that Sanchez's play acts as social commentary of the time period. Sanchez, as an active participant of the Black Arts movement, struggles with forces of power as it relates to leadership and the ways in which Black women's voices and agency was compromised by patriarchy and their participation confined to the realm of male domination. This research sheds light on the mitigation of Black women's voices as an alternative lens of analysis for the time period which deviates from the popular narrative through the juxtaposition of both scholarly research on the precarious position of Black women in social movements as well as an in-depth analysis of Sanchez's play.
4	Presenters: **Munazza Alam and Sara Camnasio**, *Physics and Astronomy* Macaulay Honors College Faculty Mentor: Kelle Cruz **How Can We Explain Inexplicably Blue and Red Brown Dwarfs?** Brown dwarfs are low mass astronomical objects that form like stars, but are too small in mass to sustain hydrogen fusion in their cores; thus, they cool and fade with time to resemble gas giant planets. Based on the ratio of fluxes at two near-infrared wavelength ranges in the electromagnetic spectrum, some brown dwarfs can be further classified as either "blue" or "red". Whereas "blue" objects are brighter at shorter wavelengths, "red" objects are brighter at longer wavelengths. Some blue brown dwarfs, called subdwarfs, have spectral features that suggest low metallicity (heavy metal content) and are known to have old ages. Many red brown dwarfs are known to be young because certain elements of their spectra are indicative of low gravity. Blue

	objects and red objects whose spectra do not show the presence of these features are considered color outliers. We are investigating the cause of extreme color in these objects by comparing near-infrared observations of these color outliers at different wavelength ranges and spectral resolutions to "normal" brown dwarfs (spectral standards), known subdwarfs, and confirmed young objects. With this extensive dataset, we have compiled a sample of unusually red and blue brown dwarfs, currently the largest known compilation, to elucidate the underlying atmospheric and physical properties of these objects whose extreme red and blue colors have not been possible to explain.
5	Presenter: **Arlene Castillo**, *Biochemistry* Summer Clinical Oncology Research Experience at Memorial Sloan-Kettering Cancer Center Co-Author: Francesca Gany Faculty Mentor: Karen Philips **The Taxi Network: Decreasing Cancer Risk through Community Based Participatory Research** There are over 100,000 taxi drivers in NYC, 87% are immigrants. They are at high-risk for cancer and cardiovascular diseases due to stress, environmental exposures and poor healthcare access. The purpose of this study is to conduct an assessment of NYC taxi drivers' health profile, priorities and points of intervention. Both yellow and livery taxi drivers were sampled. Most yellow cab drivers were recruited at gas stations while livery cab drivers were recruited at taxi bases. We developed a Needs Assessment Questionnaire that included questions on demographics, occupational characteristics, healthcare, social networks, along with validated scales. 87 taxi drivers were interviewed. 45 were yellow cab drivers and 42 were livery cab drivers. 47% of yellow cab drivers are South Asian while 64% of livery cab drivers are Dominican. The majority of all drivers drive the day shift. 49% of yellow cab drivers' household income is just enough for their expenses and 48% of livery cab drivers' household income isn't enough. A greater percentage of livery cab drivers have healthcare coverage. 18% of yellow cab drivers and 14% of livery cab drivers smoke cigarettes. More yellow cab drivers spend time doing physical exercise. The most common illnesses include chronic pain, high cholesterol and hypertension. Most yellow cab drivers gather at airport holding lots while most livery cab drivers gather at taxi bases. The Taxi community's poor health may be due to health access barriers and occupational risks. Initiatives to reach taxi drivers should be targeted to their unique circumstances.
6	Presenter: **Steven Hall**, *Chemistry* MBRS-RISE (The Minority Biomedical Research Support- Research Initiative for Scientific Enhancement program) Co-Authors: Virginia Cornish, Marie Harton, Gabriella Sanguineti Faculty Mentor: Akira Kawamura **Synthesis of Dexamethasone-Cellotetraose-Metatrexate for Chemical Complementation** Chemical Complementation is a reaction-independent assay that links enzyme catalysis to yeast cell survival in vivo. As a growth selection, for enzyme catalysis, this assay is

	advantageous for protein engineering efforts that require the search of enzyme libraries on the order of 106 variants or more. Chemical Complementation is based on the yeast-three-hybrid (Y3H) assay and detects enzyme-mediated bond formation and cleavage through the transcriptional activation of a reporter gene. The reporter gene is activated when the DNA binding and activation domains of a transcription factor are coupled with a chemically synthesized heterodimeric small molecule. Chemical Complementation has been successfully used in the detection of cellulase activity and selection of functional cellulases from a library of DNA shuffled variants. Here, we focus on the synthesis Dexamethasone-Cellotetraose-Methotrexate (Dex-Cel-Mtx), the tetrasaccharide linker used as the heterodimeric small molecule in Chemical Complementation for cellulases. We plan to synthesize Dex-Cel-Mtx chemoenzymatically using a glycosynthase, an enzyme that catalyzes the formation of the glycosidic bond between saccharides, to link the two disaccharides Dexamethasone-Cellobiose (Dex-Cel) and Methotrexate-Lactosyl Fluoride (Mtx-Lac-F). Thus far, we have synthesized the disaccharide Dex-Cel and purified the Cel7B:E197A glycosynthase for the chemoenzymatic synthesis of Dex-Cel-Mtx. The results of our syntheses are discussed here. This work was supported by the Columbia Summer Program for Under-Represented Students and the RISE program at Hunter College, Grant# GM R25 GM60665.
7	Presenter: **Rza Abasov,** *Biochemistry* Undergraduate Research Fellow Co-Authors: David R. Mootoo, Ahmad Altiti Faculty Mentor: David R. Mootoo **Synthetic Studies on Tumor Selective Cytotoxic Agents** The tetrahydrofuran containing annonaceous acetogenins (THF-AGE's), are attractive drug candidates because of their high antitumor activity (often picomolar range and lower), their relatively simple and robust structures, and their effectiveness against multi-drug resistant (MDR) tumors. However, a major drawback to their clinical use is their low selectivity for tumor over normal cells. The long-term goal of this research project is to synthesize a THF-AGE derivative capable of targeting prostate cancer cells by binding to the prostate specific marker, prostate specific membrane antigen (PSMA). To this end a THF-AGE will be conjugated to a ligand that binds PSMA with high specificity. This poster will present our progress on the synthesis of 4-deoxyannomontacin, THF-AGE that will be used in this conjugate. The precursor for this synthesis of 4-deoxyannomontacin was 1-tetradecene. This material was first converted in 6 steps to the O-isopropylidene derivative of a 5,6-dihydroxyalkene, the substrate for a key step in the synthesis, i.e. formation of the THF ring. Thus, treatment of this isopropylidene-alkene with a source of iodonium ion, iodonium dicollidine perchlorate (IDCP), afforded a single iodo-THF diastereomer in 53% yield. This product was then transformed in XX additional steps to a THF-alkene derivative. Overall, this THF-alkene was obtained in 13 steps from 1-tetradecene in 3% yield. A critical step in the completion of the synthesis of 4-deoxyannomontacin involves an alkene cross metathesis with this THF-alkene as one of the alkene partners. Studies on this reaction are in progress.

8	Presenter: **Eliyahu Reiter,** *Sociolinguistics* Co-Author: Abdil Mustafa Faculty Mentor: Maryam Bakht **Yeshivish: A New Sociolect From Old Traditions** Some Ultra-Orthodox groups, such as Hasidic sects like Bobov or Satmar, speak Yiddish both domestically and in school. Ultra-Orthodox Ashkenazi Jews of the Lithuanian school of thought operate in somewhat of a middle group. Many in the community speak an amalgam of Hebrew, Yiddish, English, and Aramaic. This amalgam is a sociolect. It does not exactly fit into any linguistic categories. As it is a fairly recent register, the earliest paper dates back to 1979 (Goldfarb) with some input from historians (Heilman). We hope that this research will provide a better understanding of the topography of this register. We would like to know the age when children start to speak Yeshivish. We hypothesize that it begins approximately at age 11. That is the age that boys start to study the Talmud, the backbone of Lithuanian Judaism. A second force is the bar mitzvah. He is given more commandments, like Tefillin. Do young boys want to seem closer to the academy than they are in actuality? Students are routinely offered prizes for their Torah learning or memorization. Does a child want to seem more religious to receive the award of attention from teachers and parents? English falls out of the community of practice. The study of secular studies is usually late in the afternoon, tacked on to religious studies as an afterthought. This signals that English words are related to frivolousness. While the formation of this lect has its roots in tribalism, we also wonder if it leads to racism.
9	Presenter: **Alla Akselrod**, *Biology* John P. McNulty Scholar Co-Authors: Deepak Menon, David P. Foster Faculty Mentor: David P. Foster **Alternative Sources of Phosphatidic Acid Generation in Basal-Low PLD Cells Suggest Compensatory Mechanisms of mTOR Activation** Mammalian target of Rapamycin (mTOR) is a nutrient-sensing protein kinase, which regulates cell proliferation and contributes to the ability of cancer cells to overcome default apoptotic mechanisms. Dietary lipids have been found to feed into and activate mTOR by the generation of Phosphatidic Acid (PA). PA is able to compete with Rapamycin for the binding and stabilization of mTOR complexes. In Ras driven cells, the exposure to lipid-less serum has been shown to elicit an elevated activity of Phospholipase D (PLD), which generates PA by the hydrolysis of Phosphatidyl Choline (PC). The PA stimulates mTOR, allowing cells to continue proliferating. We hypothesize that in cancer cells with low PLD activity, alternative sources of PA exist, allowing for the stabilization of mTOR. These alternative sources may be therapeutically targeted in cancer cells with deregulated mTOR made more sensitive to Rapamycin.

10	Presenter: **Carol Hosny,** *Biology* John P. McNulty Scholar Faculty Mentor: David P. Foster **Glutamine Deprivation Sensitizes K-Ras Mutant Cancer Cells to Cell Cycle Phase-Specific Cytotoxic Drugs** Glutamine, a conditionally essential amino acid, is used by cancer cells to support the citric acid cycle that provides many intermediates that are required for cell proliferation. It has been reported that glutamine deprivation causes cancer cells with wild type K-Ras to arrest in the G1 phase of the cell cycle whereas K-Ras mutant cancer cells to arrest in the S and G2/M phase of the cycle. Similarly, we have observed that the pharmacological inhibition of glutamine entry into the citric acid cycle causes the K-Ras mutant cancer cells to arrest in the S and G2/M phase. When these arrested cells are treated with phase-specific cytotoxic drugs such as Capecitabine and Paclitaxel, it results in apoptotic cell death. Therefore, this aberrant response to glutamine deprivation could prove to be an Achilles' heel in K-Ras mutant cancer cells and could be exploited in therapeutic targeting such cancers.
11	Presenter: **Ruth Hauptman,** *Computer Science* John P. McNulty Scholar Faculty Mentor: Lei Xie **Predicting Interaction Between Chemicals and Cytochrome P450** Cytochrome P450 (CYP450) enzymes act on exogenous as well as endogenous substrates. These enzymes play important roles in transforming a prodrug into an active drug. The polymorphism of CYP450s accounts for the individual difference in drug responses. Thus information on how drugs interact with CYP450s will be critical for developing safe, effective, and personalized medicine, and recognizing drug-drug interactions. The binding profile of a large number of chemicals with CYP450 remains unknown. Experimental screening is both time-consuming and expensive, and will benefit from computational predictions. However, few algorithms are able to reliably predict CYP450-drug interactions. My goal in this project is to predict interaction between CYP450 and unknown chemicals, based on known data using machine learning. A predictive model that maps chemical features of prodrugs, which are known to interact with a specific CYP450, to their binding patterns will be developed. Given a new chemical whose interaction with the enzymes is unknown, the model will infer if this chemical has a high probability of interacting with a specific CYP450. To achieve my goal, I will apply state-of-the-art multi-label classification and case-based reasoning techniques. The completion of this project will provide a powerful tool for pharmacogenomics and personalized medicine.

Wednesday, March 5th, 2014
Oral Presentation Session #2
1:45pm-4:00pm

12	Presenter: **Sun Young Chung**,, *Behavioral Neuroscience and Public Policy* Thomas Hunter Honors Program Co-Authors: Jonathan Iaconelli, Rakesh Karmacharya Faculty Mentors: Lynne Kemen, Rakesh Karmacharya **Epigenetic Modifications During Proliferation and Differentiation of Human Neural Progenitor Cells with HDAC Inhibitors** Chromatin modification is a fundamental mechanism of gene expression that is governed by two antagonistic enzymes - histone acetylases (HATs) and deacetylases (HDACs). Small molecule HDAC inhibitors (HDACi) have emerged as potential therapeutic agents for a variety of conditions, including nervous system diseases. HDAC inhibitors such as SAHA and MS-275 have been shown to promote neuronal differentiation; however, the effects of HDAC inhibitors on the proliferation and differentiation of human neural progenitors generated from induced pluripotent stem cells are unknown. Furthermore, synaptogenesis, the formation of synapses between neurons, has also been a key area of research for its implications on neuroplasticity and cognitive enhancement. In this project, effects of different HDAC inhibitors that target HDAC isoforms on neuronal proliferation, differentiation, and synaptogenesis were examined using HIP Neural Stem Cells. There were no detectable differences in the proliferation and differentiation assays; however, Crebinostat and ACY-1215 were linked to increased levels of synaptogenesis in neurons.
13	Presenter: **Betty Lung,** *Biochemistry and Sociology* Summer Clinical Oncology Research Experience at Memorial Sloan-Kettering Cancer Center Co-Authors: Anthony F. Yu, Nandini U. Yadav, Carlos R. Manrique, Howard T. Thaler, Clifford Hudis, Richard M. Steingart Faculty Mentors: Karen Phillips, Chau Dang **Impact of Trastuzumab-Induced Cardiotoxicity and Subsequent Trastuzumab Interruptions on Breast Cancer Outcome** Breast cancer (BCA) will be diagnosed in 200,000 US women this year. Of these, 25% patients will be “HER2(+)”: ie, have receptors for trastuzumab (Herceptin®, H), and may receive multiple cycles of H. H improves disease-free and overall survival in patients with HER2(+) BCA, but H may damage the heart, causing trastuzumab-induced cardiotoxicity (TIC). Current guidelines recommend H interruption for severe cardiotoxicity. Our goal was to determine: (1) frequency of H interruption due to TIC in women with HER2(+) BCA, and (2) whether H interruption was associated with adverse BCA outcomes. Through IRB-approved retrospective study, we identified patients with HER2(+) BCA receiving adjuvant H with chemotherapy at MSKCC from 1/2005-11/2010. Tumor characteristics, cardiac risk factors/toxicity, treatment type, and BCA

	outcomes were obtained from medical records. Log rank test and Cox proportional model were used to evaluate association between variables and time to adverse BCA events ($p<0.05$ significant). H was interrupted >1 cycle (>6 weeks) in 86/592 (15%) patients. TIC (most common reason for interruption >1 cycle) occurred in 56/86 (65%) patients with H interruption >1 cycle and in 56/592 (10%) all patients. Adverse BCA events were significantly associated with number of positive nodes, negative estrogen and progesterone receptor status, and H interruption >1 cycle from all causes (excluding BCA progression). There was a trend toward association of adverse BCA events with H interruption >1 cycle due to TIC. Coordination of care between cardiologists and oncologists to limit H interruptions while effectively treating cardiotoxicity may improve outcomes in women with BCA.
14	Presenters: **Amanda Rincon,** *Psychology* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity Through Undergraduate Education) Co-Authors: Hannah G. Rowland, Bobette Bouton, Nicole Davis, Scott Burns, Laurie Cutting Faculty Mentor: Vanya Quinones-Jenab **Analyzing Volumetric Differences in Adolescents with Attention-Deficit/Hyperactivity Symptomology and Depressive Symptoms** Previous research indicates that volumetric abnormalities exist in ADHD and are linked to ADHD symptomology. Volumetric abnormalities have also been reported in depression. Additionally, there is overlap between ADHD symptoms and depression. However, it is unclear whether there are substantial overlaps in ADHD and depressive symptoms in terms of their linkage to brain structure. For example, research studies have reported volumetric differences in the caudate of individuals with a depressive disorder, a finding that has also been reported in ADHD; however, it is unclear whether caudate abnormalities can be attributed to ADHD or depressive symptoms. The present study examines correlations between brain volumes, attention-deficit/hyperactivity disorder (ADHD), and depressive symptomology. To this end, this study sought to explore the relationship between ADHD and depressive symptoms that are linked to the brain by correlating whole brain volumes to ADHD and depressive symptomology. The sample included children ages 9-14 years old. T-scores from the child behavior checklist (CBCL) measured the degree of ADHD and depressive symptoms. Magnetic resonance imaging was used to acquire anatomical scans (T1 3D TFE with lmm3 voxels) for all participants and data were analyzed on FreeSurfer. Our results will provide a better understanding of the relationship between ADHD and depression symptomology and brain structure by providing a means to differentiate neurobiological findings.
15	Presenter: **Hameda Khandaker,** *Psychology* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity Through Undergraduate Education) Co-Authors: Rachel Bowman, Victoria Luine, Joseph Villani, Maya Frankfurt Faculty Mentor: Victoria Luine

	Sex-Specific Effects of Neonatal BPA Treatment in 7 Week and 11 Week Old Rats on Corticosterone Levels and Amygdala Spine Density BPA (Bisphenol-A), a compound commonly found in household plastics can leach out when exposed to certain temperatures and pH, and traces can be found in blood and urine. Because BPA is also a widely known endocrine disrupter and has shown to have effects on dendritic spine density we examined the effects on BPA on corticocosterone (CORT) and spine density in the basolateral amygdala (BLA) of male and female rats. Male and female Sprague-Dawley rats were injected with either saline or 40åµg/kg BPA for 7days at 6weeks of age. At 7 weeks, rats (n= 6) were exposed to a restraint stress challenge and sacrificed. The other subjects were matured until 11weeks and then exposed to the stress challenge and sacrificed. Three-way ANOVA revealed a sex X age interaction (p = .0009); Females showed a significant increase in plasma CORT from 7 to 11weeks but no significant change was seen in males. Post hoc tests show that CORT was lowest for females at 7weeks. T-tests show the development of BLA spines in male (p=.05) and female (p=.03) control rats were similar and significant with age exhibiting a 50-60% increase with age. Male BPA-treated rats, however, exhibited the greatest increase with age (p=.005). These results demonstrate that BPA alters spine density in a sex-specific manner, increased amygdala density was seen more in male than female subjects' stress indicating sex-specific anxiety responses to acute stress and BPA. Sex-differences seen in CORT also indicate a possible effect of estrous cycling in females with age.
16	Presenter: **Suchitra Nair,** *Psychology* Co-Authors: Farwa Ilyas, Zara Imtiazz Faculty Mentor: Donna McGregor **Hayoon Jay Lee's Rice Art in a Chemical Setting** Korean artist Hayoon Jay Lee uses different varieties of white, brown and red rice to create installations, prints and 3-dimensional sculptures. In an attempt to move away from the traditional resin coatings, Lee recently began varnishing her work in the environmentally friendly sealant called Paverpol. Paverpol is a water-based, non-toxic textile hardener and fiber sculpting material. One of the primary concerns with the use of Paverpol as a resin is the durability of the pieces when exposed to conditions of high humidity. In an attempt to help Lee better understand her new medium and define the optimum environmental conditions for the exhibit and storage of her work, we have been testing the lifespan and long-term stability of art pieces that have been coated in Paverpol. In this capacity we examined artworks made from both white and red rice for the effects of exposure to brute force, household cleaning products with various concentrations of acidic or basic solutions, moisture, humidity, and simulated rain. Among our most notable findings are that in general 1) the solid 3-dimensional art-works are more stable that the more fragile bowls and sheets 2) the samples made of white rice are more durable than those made of red rice and that 3) the works remain unblemished even upon exposure to humidity of 90% plus for periods of up to two weeks.

17	Presenter: **Marcel Gretzschel,** *Political Science and Human Rights* Faculty Mentor: Carol C. Gould **Inspiriting the European Idea through Human Rights** Human rights play the most significant element in the survival of the European Idea because they through them we can argue for remedies to socioeconomic inequalities. Cuts of social services give an insight into how socially and economically depriving fiscal policies are. Thus, human rights should be perceived as ethically significant demands of individuals that call for institutionalization of commonly accepted freedoms. One such freedom, namely not to be socially deprived, is particularly important in the European context because of its long-lasting impacts on various aspects of individual development. Globalization and the effects it has on human capabilities is one aspect that refutes the income-based approach by European technocrats to justify policy-choices. Refusing it helps to reinforce a focus on an 'agent-oriented' approach that supports that individuals have 'equal positive freedoms' to self-transformation, and rights of participating in decision-making. My argument for socioeconomic justice in Europe demands a more deliberate analysis on the circumstances of people's lives, rather than a biased technocratic viewpoint. It is vital that Europe be one unified community that upholds the conviction that human beings are equal. A human rights approach can show exactly how threatening socioeconomic inequalities have become, and how they are related to an interdependent system of social cooperation. Demanding institutional mechanisms that remedy socioeconomic inequalities are justified by the ethical significance that human rights play in the European Union. It is an approach that refutes the dehumanizing fiscal policies, and fosters human relationships, improves the democratization process, and inspirits the European Idea.
18	Presenter: **Diane Kogan,** *Biochemistry* Faculty Mentor: Karen Phillips **Impact of Radiation Therapy on Local Control of Osseous Metastases in Rhabdomyosarcoma** Rhabdomyosarcoma (RMS) is a muscle cancer. Patients with metastatic RMS are treated with chemotherapy and/or radiation therapy (RT). Local control rate of RMS osseous metastases with /without RT is unknown. Aim of study to assess local control rate of RMS osseous metastases treated with/ without RT. Retrospective review performed of electronic medical records of Stage IV RMS patients seen at MSKCC 2002-2012. 18 patients with bone involvement, all received chemotherapy, are basis of study. Local control considered to exist if there was no evidence of tumor progression in bone at follow-up. Medical records reviewed to determine demographics, primary tumor, RT use, pathology, sites of metastases, local control, mortality. Statistical analysis performed using Fisher Exact test, $p<0.05$ significant. Among 18 patients: Pathologic RMS tumor type; alveolar 12 (67%), embryonal 6 (33%). Primary sites: extremities, 6 (33%); pelvis, 4 (22%), parameningeal, 3 (17%), prostate, 2 (11%), 1 case each retroperitoneal, mediastinum, paraspinal (6% each). All had multiple osseous metastases present in: spine 16 (89%), extremities 11 (61%), pelvis

	11 (61%), ribs 8 (44%), skull 4 (22%), other 8 (44%). 12 (67%) patients received RT to osseous metastases; 11 of 12 patients had RT to spine. Local control observed in 12 (67%) of 18; all local failures occurred in spine. No significant difference in local control rate between patients who did/ didn't receive RT (8/12=67% vs. 4/6=67%, p=1.0). Study showed that spine was most common site of metastatic disease and of all local failures. Local control rate, 67%, wasn't significantly impacted by RT.
19	Presenter: **Michael Rabaldi,** *Psychology: Neuroscience Concentration* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity Through Undergraduate Education) Co-Authors: Najib Majaj, Lynne Kiorpes Faculty Mentor: Vanya Quinones-Jenab **A New Understanding of Object Recognition: The Category Structures of Non-Human Primates** While object recognition has been examined in philosophy for over two millennia, only recently have we been able to explore the neural representation of this phenomenon. Specifically, the cells of inferior temporal cortex (ITC) in the macaque respond selectively to certain types of objects. Population responses of neurons in ITC have been shown to represent human-defined category structures. But even in light of these discoveries, our current definitions of object recognition rely on human semantics and are often linguistically defined. Consequently, current studies tend to anthropomorphize the cells in ITC, naming them according to their object specificity (i.e., Jennifer Aniston cells). Surprisingly few studies have explored object recognition in monkeys, and those that have been done have relied on paradigms that do not penetrate the crux of the object recognition question. To address these problems, we utilized an odd-man out task, where we ask a monkey to select the odd one of three stimuli. We trained two Macaca nemestrina on eight human-defined categories and compared their performance with a human's on the same task. Unlike humans, the monkeys' performance seems to be explained, in part, by the pixel variability of exemplars within a category. These results raise serious questions about our current understanding of object recognition. We propose an operational definition of object recognition that does not rely on human-specific capabilities and attempt to interpret previous neurophysiological findings in light of this new understanding.
20	Presenter: **Sara Speiss,** *Linguistics* Faculty Mentor: Maryam Bakht **Who the "Whore" is in "Shut Your Little Whore Mouth": Contrasts of Gender and Power in BDSM Pornography** Pornhub.com and Redtube.com are two mainstream pornography internet sites in which people can access videos within a variety of subcategories. Being a "dominant" or "submissive" is a meaningful categorical distinction within the heteronormative negotiation of sex and pornography.

	In this project, I examine the gendered differences in dominant and submissive labels. In doing so, I focus on the ways that the discourse of pornography and sex on these two sites treat those who do not fulfill stereotyped expectations in a heteronormative frame. More precisely, I contrast the ways that women must be defined when positioned as the dominant, while being undefined as the passive partner in male/female sexual partnerships. I compare videos catalogued as #BDSM, #bondage, #punishment, #sadism, #masochism, and #submission to see how terms of address show linguistic variety, including dyads, threesomes, and orgies. As the audiences of these websites is overwhelmingly male and heterosexual (apparent through the "for women" subcategory), a female being dominant or a dominatrix- is a niche subcategory where the female is the object of focus that needs to perform within a limited frame of personality. In this study, I contrast this persona with that of a male dominant, as well as the behavior between heterosexual and homosexual partnerships. The use of the words "submissive" and "dominant" is gendered. They are gendered upon audience, upon partners, upon clothes and manners of speaking, which attests to the fluidity of gender, sexuality, and power.

Thursday, March 6th, 2014
Oral Presentation Session #3
9:00am-10:15am

21	Presenter: **Lainga Tong,** *Biology* Raab Presidential Fellow, Ronald E. McNair Scholar Co-Authors: Csaba Moskát, Miklós Bán, Rebecca Croston Faculty Mentor: Mark Hauber **Physical and Sensory Properties of Egg Rejection Decisions by Hosts of Common Cuckoo** To reduce the fitness costs imposed by avian brood parasites, hosts have evolved defenses against the parasitism, including the rejection of foreign eggs. We investigated the effect of spectral and perceptual differences between natural and artificial eggs colors on the rejection of foreign eggs in the Great Reed Warbler, Acrocephalus arundinaceus, which is a host of the Common Cuckoo, Cuculus canorus. We used physical reflectance spectra of eggs and physiological parameters of the visual system of another, rare cuckoo host, the European Blackbird, Turdus merula, to characterize sensory thresholds of the avian visual system. Rejection rates of experimentally dyed eggs of varying colors were positively related with both spectral differences and perceptual differences from the hosts' natural egg colors. These results revealed that these hosts increasingly reject those foreign eggs which are physically and perceptually more dissimilar from their own eggs.
22	Presenter: **Daniel Pana**, *Philosophy* Faculty Mentor: Carol C. Gould **Social Conflict and Self Development: A Synthesis**

	The great achievement of the Enlightenment was the decoupling of legal recognition from social esteem. With the advent of bourgeois democracy, rights were seen as something accorded to all members of society regardless of their social position; they were no longer differentially distributed legal privileges. A universalist conception of the human as rational agent is what made this possible at all. But this uncoupling was accompanied by the shattering of the shared value-horizons of traditional communities. The legal order was no longer bound, as it goes, by "comprehensive worldviews" a la Rawls or the concrete value-hierarchies of estate systems. Thus, a seemingly unbridgeable gap was formed between the person as legal and the person as particular individual with concrete features and ways of life. This reification of the person has been the subject of many a theorist from Hegel, to Marx, to Lukacs, and The Frankfurt School, to name a few, and it is within this tradition that Honneth finds himself. He offers us a theory of social transformation based on the experience of disrespect. However, his conception of rights too narrowly hinges on autonomous moral agency, which limits the scope of freedom to the political realm and, in turn, does not allow value communities the fullest possible freedom in interpreting what actions contribute to the realization of the culturally defined value-framework. In this paper I will attempt to synthesize Honneth's transformative social theory with Gould's theory of rights, which is based on equal positive freedom to the conditions of self-development, and her account of the embodied politics of inclusive communities. This synthesis will vindicate Honneth's account of social struggle's transformative potential, and in turn point to a form of socialization where self-development permeates all institutions and forms of life.
23	Presenter: **Sayeeda Chowdhury,** *Biochemistry* Faculty Mentor: Karen Phillips **Novel Translocation Discovery by Next Generation RNA Sequencing of Soft Tissue Sarcomas** Sarcomas are rare cancers originating from mesenchymal cells. There are over 50 pathologic subtypes and therefore difficult to classify based on morphology. There is a need for objective molecular markers for diagnosis and prognosis. Translocations, which occur when a gene moves from its original chromosomal locus and fuses to another gene on a different chromosomal locus, may serve as objective molecular markers. The purpose of my study was to detect and validate a novel translocation in a rare soft tissue sarcoma. Ten sarcoma samples were obtained from children and young adults and one of these samples (an ossifying fibromyxoid sarcoma) was selected for study. Next generation RNA sequencing and data analysis by FusionSeq was used for detection of a novel translocation. RT-PCR (reverse transcriptase-polymerase chain reaction) and FISH (fluorescence in situ hybridization) was used for validation of a novel translocation. The top fusion candidate pair was ZC3H7B and BCOR on chromosome 22 and X, respectively. FISH and RT-PCR validated the involvement of these two genes in a simple inter-chromosomal translocation. By FISH, BAC probes flanking BCOR gene and ZC3H7B both showed a break-apart signal in keeping with their gene rearrangements. Also, FISH detected the fusion of the two genes. RT-PCR confirmed a 5' ZC3H7B (exon 10) - BCOR (exon 7) 3' orientation of the transcript and the alignment to the transcript of these two genes. Further research will be conducted in order to see the significance of this translocation in the diagnosis and treatment of this subtype of

	soft tissue sarcoma.
24	Presenter: **Ana White,** *Nursing* RAISE-W (Resource Assisted Initiatives in Science Empowerment for Women) Co-Author: August Wojtkiewicz Faculty Mentor: Anthony Gronowicz **Green Initiative- CUNY Divestment from Fossil Fuel (Resolution)** WHEREAS, The CUNY Board of Trustees have approved divestment before on two occasions, once in 1984, divesting from companies doing business in apartheid South Africa, and again in 1991 when they divested from tobacco companies, WHEREAS, immediate action is necessary by all who want to slow and reverse the pace of environmental degradation, and preserve the quality of life for future generations, RESOLVED, that the University Student Senate urges the CUNY Board of Trustees to divest the endowment from the top 200 carbon dioxide polluting publicly traded and government owned fossil fuel companies, which hold the vast majority of the world's proven coal, oil, and gas reserves, and reinvest these divested funds into renewable and sustainable-minded companies promoting solutions to climate changes.
25	Presenter: **Michael Wilkinson,** *Biology* MARC (Minority Access to Research Careers Program) Co-Authors: Armin Lahiji, Benjamin Ortiz Faculty Mentor: Benjamin Ortiz **Assessing the Activity of the Human CD2 Gene Locus Control Region in T cells Derived In Vitro from Embryonic Stem Cells** Genetically engineered T-cells have the capability to express and activate chimeric antigen receptors (CAR), which are triggered by specific target antigens of interest, such as those expressed by tumor cells. Locus Control Regions (LCR) are a group of cis-regulatory DNA elements that are characterized by their ability to support high level expression of a linked transgene at any ectopic site of integration in the genome. Furthermore, LCR elements confer developmental and cell type specificity to transgene expression. The study of LCRs provides a new avenue towards understanding the regulation of T-cell development, and adds to the genetic tool kit for achieving robust levels of therapeutic gene expression in engineered T cells. We study the LCR of the mouse T cell receptor alpha (TCRa) gene. We use a cell co-culture system to follow T cell development in vitro from LCR-driven reporter gene transfected embryonic stem cells. We have shown that full TCRa LCR function is supported by this system. The aim of this study was to observe the function of the LCR found in the human CD2 (hCD2) gene locus, which is also active in T cells. The timing and levels of hCD2 linked reporter gene expression will be observed in developing T cells using flow cytometry. We will also investigate the cell type specificity of hCD2 LCR-driven reporter expression in this system. Full hCD2 LCR activity in transfected embryonic stem cells, via the co-culture system, will provide an efficient way to study hCD2 LCR functionality and development in T-cells.

26	Presenter: **Samantha Sundius,** *Sociology* Faculty Mentor: Maryam Bakht **Sustainable Trends?: Constructions of Respectability in Crafts Drinks Professions** The craft drinks movement in America is important: it not only makes for better quality beverages, it has the potential to support artisan producers of spirits, beer, wine, coffee, sodas, syrups, and bitters, and put money in the pockets of many small businesses that help to create and sell these products. While drinks typically don't offer the nutritional value of food, they carry with them centuries worth of history and artistry; these attributes make drinks fantastic conduits for the messages associated with the growing movement to recognize the need for and benefits of producing economically and environmentally sustainable foods. The craft drinks movement is surrounded by a rhetoric of respect and respectability that contributes to its sense of importance: respect for tradition and traditional methods, respect for the environment, the economy, the consumer, and the trades associated with the industry. We might consider that the identity of consumerism associated with food and drink in America since the 1950s hasn't necessarily died down, but that it is shifting from a desire for modern convenience to a desire for traditional respect (or respect for tradition). This paper explores facets of American society that opened public interest to professions in the craft drinks movement in recent years and examines some of the more worrisome aspects of "respectability" namely, the racial and gendered imagery and discourse that is used to make respectability and status salient both within the drinks industry and in what is communicated to consumers through marketing and industry personalities.

Thursday, March 6th, 2014
Oral Presentation Session #4
1:45pm-4:15pm

27	Presenter: **Sara Soo-Hoo,** *Biology* Faculty Mentor: Karen Phillips **Survival Following Minimally Invasive Treatment of Hepatocellular Carcinoma** Purpose: Hepatocellular carcinoma (HCC) is the fifth most common cancer worldwide and the third leading cause of cancer deaths. Most HCC patients present with underlying liver dysfunction and/or advanced disease. The optimal therapy for HCC has traditionally been surgery, but <20% of patients are eligible for surgery. Minimally invasive treatments such as percutaneous ablation have generally been reserved for sicker patients with advanced or unresectable disease. The goal of our study was to assess the outcomes of percutaneous ablation in patients with solitary, early stage HCC.

	Methods: With approval of the MSKCC Institutional Review Board, a retrospective review was conducted of 73 HCC patients from 2007-2012 who satisfied the Milan Criteria (i.e., 1 lesion <5cm or up to 3 lesions ≤3 cm) and were treated with percutaneous ablation alone or in combination with hepatic artery embolization. Medical records were reviewed to assess patient data including tumor size and treatment complications. Results: Of 73 patients, most were male (82%) and presented with HCC tumors <3 cm (86%). After treatment, 40 (55%) patients displayed evidence of either a local recurrence (14/40, 35%) and/or further progression of disease (26/40, 65%). With a median follow-up of 22 months, the 1, 2, and 3 year recurrence rate was 61.8%, 45.3%, and 27.8%, respectively. The 1, 2, and 3 year survival rate was 92.5%, 77.9%, and 68.7%, respectively, with a median survival of 58 months. Only 11 (15%) patients experienced complications, with abdominal pain (5/11, 45%) being the most prevalent. Conclusion: Percutaneous ablation is a safe and effective treatment for patients with early HCC, and may potentially be considered as an alternative to surgery for suitable candidates. Further study comparing outcomes of ablation vs. surgical resection would be helpful to establish the best treatment for patients with early stage HCC.
28	Presenter: **Taejha Richardson**, *Sociology/AFPRL* Mellon Mays Fellow Faculty Mentor: John Hammond **Mennonite Farming and the Environment in Belize** This research explores the farming practices of several different Mennonite societies and the effects of their agricultural prosperity on the environment in Belize. Mennonites are a pacifist Christian religious group who have settled in Belize seeking asylum from socio-economic and political oppression. There are eleven different Mennonite communities in Belize. These communities are comprised of three different sects of Mennonites; Altkolonier, Sommerfelder and Kleine Gemeinde. These sects are differentiated from each other based on their differing understanding of what it means to “live separate” from the world. This research draws upon primary and secondary scholarly sources in order to explore how the differences in their religious beliefs and life choices considerably affect their agricultural practices and prosperity and ultimately their impact on the Belizean environment. Because of their distinct ethno religious position within Belize society as well as their choice to live isolated, they are often scapegoated by Belizeans for the increase rate of deforestation attributed to their slash and burn farming techniques. However, there are a multitude of different factors that also cause environmental degradation including eco-tourism ventures, outdated government policies and even illegal farming by migrant squatters. This research ultimately questions whether agricultural prosperity or ecological sustainability is more beneficial for the country as a whole as well as the Mennonite communities keeping in mind the Mennonite principle of Ordnung.
29	Presenter: **Jennifer Ranck**, *Greek and Latin* Faculty Mentor: Lawrence Kowerski

	Cassandra: The Keen-Scented Hound Scholars have long noted that animal imagery is used to characterize figures in the Oresteia of Aeschylus (Heath 1999; Ferrari 1997); yet, while the trilogy is rife with animal imagery, the use of such imagery in the Cassandra scene in the Agamemnon has received little attention (Mitchell-Boyask 2006). The imagery used to describe Cassandra is consistent with that used to describe other characters throughout the Oresteia; and largely, it depicts Cassandra as a victim. One image, however, that of the keen-scented hound (ἔοικεν εὔρις ἡ ξένη κυνὸς δίκην εἶναι ματεύει δ᾽ ὧν ἀνευρήσει φόνον, A. Ag. 1093-94) is incongruous with the others because it depicts Cassandra as a predator, not as a victim. This paper will explore the use of this hound image as a way for the play to link Cassandra's prophetic skill, and thus her character as a whole, with the Erinyes; only Cassandra and the Erinyes are depicted as hounds who track their prey by scent. I argue that this link to the Erinyes, established by the hound image, renders Cassandra as a prophetic hunter, a prophetic Erinys, and that it elevates Cassandra to a major role in the Oresteia, a role which has not been typically recognized by modern scholarship.
30	Presenter: **Seong Im Hong,** *Biochemistry* Summer Clinical Oncology Research Experience at Memorial Sloan-Kettering Cancer Center Co-Authors: Evis Sala, Hebert Vargas Alvarez, Maura Miccó, Debra Goldman, Douglas Levine Faculty Mentor: Karen Phillips **Radiogenomics in Ovarian Cancer: Linking Phenotype with Genotype** High-grade serous ovarian cancer (HGSOC) accounts for up to 80% of ovarian cancer in the US. Prognosis is poor, with 40% 5-year survival. Classification of Ovarian Cancer (CLOVAR) gene expression subtypes predict prognosis; Mesenchymal tumors have worst prognosis. However, due to intratumor heterogeneity, sampling one site to assess genotype may not represent the whole tumor. Radiogenomics links radiophenotype (i.e. tumor appearance on imaging) to genotype, and may provide a noninvasive method to obtain holistic prognostic information. To investigate a link between radiophenotype and genotype, retrospective review of database from 11/06-5/09 was conducted, yielding 46 HGSOC patients who had CLOVAR genomic subtyping and underwent computed tomography (CT) before cytoreductive surgery and chemotherapy. CLOVAR subtypes were classified as Immunoreactive, Differentiated, Proliferative, or Mesenchymal. Independent readers blinded to CLOVAR subtype, Reader 1 (R1) and Reader (R2), evaluated CT images. CT traits were correlated with CLOVAR subtypes. Fisher's exact test was performed, with $p<0.05$ considered significant. CT traits significantly correlated with CLOVAR subtypes were peritoneal disease shape ($p=0.0060$ and $p=0.0079$ for R1 and R2) and mesenteric implants ($p = 0.0036$ and $p=0.0259$ for R1 and R2). For R1, diffuse peritoneal disease was present in 14/16 (88%) Mesenchymal vs. 2/10 (20%) Immunoreactive tumors ($p=0.001$). Mesenteric implants were present in 13/16 (81%) Mesenchymal vs. 4/20 (20%) Immunoreactive or Proliferative tumors ($p<0.001$).

	In conclusion, radiophenotype may be used as a genetic surrogate to elucidate prognostically relevant tumor genotype. Diffuse peritoneal shape and mesenteric implants, challenging for cytoreductive surgery, are significantly correlated with CLOVAR Mesenchymal subtype (worst prognosis).
31	Presenter: **Thomas Hart,** *Bioinformatics* Macaulay Honors College, Undergraduate Research Fellow Faculty Mentor: Lei Xie **Computationally Predicted Off-Targets Explain the Anti-Cancer Effects of Metformin** Metformin, a drug widely prescribed to treat type 2 diabetes, exhibits strong anti-cancer effects through activation of AMPK signaling. However, the direct molecular interactions which produce this effect have not yet been determined. By applying a structural systems biology approach, we attempted to elucidate the molecular basis of the anti-cancer effects of metformin. Starting by comparing the binding site of a known metformin-interacting-protein (DPP4) to all structurally-characterized human proteins, we identified sixteen putative metformin off-targets. Subsequently, we reconstructed sixteen protein-protein interaction sub-networks which systemically link these putative off-targets to the set of genes whose translational activity is altered by metformin. Using over-/under-representation analysis we determined that a number of cancer-related pathways are over-represented in the nodes of these sub-networks relative to a random selection. We determined the relative participation of the nodes of each sub-network in these and other cancer-related pathways through comparison with control sub-networks generated from randomly-chosen proteins. Sub-networks based on the MAPK14, IL12B, AKT1, and SEMA7A genes showed the highest participation in these cancer-related pathways. Finally, we analyzed the criticality of sub-network nodes. Several cancer-related genes, such as TP53, AKT1, and PCNA genes were critical in nearly all sub-networks. Others, including JUN, ESR1, and HNRNPK were significantly more critical within the highly-participatory sub-networks than less-participatory or control sub-networks. Together these genes represent the most important nodes within the interaction network through which metformin elicits its anti-cancer effect. The identification of molecular targets and genetic factors that affect the pharmacology of metformin will shed new light on developing metformin as a safe, effective, personalized anti-cancer therapy.
32	Presenter: **Gianna Torre,** *Art History* Yalow Scholar Co-Author: Ayca Gucalp Faculty Mentor: Tiffany A. Traina **Application of the Nielsen Criteria to Predict Benefit of Bicalutamide in Patients with Androgen Receptor (AR) Positive, Hormone Receptor Negative Metastatic Breast Cancer** Purpose: Triple negative breast cancer (TNBC) is breast cancer (BC) that stains negative (-) for estrogen (ER), progesterone (PR) and HER2 receptors. Patients do not benefit from hormone therapies. We found a subset expressing androgen receptor (AR). Growth of this subset is driven by androgen and may be abrogated by anti-androgen therapy. In a multicenter phase II trial testing bicalutamide (anti-androgen drug) in

	patients with AR(+) metastatic ER/PR(-) BC, 21% patients benefited. Nielsen criteria (NC) are an established immunohistochemical (IHC) surrogate for BC subtype demonstrating basal-like (BL) expression profile. BL breast cancers stain (-) for ER/HER2, but positive (+) for cytokeratin (CK) 5/6 and epidermal growth factor receptor (EGFR). Hypothesis: basal-like tumors by NC will not respond to bicalutamide. Methods: Unstained slides/tissue blocks from trial tested for ER, HER2, CK 5/6 and EGFR at MSKCC core facility as percent cells staining and intensity of staining. Response classified as progression of disease (POD) or stable disease (SD). Results: 4 of 26 study participants had sufficient tumor for testing. Two were (-) for CK 5/6 and EGFR, i.e., not BL. Among these, one responded (SD>12 months), one progressed (POD< 3 months). Two were (+) for CK 5/6 and EGFR, hence expressed NC. Both showed POD<3 months, i.e. did not respond to bicalutamide. Conclusions: Data support our hypothesis that BC expressing NC do not respond to bicalutamide, suggesting a BL phenotype rather than an AR-dependent one. Further study is needed.
33	Presenter: **Jason Sloan,** *Biology and English* Undergraduate Research Fellow Faculty Mentor: Derrick Brazill **Determining the Cytoskeletal Interactions of PaxB and PldB in *Dictyostelium discoideum* Aggregates** Regulation of the cytoskeleton by extracellular signals is critical to numerous cellular processes such as embryogenesis, proliferation, differentiation and migration. Loss of regulation contributes to such diseases as metastatic cancer and atherosclerosis. Phospholipase D (PLD) and paxillin are two proteins known to link extracellular signals to the cytoskeleton. The metazoan Dictyostelium discoideum acts as a model for mammalian intracellular interactions, with homologues of both PLD (PldB) and paxillin (PaxB). Based upon strong preliminary research, it is hypothesized that starvation induces changes in the extracellular factors that regulate the activities of both proteins when forming a multicellular fruiting body, via an F-actin binding complex involving both PldB and PaxB. To determine whether PldB depends on PaxB for its localization, and vice versa, the cellular location of PldB in wild type cells, paxB- cells and cells overexpressing PaxB will be examined by confocal microscopy and compared with that of PaxB observed in wild type cells, pldB- cells and cells overexpressing PldB. To determine whether the interaction detected between PaxB and PldB is direct, tagged versions of the proteins will be bacterially expressed and purified, and their binding measured in vitro. Analysis of the results will define the interactions of PldB and PaxB in the Dictyostelium model, and can be used to evaluate the signaling structures that regulate the cytoskeleton in mammalian cells to provide a clearer framework for therapeutic intervention in a variety of associated diseases.
34	Presenter: **Emily Corvi,** *Sociolinguistics* Co-Authors: Matthew Baquerizo, Alejanda Batista, William Lopera

	Faculty Mentor: Maryam Bakht **"No, girl. No.": An Analysis of Pronouns in RuPaul's Drag Race** In this study, we analyze pragmatic discursive practices of participants on the American reality television series RuPaul's Drag Race (Seasons 2-5) aired by the LGBT*Q channel LogoTV. The contestants on this show represent a sociolinguistic community with specific discursive practices. The competitive style of television requires that contestants interact in a variety of speech contexts including mixed group settings, conversational dyads, and personal interviews with a producer. Each of these settings requires a certain degree of linguistic formality measurable by sociolinguistic methods. Our study examines the fluidity of gendered pronouns ("he/him/his" and "she/her/hers"), terms of address ("honey," "girl," etc.) and discourse markers commonly used in the LGBT*Q community using quantitative linguistic methods. With the shifting setting, speech contexts and physical appearances of the contestants, our study hypothesized that changes would also occur across their usage in these linguistic categories. Speech context was found to be significant and elicited different types of discourse markers discernible by pragmatic factors such as formality. The "work room" context where contestants create their outfits in an open group-setting versus the "judging panel" also elicited different frequencies according to power and stance of the speaker. Throughout the entire show, shifts in power can be observed between contestants and judges. Our conclusions shed light on how identity is negotiated within the drag and LGBT*Q community.
35	Presenter: **Harrison Troyano,** *Greek and Latin* Thomas Hunter Honors Program Faculty Mentor: Ronnie Ancona **Food, Sex, and Excess: The Paradoxes in the Characterization of Mamurra in Catullus 29** In this paper, I aim to illustrate the paradoxical characterization of Mamurra, a notoriously wealthy Roman knight of the first center BCE, in the 29th poem of Catullus, a Roman lyric poet. Catullus 29 is a poem of invective, in which Catullus rebukes both Mamurra for his political and financial excess and Julius Caesar for his political submission to Mamurra, who is of a lower office. Catullus aims his criticism of Mamurra in a multifaceted attack, inveighing against Mamurra both directly and indirectly. Although Mamurra is authoritative, assertively making his higher-ups look like pushovers, he, paradoxically, is also submissive and is made into the passive recipient of his overpowering susceptibility towards vice and excess. With the poem's vocabulary of words associated with ingestion and the connotations of sexual receptivity and oral sex that it entails, Catullus presents the image of a Mamurra made feminine by his voracious, overactive mouth, regardless of his political dominance. This paradox creates a sense of polarization that separates the moral alignments of the characters into distinct realms of dominance and passivity. It is here that I argue Catullus places the true subject of the invective, a large-scale societal criticism addressing the lack of moderation in his time, made possible through this characterization of Mamurra.

36	Presenter: **Izrail Abdurakhmanov**, *Biology* Macaulay Honors College Co-Authors: Ron Zipkin, Raymond Leidich, Joel Martin, Tammy Huang, Mark Carrington Faculty Mentor: Jayne Raper **Locating SRA in Transfected *Trypanosoma brucei brucei*** African Sleeping Sickness is a disease prevalent in Sub-Saharan Africa caused by trypanosomes–eukaryotic, unicellular, flagellated parasites that thrive in the bloodstream of several mammalian species. Afflicted organisms fall into a comatose state and eventually die as a result of the parasites crossing the blood-brain barrier and invading the central nervous system. Humans and certain other primates have innate immunity against Trypanosoma brucei brucei mediated by Trypanosome Lytic Factor (TLF), which is a subset of high density lipoprotein particles. Apolipoprotein L-I (APOL-I), the lytic component, is a key protein present in TLF that is responsible for killing trypanosomes through forming a pore in the lysosomal membrane. However, T. b. rhodesiense, a human infective strain of trypanosomes, is resistant to APOL-I due to Serum Resistance Associated protein (SRA), which binds APOL-I and neutralizes its pore forming capacity. The exact location of SRA and site of APOL-I neutralization within the parasite is debated but believed to be within the endocytic pathway. High affinity fluorophore-labeled anti-SRA monoclonal antibodies were used on T. b. brucei transfected with the SRA gene, under a tightly regulated expression system, in order to determine the localization of SRA within the parasite through the use of fluorescence microscopy and FACS. From the data it appears that there are varying points of SRA localization between the nucleus and kinetoplast, and by further using endocytic markers in conjunction with the SRA antibodies, the exact location within the endocytic pathway may be determined.
37	Presenter: **Rachel Elmies,** *Urban Studies* Faculty Mentor: Maryam Bakht **Not the Baby-Sitters Club : Realness, Facework, and Strategy on Oxygen's Bad Girls Club** The city changes, but the premise is always the same: seven women, one house, and four months of taping. "Realness" and linguistic authenticity are prized on the Bad Girls Club, a hit reality television show on the Oxygen Network. The goal is to make it to the end of the filming period without being removed from the house -- either by the show's producers, or the other contestants. Each woman uses dialogue to construct distinct identities and performs "facework" to enhance or maintain their image as the baddest girl in the group. Through the tears, weave-pulling, and plotting, the women adapt their speaking styles and indexical cues to best align with the dominant women in the house or linguistically distinguish themselves from their rivals.
38	Presenter: **Talicia Jackson,** *Pre-Health* Faculty Mentor: Karen Phillips **Sexual Dysfunction in Women with Lymphoma: Prevalence and Etiologies** This study was performed in order to understand the impact of lymphoma treatment on

	sexual dysfunction in women with lymphoma. We aim to better define the prevalence and severity of sexual dysfunction in women undergoing therapy. We developed a survey that includes a validated questionnaire, the female sexual function index (FSFI), and an established measure of health-related quality of life (the EuroQol EQ-5D). It also includes disease-specific items to characterize sexual dysfunction and its causes based on literature review and expert consultations. Anonymous survey collection was conducted in outpatient clinics at Memorial Sloan-Kettering Cancer Center (MSKCC), with IRB approval. We queried 36 women with lymphoma. The mean age was 38 (range 19-77). Among these women, 94% reported current or past chemotherapy. Sexual dysfunction attributed to lymphoma or its treatment, defined as an FSFI score <26.55, was reported by 50% of respondents, with a mean score of 20. 55% were bothered by their sexual dysfunction. Patients attributed their sexual dysfunction to chemotherapy, fatigue, and anxiety. Sexual dysfunction was seen in these domains: desire, lubrication, arousal, orgasm, and pain. Sexual dysfunction is prevalent in women treated for lymphoma and should be discussed with patients as a potential adverse effect of therapy. Assessment of sexual symptoms throughout treatment and beyond may facilitate the use of potential interventions such as lubricants, dilators, treatment modification, hormonal therapy, and counseling. Future work includes a longitudinal prospective trial to further characterize the etiologies of these symptoms and a randomized controlled trial to evaluate interventions for sexual dysfunction.

Poster Presentation Abstracts

Wednesday, March 5th, 2014
Poster Session #1
10:00 am – 12:00 pm

1	Presenter: **Rena Abramova**, *Mathematics* John P. McNulty Scholar Faculty Mentor: Robert Thompson **Fourier Series** A Fourier series is an expansion of a periodic function in terms of an infinite sum of sines and cosines. Fourier series are extremely useful for solving partial differential equations, which are included in the field of applied mathematics. Some of the most important examples of such equations are the Heat and Wave Equations. Fourier series help to describe important physical phenomena from diverse fields and therefore have numerous applications in physics, engineering, chemistry, astronomy, finance, economics and acoustics. Another construction related to Fourier series is the Fourier transform. The Fourier transform also has many diverse applications, especially in physics and engineering. One application of Fourier series to problems in quantum mechanics is Schrodinger's Equation. A solution of this equation is the wave function of an electron, which can be used to predict the behavior of the electron. The Black-Scholes Equation is another partial differential equation, which presents an application of Fourier series and Fourier transforms in finance and economics. The Black-Scholes formula is an options pricing model, which is used to calculate the theoretical price of European call and put options. In this poster presentation I will summarize some of the key features of this topic.
2	Presenter: **Gianluca Arianna**, *ACS Chemistry* Thomas Hunter Honors Program Faculty Mentor: Charles M. Drain **Dynamic Aggregation of Three New Photodynamic Therapeutics** Photodynamic therapy is treatment directed to cancer cells with the goal of destroying them using molecular sensitizers. The sensitizer absorbs light energy within a cell to transform molecular oxygen to singlet oxygen which causes oxidative stress and cell death. A drawback to Photodynamic therapy is the possible aggregation of the sensitizer which reduces the amount of light absorbed, thus decreasing the amount of singlet oxygen produced. This study investigated the aggregation behavior of three derivatives, P-Glu4, I-Glu4 and C-Glu4, in Phosphate buffered saline (PBS). PBS was used to mimic conditions in vitro. A cellular uptake test, using MDA-231 cancer cells, was also conducted to determine if varying concentrations of the sensitizers would affect their uptake. Ultimately due to their hydrophilicity, the compounds exhibited little aggregation in PBS. Fluorescence microscopy results of the cellular uptake indicate that the varying fluorescence intensities of P-Glu4, I-Glu4 and C-Glu4 were linked to differences in

	quantum yields. Furthermore, the cell toxicity of P-Glu4 and C-Glu4 was measured after incubating MDA-231 and MBT2 cells with dye and radiating them with white light. Cytometry revealed that of the two dyes, P-Glu4 was the more effective photosensitizer. These results will help shed more light on the derivatives interactions with cancer cells and their eventual use as PDT agents.
3	Presenter: **Lauren Christopher**, *Psychology* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program), Thomas Hunter Honors Program Co-Authors: Lauren Christopher, Collette Berbesque, Brian M. Wood, Frank W. Marlowe Faculty Mentor: Herman Pontzer **A Comparative Analysis Concerning Hypertension in Both U.S. and Hadza Populations** Hypertension is the leading cause of heart disease in the United States. Lifestyle risk factors in the U.S, including tobacco use, being overweight and obese, decreased physical activity, and poor diet, are commonly associated precursors for hypertension. To gain a better understanding of how lifestyle risk factors affect cardiovascular health, we measured and analyzed blood pressure, smoking behavior, diet, and daily walking distance among Hadza hunter-gatherers. Traditional populations such as the Hadza provide an important point of comparison because they generally experience very low rates of cardiovascular disease. The total sample size was 150 adult males and females, with adult being defined as eighteen and older. All data were collected directly from the Hadza tribe by members of this project and compared to statistics provided by the CDC. The Hadza self-report tobacco use at higher percentages than U.S adults; 77% of Hadza adults engage in some form of tobacco use compared to 19% in the U.S. Additionally, the Hadza have a substantial proportion of meat and honey in their diet. Despite these risk factors, hypertension is very low among Hadza hunter-gatherers compared to U.S adults: 34% of U.S adults have hypertension compared to the 12% of Hadza adults. The Hadza surpassed the U.S in daily walking distance in all gender and age categories, generally walking more than double the average daily walking distance in the U.S. Our results suggest that the Hadza's high rate of physical activity may be protective against hypertension even in the presence of other risk factors.
4	Presenter: **Katarzyna Golec**, *Mathematics: Quantitative Biology Concentration* John P. McNulty Scholar Faculty Mentor: Robert Thompson **Probability Models and Stocastic Processes** Probability models are usually concerned with different models based on various natural phenomena. Any realistic model must take into account the idea of randomness. Since, probability theory is a portion of mathematics that consists of analysis of uncertainty, an extensive analysis and knowledge of probability theory is necessary. The application of random processes (or stochastic) depends on the nature of the problem. The Stochastic processes include Markov Chain, which are usually applicable in the sciences or the counting processes such as the Poisson process which determine the relationship between the process and the exponential distribution. The presentation highlights the importance of the processes as well as the widely used applications in the sciences.

5	Presenter: **Ariela Hazan**, *Biology* HHMI (Howard Hughes Medical Institute) Co-Authors: Lisa Liu, Eddie Grinman, Jesus Angulo Faculty Mentor: Jesus Angulo **Crystal Clear: Neurotensin Protects Against the Neurotoxic Effects of Methamphetamine** Methamphetamine (METH) is a psychostimulant substance of abuse. Aside from its high potential for addiction and its somatic side-effects, it has also been shown to have damaging effects on the brain, in particular in the striatum. Meth has been shown to induce dopaminergic degeneration, glial cell activation and apoptosis. We looked at neurotensin, an endogenous neuropeptide, as a medicinal candidate for protection against the neurotoxic effects of METH in the striatum. Several different parameters were examined, including dopaminergic damage, astrocyte and microglial activation, and changing levels of nitric oxide (NO). Our results show that the neurotoxic effects of METH on the striatum were attenuated with pre-treatment of neurotensin. Future studies will elucidate the mechanism by which this endogenous substance in the healthy brain protects from pharmacological damage.
6	Presenter: **Marouf Hossain**, *Biology* Macaulay Honors College Co-Authors: Olga Melnycheko Faculty Mentor: Mandë Holford **Synthesis and Characterization of Novel Peptide Toxin Ta1 From Venomous Marine Snail *Terebrid anilis*** This project involves the discovery, structural characterization, and biological evaluation of novel peptide toxins from venomous marine snails that can be used to manipulate signaling in the nervous system. Peptides, while currently not bioavailable as small molecule therapeutics, have advantages of higher target specificity and selectivity, and decreased toxicity. Venomous terebrid snails are known to produce 50-200 disulfide rich peptidic toxins per specimen. The Holford lab is working on synthesis and characterization of novel cysteine-rich peptides in order to identify specific ligands for ion channels and receptors. Standard Fmoc solid phase peptide synthesis (SPPS) of a novel peptide toxin from Terebra anilis, Ta1, was performed using a microwave assisted peptide synthesizer. Ta1 is a 29 amino acid residue peptide with two disulfide bonds. The linear peptide was chemically synthesized and purified to 95% using reverse-phase high performance liquid chromatography (RP-HPLC). Ta1 was folded using thiol assisted air oxidation to from the active disulfide linked conformation of the peptide. Mass of the linear and folded peptide was confirmed using liquid chromatography mass spectrometry (LC-MS). Bioactivity of Ta1 was determined using a phenotypic polychete worm assay, as polychetes are the native prey of terebrid snails. Further in vitro and in vivo experiments will be performed to identify Ta1's specific molecular target.
7	Presenter: **Anne Kadamani**, *Political Science* JFEW Eleanor Roosevelt Scholar in Public Policy Co-Authors: Yohan Garcia, Geraldine Marrero Faculty Mentor: Charles Tien

	Do Term Limits Increase the Number of Women Elected to State Offices? Evidence from 1979 to 2013 Women are disproportionately underrepresented in public office despite compromising over 50% of the electorate and total population. Over time, women have made gains nationally and statewide legislative bodies. Still, women only hold 18% of the seats in Congress and 24% of the seats in state legislatures. The paucity of women in elected positions has been attributed to a number of causes: gender socialization, occupation, political geography, electoral bias, ambition, party recruitment, and incumbency. Incumbency has been faulted with creating legislatures that are less diverse, where underrepresented groups are unable to gain access to office. To increase diversity, competition, increase voter turnout, increase confidence in government, and decrease government spending, 15 states have opted to instill term limit mandates on its representatives. Our research addresses the effect of term limits on the number of women elected to office. We use interrupted time series analysis to measure the impact of term limits on the electoral success of women, while controlling for state ideology, religiosity, and legislative professionalism. We examine the effect of term limits on the number of women elected to upper and lower houses.
8	Presenter: **Valentyna Kostiuk**, *Biology* Ronald E. McNair Scholar, RAISE-W (Resource Assisted Initiatives in Science Empowerment for Women) Co-Authors: Gayathri D. Raghupathy, Weigang Qiu, Benjamin D. Ortiz Faculty Mentor: Benjamin D. Ortiz **Identification of Evolutionarily Conserved Sub-Sequences within the Locus Control Region (LCR) of the T Cell Receptor-alpha (TCRa) Gene** The TCRa protein plays an important role in cell-mediated immune responses and T cell development. The mouse TCRa gene shares a complex gene locus with the anti-apoptosis gene Dad1. The TCRa LCR, found between these genes, is thought to regulate the spatiotemporal expression of the genes in this locus. An LCR is a cis-acting gene regulatory element encompassing multiple DNAse hypersensitive site (HS) regions. The TCRa LCR contains nine HS, four of which HS1, HS1', HS4 and HS6 have been proven functional. The TCRa LCR is suspected to function via specific binding of effector proteins to the HS DNA. Besides genetic and biochemical approaches, research on the LCR sequence conservation can provide insight into the HS functions and the proteins involved. Bioinformatics analyses of the TCRa LCR sequence in the USCS genome browser showed 459 homologous alignment blocks found among 46 vertebrate species. We focused our attention on the blocks located within the HS1', HS4, and HS6. HS1' showed the highest conservation level and contained 51 conserved sequences. We then used the online computational biology database to predict the proteins that could bind to the found sequences. A thorough scrutiny of the implicated protein structures is ongoing, in order to identify true hits. Computational predictions will be confirmed via biochemical techniques: Electrophoretic mobility shift assay and Chromatin immunoprecipitation. Thus, the identification of the proteins that bind to the HS will provide more knowledge about the mechanism of LCR regulation of the TCRa locus.

9	Presenter: **Nicola Kriefall**, *Biology* John P. McNulty Scholar Co-Author: Christopher Braun Faculty Mentor: Christopher Braun **Does Jamming Establish Social Dominance in Weakly Electric Fish?** Pulse-type gymnotiforms use weak electric signals to sense their environment and communicate, rendering them susceptible to electrosensory interference, or 'jamming'. We aim to determine whether jamming represents a significant social challenge that dominant fish utilize to enforce submission. We will simulate this social interaction using computer-generated signals with the respective frequencies of putatively domineering, or submissive signals, and with randomized control signals. The subject fish's own electric signals will be recorded in response to these playbacks. Additionally, gonadal and corticosteroid hormones passively diffuse into the holding water of the fish (through their gills), allowing tracking of hormonal changes before, during, and after the procedure. We expect to see a change in the fish's electric signal and hormone release in response to the jamming protocol as compared to the submissive and control protocols. We hypothesize that fish with higher circulating androgen levels will carry out the jamming behavior themselves more often, if the trait is indeed a demonstration of dominance. Analysis of the results will uncover just how this social interaction is mediated by the complex electrosensory system and hormones in weakly electric fish, a model system of the neural control of behavior.
10	Presenter: **Katherine Lopez,** *Psychology* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program) Co-Author: Miguel A. Briones Faculty Mentor: Shirzab Jenab **The Effects of L-DOPA on Dopaminergic Neurons** Parkinson's disease (PD) is a debilitating disorder that affects millions of adults every year. Once diagnosed, it plagues the patient for the rest of their life. PD primarily affects the individual by depleting the amount of dopamine released by neurons, specifically in the substantia nigra area of the brain. Dopamine deficiency results in loss of muscle control and movement, the trademark symptoms for this disorder. L-DOPA, a chemical that is converted to dopamine in the body, has commonly been given as a therapeutic treatment to PD patients. L-DOPA increases the dopamine levels in the brain, adjusting for the initial loss of dopamine neurons. However, the question remains whether L-DOPA has a neurotoxic effect on PD patients. Many patients who take L-DOPA report an onset of abnormal, involuntary movements termed dyskinesia. In addition, the effectiveness of L-DOPA treatment lessens over time. Thus, we wanted to test for L-DOPA's neurotoxicity on dopaminergic neurons in a cell culture model. Our aim was to study three different cell culture groups and compare whether apoptotic molecules were expressed using western blots. Our findings will help determine whether L-DOPA can have negative effects in PD treatment and build a more concrete model of dyskinesia.

11	Presenter: **Rubana Rahman**, *Psychology* John P. McNulty Scholar Faculty Mentor: Cheryl Harding **Body Weight and Heart Rate Variability as Predictors of Anxiety and Fear** People who are exposed to mold complain of adverse health effects including asthma, chronic fatigue, joint and muscle pain, and cognitive problems. Our lab is the first to use an animal model to determine if mold could cause cognitive problems and the physiological mechanisms involved. We have already shown that mold exposure causes increased anxiety and fear, memory loss, and balance problems. These effects are correlated with immune activation and brain inflammation. In the current study we looked at two variables that are related to immune function in order to see if animals have inherent characteristics that can predict their susceptibility to negative effects following mold exposure. The variables studied were body weight and heart rate variability. Both variables are excellent predictors of cognitive problems mediated by immune reactions in response to stress. As predicted, both heart rate variability and body weight showed positive correlations with increased fear as measured by auditory-cued fear conditioning and anxiety as measured by elevated plus maze. However, body weight proved to be a stronger predictor than heart rate variability. There were strong positive correlations between the animals' body weights at several points during the experiment and their anxiety and fear when tested after 3-4 weeks of mold exposure. Our data suggest that heavier individuals have a higher risk of immune activation, brain inflammation and cognitive problems following mold exposure.
12	Presenter: **Shajoti Rahman**, *Biology: Neuroscience Concentration* John P. McNulty Scholar Co-Authors: Richie DeStefano, Gina Manes, Tina Roa, Cheryl Harding Faculty Mentor: Katharine Hsu **Effect of Compound KIR2DL1 and HLA-C Allotypes in Hematopoietic Stem Cell Transplantation Outcome** Natural Killer (NK) cells integrate activating and inhibitory signals to induce inflammatory and cytotoxic processes to control disease and infection. A subpopulation of "licensed" NK cells is inhibited via signaling through Killer Immunoglobulin-like Receptors (KIR) that recognize host Human Leukocyte Antigen (HLA). Compared with their unlicensed counterparts, licensed NK cells respond against target cells lacking "self" HLA. The relative insensitivity of unlicensed NK cells to inhibition by host HLA may be beneficial in acute myelogenous leukemia (AML). Indeed, in HLA-matched hematopoietic stem cell transplantation (HCT), unlicensed donor NK cells are associated with lower relapse and mortality. Thus, KIR allotyping may allow selection of donor KIR isoforms predicted to benefit anti-cancer impact. KIR2DL1, which can be subdivided at amino acid position 245 into arginine (R245) or cysteine (C245) is ligated by HLA-C2. We hypothesize that donor KIR2DL1 C245 will decrease relapse and mortality of HCT recipients compared to KIR2DL1R245 in HLA-C2+ patients due to relatively poor licensing by HLA-C2. KIR2DL1 dimorphism at 245 will be determined for 1277 HCT donors using PCR-SSOP, which identifies KIR2DL1 genes via combinations of microbeads targeted to genomic sequences. We established a computer-based

	algorithm to determine 2DL1 allotypes from OneLambda HLA fusion software through specific microbead combinations that positively identify KIR2DL1 allelic subgroups. Relapse and overall mortality will be assessed after stratifying donors based on KIR2DL1 (C vs. R) and HLA-C2 heterogeneity in patients with AML receiving HCT. We anticipate that understanding how KIR2DL1 alleles impact post-transplant outcomes will assist in selecting donors for HCT that predict for diminished leukemic relapse and improve patient survival.
13	Presenter: **Gaddiel Rodriguez Jr.**, *Biochemistry* MARC (Minority Access to Research Careers Program) Co-Author: James Stivers Faculty Mentor: Derrick Brazill **A High-Throughput Colorimetric Assay for SAMHD1 dNTP Triphosphohydrolase** SAMHD1 is a dendritic and myeloid cell specific HIV-1 restriction factor, composed of a Sterile Alpha Motif (SAM) domain known to facilitate protein-protein and protein-nucleic acid interactions and a Histidine-Aspartate domain (HD) known to possess nuclease and triphosphohydrolase activities. The non-specific dNTP triphosphohydrolase activity of SAMHD1 requires activation by dGTP binding to an activator site and serves to reduce intracellular dNTP pools which inhibits the reverse transcriptase activity of HIV-1. To discover small molecule probes for SAMHD1 we have developed the first sensitive high-throughput (HTP) colorimetric assay for SAMHD1 activity. The assay measures the levels of PPPi after conversion to inorganic phosphate using E. coli inorganic polyphosphatase employing the malachite green phosphate detection reagent. The assay is amenable for HTP screening of small molecule compound libraries for discovery of inhibitors or activators of SAMHD1. Such compounds will be useful for understanding the physiological function of SAMHD1 in innate immunity against HIV-1 and exploration of new therapeutic avenues for AIDS treatment.
14	Presenter: **Syed Sarder,** *Biochemistry* MBRS-RISE (The Minority Biomedical Research Support- Research Initiative for Scientific Enhancement program) Co-Authors: Frida E. Kleiman, Jorge Baquero Faculty Mentor: Frida Kleiman **Functional Studies of Nuclear Phosphorylated Forms of Tau and Possible Connections to Alzheimer's Disease** Neurons of Alzheimer's disease patients show the development of paired helical filaments (PHF). These filaments are formed by insoluble hyperphosphorylated-tau aggregates. In normal individuals, tau is a highly soluble protein that stabilizes microtubules in the cytoplasm of neurons. Many efforts have been made to identify factors that might regulate tau phosphorylation under different conditions. For example, it has been shown that p73, a homologue of tumor suppressor p53, regulates the accumulation of phosphorylated-tau during Alzheimer's disease. It was also shown that p44, another isoform of p53, promotes the phosphorylation of tau and activates the transcription of different tau kinases. Dr. Kleiman's lab has recently shown that p53 can regulate mRNA 3' processing in the nucleus during DNA damage response (DDR).

	As p53 and its isoforms are involved in nuclear functions during the cellular response to DDR; first we decided to examine the possibility that tau might localize in the nucleus of different cells. Our fractionation assays indicate that many tau isoforms are present exclusively in the nucleus of non-neuronal cells, such as HCT116 human colon carcinoma cell line. Interestingly, the pattern of these tau isoforms change after UV-treatment. We confirm the phosphorylation of nuclear tau by CIP treatment of nuclear extracts from these cells. Finally, we found that some of tau nuclear isoforms are ubiquitinated using in vivo ubiquitination assays. Although these are preliminary studies, these findings reveal a new possible connection between tau and other nuclear processes, such as DDR, mRNA 3' processing and gene expression.
15	Presenter: **Jane Selegean**, *Behavioral Neuroscience* John P. McNulty Scholar, JFEW Eleanor Roosevelt Scholarship Co-Authors: James B. Bussel, Madhavi Lakarraja, Naznin Haq Faculty Mentor: Spiro Alexandratos **Maternal Related Antibodies (Anti-GP-Ib/IX) and Spontaneous Abortion** Antibodies have been identified to platelets which result in accelerated destruction and suppress the production of platelets in immune thrombocytopenia (ITP). These antibodies may play a role in miscarriage. One antibody, Anti-GP-Ib/IX, creates worse outcomes secondary to intravenous immunoglobulin (IVIG) treatment. Anti-GP-Ib/IX induces GP-Ib/IX desialyation, leading to platelet destruction and thrombocytopenia in the mother. The objectives are to observe: (a) association of Anti-GP-Ib antibodies with risk of miscarriages, (b) clinical characteristics related to a mother's risk of having a miscarriage. This is the preliminary report of an ongoing study in which consent and blood drawing are obtained prospectively in threatened miscarriage and then a retrospective chart review is conducted on women who had a miscarriage and those without miscarriage (controls). Patients with a cytogenetic evaluation reporting genetic mutations were excluded. Clinical characteristics were collected for patients and controls. Blood samples were tested for presence of Anti-GP-ë_3, and Anti-GP-Ib antibodies using monoclonal antibody immobilization of platelet antigen (MAIPA). Comparisons were made between patients and controls and for patients who tested positive for Anti-GP-Ib. Statistical analysis was performed using means, ranges, proportions; p-value<0.05 was considered significant. Currently, samples from 44 patients (21- 44 years, mean 35.4) and 36 controls (20 - 48 years, mean 32.2) have been tested. Ten patients had abnormal cytogenetic testing and were excluded. 12/34(35.3%) patients and 10/36(27.8%) controls had Anti-GP-Ib antibodies (p=0.5). There was no significant difference in clinical characteristics between patients and controls, nor among patients with positive Anti-GP-Ib and negative Anti-GP-Ib.This preliminary report does not demonstrate that Anti-GP-Ib increases the risk of miscarriage. Also no clinical characteristics differentiate women who had a miscarriage from controls. More patients and controls will be enrolled to assess if presence of Anti-GP-Ib/IX in pregnant women is associated with increased risk of miscarriages.

16	Presenter: **Anastasia Sergiienko,** *Physics and Astronomy* Catalyst Scholar Co-Authors: Phillip Stallworth, Jing Peng, Steve Greenbaum Faculty Mentor: Steve Greenbaum **Multinuclear NMR and EPR studies on Si-doped Diamond-like Carbon** Diamond-like carbon (DLC) is a material which has important applications as durable, low-wear and low-friction coatings. Some applications require operation at relatively high temperature and it is extremely important to study whether the heating process results in structural changes at the atomic level. Samples provided by our collaborators from the University of Pennsylvania, led by Prof. Robert Carpick of the Department of Mechanical Engineering, were annealed at different temperatures. Our ultimate goal is to investigate the atomic structure of DLC annealed at different temperatures and various techniques are employed in this effort. Electron Paramagnetic Resonance (EPR) method is used to determine the unpaired electron spin density, which is due to the dangling bonds or structural defects, as a function of annealing temperature. It is observed that unpaired electron spin density decreases with the elevation of the annealing temperature. 1H, 13C and 29Si Nuclear Magnetic Resonance (NMR) is employed to quantify the protons and investigate the carbon and silicon local structural environments. NMR allows for determination of the ratio of carbon hybridizations (sp2:sp3) and hydrogen content which are correlated with the mechanical properties of the material.
17	Presenter: **Chhime Sherpa**, *Biochemistry* John P. McNulty Scholar Co-Authors: Srinivas V. Chakravartula, Mandë Holford Faculty Mentor: Mandë Holford **Chemo Selective Strategy for Capturing Cysteine Rich Peptides from Snail Venom** Venomous marine snails are one of the most effective medicinal resources for the treatment of severe chronic pain for HIV and cancer patients. The disulfide rich peptides found in marine snail venom are biologically active, stable and can be converted into potential drug candidates for treating pain. Each snail can provide 50-200 novel peptides in its venom. To reduce the complexity of analysis, we synthesized a molecule N-(2-(acryloylamino) ethyl)-1,3-thiazolidine-2-carboxamide also known as ATC, that specifically reacts with free thiols of cysteine residues in snail peptides. The ATC tag facilitates and characterization of the disulfide rich venom peptides. The purity of the ATC compound synthesized was determined on LC-MS and NMR. To test the efficiency of the ATC tag, it was reacted with Arg58, a 23 amino acid residue terebrid snail venom peptide. This peptide was synthesized on a peptide synthesizer using F-moc chemistry on a solid support resin (solid phase peptide synthesis). Arg58 peptide has six cysteine residues. ATC tag was reacted with Arg58 peptide under basic conditions in phosphate buffer (pH7.8-8.0) for 2 hours at 370C. The reaction mixture was quenched with acetic acid and further analyzed on LC and mass spectrometry (MS). MS results showed complete addition of ATC moiety to all the six cysteine residues of the Arg58 peptide. Our next step would be coupling ATC tag to an aldehyde resin for the covalent capture of all the cysteine rich peptides from the venom. The resin will be cleaved under acidic

	conditions and filtered. The pooled enriched ATC- cysteine containing peptides of the venom will be analyzed extensively on mass spectrometry. This poster describes the synthesis and initial characterization of the ATC tag to facilitate venom peptide characterization.
18	Presenter: **Muhammed Shoaib**, *Chemistry* Co-Authors: Shima Tafreshi, Kimberly Fung, Suchitra Nair Faculty Mentor: Donna McGregor **Understanding the Coordination Chemistry and Stability of Rhenium-tripeptides: Development of Radiotherapeutic Drugs for the Treatment of Cancer** Cancer is the abnormal growth of cells in one or more parts of the body, which begins to attack other tissues. A promising treatment method is radiotherapy because it specifically targets a tumor instead of the entire body. Generally, radiotherapeutic drugs are comprised of three distinct components: a target vector, a linking agent, and a chelated molecule. This project proposes the synthesis and characterization of Rhenium-188 tripeptide complexes (using D-amino acids, unlike previous work using natural L amino acids) to examine the specific peptide features that stabilize the active ReV=O core. Previous work has shown that complexes resulting from peptide-based metal chelators can exist in two diastereomeric forms, where the MV=O group (M=Tc or Re) is either syn or anti to the amino acid substituents and that these diastereomers often interconvert over time. The specific aims of this project are to 1) synthesize FKC and FGC Rhenium-188 tripeptides using D-amino acids 2) test the stability of the Re-tripeptide diastereomers, and 3) compare the D-amino acid tripeptide complexes to those of the formerly published L forms. This presentation will focus on the development of the synthetic pathways for complexation of the radiometal to D-tripeptides and provide an overview of the stability studies.
19	Presenter: **Esraa Soliman**, *Biochemistry* John P. McNulty Scholar, Thomas Hunter Honors Program Co-Authors: Frida E. Kleiman, Danae Fonseca Faculty Mentor: Frida Kleiman **CstF-50/p97 Regulates HuR Ubiquitination by BRCA1/BARD1 Ub Ligase During DNA Damage Response** Control of mRNA stability is essential for regulation of gene expression and DNA repair during DNA damage response (DDR). HuR is an RNA binding protein that plays an important role regulating the stability of its mRNA targets during DDR. It is known that HuR stabilizes mRNA targets involved in DDR. However, under non-stress conditions, ubiquitinated HuR is released from those mRNAs by p97, an escort protein in the ubiquitin pathway, resulting in destabilization of mRNAs involved in DDR. The studies presented here are aimed to identify the E3 Ub ligase involved in HuR ubiquitination. Dr. Kleiman's lab has shown that the mRNA processing factor CstF-50 and p97 form a complex with BRCA1/BARD1 E3 Ub ligase after UV treatment, regulating ubiquitination of BRCA1/BARD1 substrates. Our results indicate that BRCA1/BARD1 can modify HuR using in vitro ubiquitination

	reactions. Besides, we showed that GST-CstF-50 interacted with His-HuR in pull down assays. Consistent with this, co-immunoprecipitation assays showed the p97/CstF-50/HuR complex formation in HCT116 cells in a UV-independent manner. Strikingly, both GST-CstF-50 and His-p97 were able to inhibit the ubiquitination of HuR by BRCA1/BARD1 in vitro ubiquitination reactions. Based on these results we propose a model where under non-stress conditions BRCA1/BARD1 ubiquitinates HuR, inducing HuR release and destabilization of mRNAs involved in DDR. After UV treatment, HuR ubiquitination by BRCA1/BARD1 activity is inhibited by CstF-50/p97, resulting in HuR binding to target mRNAs and the stabilization and expression of mRNAs involved in DDR.
20	Presenter: **Khalifa Stafford**, *Biochemistry* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program) Co-Authors: Brian M. Wood, Jessica Rothman, Herman Pontzer Faculty Mentor: Herman Pontzer **Hadza Hunter Gatherer's Sugar Intake: Implications for Western Health and Diet** Energy dense diets that are high in sugars are thought to be key contributors to the overweight, obesity, and diabetes epidemics. Traditional populations, in which the incidence of obesity and diabetes are low, provide an important point of comparison for understanding the causal factors underlying metabolic diseases. Here, we examined diet and obesity among the Hadza hunter-gatherers of Northern Tanzania. The Hadza, who maintain a lifestyle similar to our Pleistocene ancestors, consume 307 sugar calories, in the form of honey, per day. Based on empirical relationships, between sugar intake and prevalence of metabolic health conditions in 177 countries worldwide, the Hadza's sugar intake would be expected to result in a 41.6% overweight occurrence, 12.6% obesity incidence, and a near 7.5% diabetes prevalence. To begin to assess why the Hadza fail to show a prevalence of these diseases, despite their large consumption of sugar, we determined the nutritional content in Hadza honey and compared the quantity of specific sugars with published U.S. honey data. Percentage of fructose, glucose, sucrose and maltose in Hadza honey were similar to the quantity of these sugars in U.S. honey. Our data suggests that other factors, such as having an active lifestyle, may play a role in preventing obesity and diabetes in the presence of a sugar-rich diet
21	Presenter: **Kaity Tung**, *Biology* Macaulay Honors College Co-Authors: Darin Salloum, Suman Mukhopadhyay, Aleksandra Polonetskaya Faculty Mentor: David P. Foster **Mutant Ras Elevates Dependence on Serum Lipids and Creates a Rapamycin Synthetic Lethality** The conversion of normal cells to cancer cells involves a shift from catabolic to anabolic metabolism involving increased glucose uptake and the diversion of glycolytic intermediates into nucleotides, amino acids and lipids needed for cell growth. An underappreciated aspect of nutrient uptake is the utilization of serum lipids. We

	investigated the dependence of human cancer cells on serum lipids and reported that Ras-driven human cancer cells are uniquely dependent on serum lipids for both proliferation and survival. Removal of serum lipids also sensitizes Ras-driven cancer cells to rapamycin, an immunosuppressant drug with antiproliferative effect, due to its ability to suppress phosphorylation of the mTORC1 substrate eukaryotic initiation factor 4E-bind protein-1 (4E-BP1) and implies the enhanced need for serum lipids, creating a synthetic lethal and therapeutically exploitable phenotype. While depriving humans of serum lipids is not practical, suppressing uptake of lipids is possible. It has been shown previously that mutant Ras stimulates pinocytosis, suggesting the increased dependence on lipid uptake. Thus, suppressing pinocytosis in Ras-driven cancer cells with 5-(N-ethyl-N-isopropyl) amiloride (EIPA) sensitized the cells of rapamycin treatment.
22	Presenter: **Gloria Yuen**, *Accounting* Faculty Mentor: Christa Acampora **Multimedia: Modifying the Essence of Delivering Research** The utilization of multimedia involves a combination of textual, video and audio resources. Multimedia has evolved tremendously in many different forms, providing viewers a better understanding of analyzing specific ideas/concepts. Interactive media captures the audiences' attention through sound and images which can easily heighten engagement of relevant subject matter. I was able to implement the usage of audio clips in my Think Book! Project for my Philosophy course and this element enhanced my argument of various issues enabling me to draw upon connections in relation to the contemporary world. This specific type of resource contributed to not only my own interpretation but offers insight disclosing similar objectives.

Wednesday March 5th, 2014
Poster Session #2
1:30 pm – 3:30 pm

23	Presenter: **Brenda Abdelmesih**, *Biology* HHMI (Howard Hughes Medical Institute) Co-Authors: Tayyaba Toseef, Carmen Melendez Faculty Mentor: Carmen Melendez **Identifying the Role of MLCK in Schwann Cell Cytoskeletal Organization, Differentiation, and Myelination** Myelination in the peripheral nervous system is carried out by Schwann cells (SC), which surround all axons. Non-muscle myosin II (NMII), an actin-binding motor protein, is a key regulator of cytoskeleton dynamics necessary for interactions between SC and axons and normal myelin formation. NMII activity is regulated by the phosphorylation of its regulatory light chain (MLC), Previous data suggests that one of the kinases that phosphorylates MLC, myosin light chain kinase (MLCK) may be involved in pathways activated in SC by axonal signals at the onset of myelination. The purpose of this project is to use immunoprecipitations to identify proteins that may be interacting with MLCK in SC during cytoskeletal organization, differentiation, and myelination. Identification of

	these proteins might help to elucidate novel pathways that can be manipulated in demyelinating diseases to promote repair and remyelination.
24	Presenter: **Munazza Alam,** *Physics and Astronomy* Macaulay Honors College Faculty Mentor: Kelle Cruz **What are Blue Brown Dwarfs?** Brown dwarfs are cool, low mass objects that form like stars, but are not massive enough to sustain hydrogen fusion in their cores. As a result, they cool and fade over billions of years to resemble gas giant planets. Such commonalities arise because the temperatures and spectral features of brown dwarfs and gas giants overlap. Brown dwarfs range in temperature from 1300 K to 2500 K and are typically the size of Jupiter. A problem arises in the study of brown 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, brown dwarf atmospheres are more complex, and their spectral features depend on multiple properties at once. Parameters such as temperature, gravity, and metallicity (heavy metal content) influence the spectra of these objects. Some brown dwarfs can be described as "blue" because they do not emit as much longer wavelength light as their similarly-classified counterparts. Some blue objects are known to be old and have spectral features indicative of low metallicity. Other brown dwarfs 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 near-infrared observations of known subdwarfs, unusually blue brown dwarfs, and "normal" objects (brown dwarf spectral standards) at different wavelengths and spectral resolutions to understand their physical and atmospheric properties.
25	Presenter: **Tricia Alston**, *Medical Laboratory Sciences* Co-Author: Daiva Ahire Faculty Mentor: Robert Raffaniello **Variations in the Multimerization Region of the *H. pylori CagA* Toxin Affects Virulence** Helicobacter pylori colonizes the human stomach by infecting epithelial cells. It is the primary cause of peptic ulcer disease and gastric cancer. Cytotoxin-associated gene A (CagA) protein is a virulence factor produced by H. pylori. Strains positive for CagA are associated with more severe gastric diseases. The 3" region of the CagA gene exhibits heterogeneity with respect to tyrosine phosphorylation motifs (EPIYA) and CagA multimerization motifs (CM). CagA proteins are categorized as either Western or Eastern based on EPIYA sequences. CM motifs are also identified as Western and Eastern based on sequences found in Western and East Asian countries. It has been suggested that CagA proteins possessing an Eastern CM type are associated with less severe gastric disorders. In the present study, we examined the effects of CagA proteins with two CM motifs on cell function. Two CagA proteins were examined: CagA with a Western and Eastern CM motif (CagA-WE), and CagA with two Western CM motifs (CagA-WW). CagA sequences were fused with green fluorescent protein (GFP) to form a GFP-CagA fusion protein. GFP-CagA and GFP control constructs were transfected into human gastric adenocarcinoma cells (AGS). GFP-CagA expression was verified by

	immunoblotting and immunofluorescence. We found that CagA-WE-transfected cells were less adherent when compared to CagA-WW. CagA has been shown to cause cell elongation in AGS cells. Cell elongation was more frequent in CagA-WW-transfected cells when compared with CagA-WE (8.34% versus 3.97% cells, respectively). These results suggest that different CM motif types may affect CagA virulence.
26	Presenter: **Stefanie Balbuca**, *Psychology and Biology* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Author: Teneka Jean-Louis Faculty Mentor: Maria Figueiredo Pereira **Effects of Prostaglandin J2 on the Processing of Amyloid Precursor Protein: Relevance to Alzheimer's Disease** One of the hallmarks of Alzheimer's disease is the formation of senile plaques in the affected brain areas. These plaques contain aggregates of β-amyloid peptides (Aβ) generated by processing of the amyloid precursor protein (APP). It is thought that these extracellular protein aggregates disrupt cellular homeostasis and cause neuronal dysfunction. There are multiple mechanisms that promote Aβ production in the brain of AD patients. The goal of this project is to address how the endogenous product of inflammation prostaglandin J2 alters APP processing possibly contributing to the generation of toxic forms of Aβ. Understanding this process could lead to the development of therapies to prevent Aβ formation.
27	Presenter: **Bridgit Boulahanis**, *Environmental Science* Raab Presidential Fellow Co-Authors: S.A. Soule, A.T. Fundis, D. Clague, W.W. Chadwick Faculty Mentor: Haydee Salmun **Syn-eruptive CO2 Degassing of Submarine Lavas Flows: Constraints on Eruption Dynamics** At fast- and intermediate-spreading rate mid-ocean ridges, quenched lava samples are commonly supersaturated in CO2 with concentrations similar to the pressure/depth of shallow crustal melt lenses. This supersaturation is attributed to rapid ascent and decompression rates that exceed the kinetic rates of bubble nucleation and growth. Based on analysis of vesicle population characteristics and complementary noble gas measurements, it is proposed that diffusion of CO2 into bubbles can be used as a basis to model the gas loss from the melt and thus place constraints on the dynamics of the eruption. We suggest that submarine lava flows represent a natural experiment in degassing that isolates conditions of low to moderate supersaturation and highlights timescales of diffusion and vesiculation processes that are relevant to shallow crustal and conduit processes in subaerial basaltic volcanic systems. Here we report a new suite of volatile concentration analyses and vesicle size distributions from the 2011 eruption of Axial Volcano along the Juan de Fuca Ridge (~1500 m.b.s.l.). This sample suite provides a comprehensive view of the variability in volatile concentrations within a submarine eruption and new constraints for evaluating models of degassing and vesiculation. Initial results show systematic variability in CO2 supersaturation along

	eruptive fissures as well as with increasing distance along flows pathways providing constraints on threshold decompression rates required to nucleate and grow bubbles in a basaltic melt, timescales of degassing in natural systems, and the properties of consequent vesicle populations.
28	Presenter: **Ariel Calderon**, *Biology* MARC (Minority Access to Research Careers Program), Jenny Hunter Scholar Co-Authors: Jordana Lovett, Armin Lahijii, Benjamin D. Ortiz Faculty Mentor: Benjamin D. Ortiz **Characterization of DNAse Hypersensitivity Site 4 in TCR Alpha Locus Control Region** The proper expression of T Cell Receptor α (TCRα) is regulated by the TCRα Locus Control Region (LCR). TCRα-LCR lies between two differentially regulated genes, TCRα and Dad1 and consists of 9 DNaseI hypersensitive sites (HS). Four of these HS have been characterized and shown to be necessary for full LCR function. In order to further understand how individual HS contribute to full LCR activity, we have created "mini LCR" constructs containing only these four HS. Here, we aim to characterize the function of one of these (HS4) via deletion/replacement mutations. One construct removes HS4 from the mini-LCR. Another construct replaces HS4 with a similarly sized "stuffer" DNA fragment to test the importance of element spacing in the LCRs control of gene expression. These constructs will be linked to a reporter gene and transfected into mouse Embryonic Stem Cells (ESCs). Reporter gene expression will be assessed to determine the activity of the various mini-LCR constructs in comparison to the full mini-LCR. Developing T cells carrying these constructs will be tested via flow cytometry for the developmental timing and cell type specificity of reporter gene expression. Ascertaining the role of HS4 in LCR activity has not only basic implications, but can also be of translational importance. Introduction of gene constructs into T cells for therapeutic purposes is a potential approach to treat many different diseases. The mini-LCRs we are testing may prove useful at controlling the timing, level and distribution of therapeutic transgene expression in genetically engineered cells.
29	Presenter: **Hila Chase**, *Biology and Archaeology* MARC (Minority Access to Research Careers Program), Thomas Hunter Honors Program, Yalow Scholar Co-Author: Laura Quintana Rio Faculty Mentor: Derrick Brazill **Pbx-directed Control of Cellular Behaviors that Drive Face Morphogenesis** Cleft lip/palate (CL/P) is the most prevalent human craniofacial birth defect world-wide (~1/700 live births). The affected individuals suffer from obvious facial deformation and are greatly impacted socially and communicatively. During development, philtrum formation occurs through fusion of nasal and maxillary processes at the lambdoidal junction (ëÈ), requiring disintegration of the epithelial layer. CL occurs when the epithelial layer on each nasal process fails to disappear. Since Epithelial-Mesenchymal Transition (EMT, a process in which cells change fate) is known to have a role in fusion of the palatal shelves, we believe it may play a similar role during fusion of the facial prominences at the ëÈ, and hypothesize that impaired EMT may be a cause of CL. Pbx

	transcription factors (TFs) are known to regulate cell proliferation, migration and apoptosis during facial morphogenesis, and EMT in cancer metastasis. Pbx genes are expressed during fusion at the ëÈ and their loss in Pbx compound mutant embryos (Pbx1-/-;Pbx2+/- and Pbx1-/-;Pbx3+/-) produces CL phenotype. To assess epithelial cell fates at the ëÈ, we used cell lineage tracking experiments with reporter transgenic mice marking cells of epithelial origin at the ëÈ, together with immunofluorescence using markers for EMT, apoptosis, and cell migration. To determine the role of Pbx TFs in those processes, we performed parallel experiments in wild-type and Pbx1/Pbx2 compound mutant embryos. The obtained results will help establish the role of Pbx-mediated EMT in the developmental causes of CL in mammals. Further analyses will also allow a better understanding of this disfiguring malformation.
30	Presenter: **Shui Chu,** *Physics and Astronomy* Catalyst Scholar, Jenny Hunter Scholar Faculty Mentor: Yuhang Ren **Improving the Efficiency of Copper-Indium-Gallium-Selenide Solar Cells** Solar energy uses no fuel, produces no air pollution, and relies on renewable energy, i.e. sunlight. The typical efficiency of silicon-based solar cells ranges from ten to twenty percent. Another type of solar cells are copper-indium-gallium-selenide (CIGS) solar cells, which are widely used because they are thin, flexible, have a direct and adjustable bandgap, and a low manufacturing cost. At our laboratory at Hunter College, we make CIGS solar cells using a glass substrate, molybdenum, CIGS, cadmium sulfate, zinc oxide, and aluminum-doped zinc oxide that are arranged in layers from bottom to top, respectively. In this presentation, I shall discuss the conditions for the manufacturing of CIGS cells and present a summary of results of our progress to date.
31	Presenter: **Stephie-Anne Duliepre**, *Biology* HHMI (Howard Hughes Medical Institute) Co-Authors: Fanny Cheung, Magdalena Kiprowska, Patricia Rockwell Faculty Mentor: Patricia Rockwell **Differential Effects of Inflammations, Mitochondrial Dysfunction, and Proteasome Inhibition, on mTOR and Synaptic Function in Cortical Neurons** Neurodegenerative disorders such as Alzheimer‰Ûªs disease (AD) are associated with inflammation and malfunctions of the mitochondria and ubiquitin proteasome pathway (UPP). In each case, these events contribute to a progressive shrinkage of the hippocampus and cerebral cortex in the brain together with neuronal cell death through pathways that are unclear. In this study we compared the effects of 1) prostagandin-J2 (PGJs), a toxic inducer of inflammation, 2) oligomycin, an ATP synthase inhibitor in mitochondria and 3) epoximicin, a proteasome inhibitor on the mammalian target of rapamycin (mTOR) signaling pathway and the presynaptic and postsynaptic proteins synapsin and postsynaptic protein-95 (PSD-95). The mTOR pathway is a critical regulator of protein synthesis in neurons. Synapsin regulates the release of neurotransmitters at synapses while PSD-95 serves a scaffold protein for neurotransmitter receptors. The results show that the serine/threonine kinase AKT an

	upstream regulator of mTOR and the mTOR downstream effector, ribosomal protein S6 kinase (S6K) are decreased by each inhibitor. Treatments with oligomycin also decreased the levels of the prosurvival extracellular-signal-regulated kinases ERK å_ as well as synapsin and PSD-95 while proteasome inhibition but not inflammation, reduced PSD-95 to a lesser extent. Together, our findings suggest that synaptic protein levels and mTOR function in cortical neurons are more sensitive to a loss in ATP synthesis and inflammation than proteasome inhibition. While all three malfunctions are implicated in neurodegeneration, these findings also suggest that they elicit differential effects on synaptic function and protein synthesis in cortical neurons during neurodegeneration.
32	Presenter: **Meshkat Haque**, *Biology* Co-Authors: Paolo Estrada, Monica Trujillo, Akira Kawamura Faculty Mentor: Akira Kawarmura **Isolation and Characterization of Biologically Active Compounds From Streptomyces Strain MTE4a** Actinomycetes are a group of gram positive bacteria known to produce biologically active compounds with therapeutic properties. A new strain of a well-known actinomycete, Streptomyces, was identified in soil samples collected in New York. This strain is known as Streptomyces MTE4a. MTE4a was grown and two compounds showing biological activity were isolated and purified from its culture broth using chromatography techniques. The first compound is 17-hydroxycyclooctatin, which undergoes structural transformation under mildly acidic pH. Thus, our working hypothesis is that 17-hydroxycyclooctatin is used by the bacteria to monitor environmental changes. Molecules like 17-hydroxycycooctatin are important, because those molecules, once characterized, would provide us with clues to communicate with bacteria. Further chemical and biological studies are underway to determine the functions of 17-hydroxycyclooctatin. The second compound is currently structurally unknown but, was seen to show potent anti-microbial activity. Spectroscopic analyses are underway to elucidate the chemical structure of this anti-microbial compound. Results can contribute to the use of natural products as medicinal agents to combat various infectious diseases.
33	Presenter: **Talicia Jackson**, *Pre-Health* Co-Authors: Rebecca Guest, Jamie Servidio Faculty Mentor: Karen Phillips **Evaluation of Wellness Workshop Tailored to MSKCC Environmental Service Employees** The purpose of this study was to evaluate the usefulness of a tailored wellness workshop aimed to improve employee engagement in, as well as access and utilization of employee wellness programs at Memorial Sloan Kettering Cancer Center (MSKCC). A tailored wellness workshop, “Stress and Your Health,” which included information on exercise, nutrition, resiliency, and smoking cessation, was delivered to three shifts of Environmental Services employees: day, evening, and overnight. Brief pre and post surveys were distributed to assess program evaluation, participant engagement, and changes in attitudes and projected behaviors. Record was kept of post-workshop

	inquires for wellness appointments. All work was conducted with IRB approval. Following the workshop, participants were more likely to participate in MSKCC employee wellness programs. The most interest was gained in the Building Resilience program, with 12% increase of interested employees. 90% of participants felt that the workshop was very useful and 92% found it very enjoyable. The evening shift, which received the workshop in a large group setting, found the event to both the most useful and enjoyable. This contradicted our hypothesis that small group interactions would be the most engaging. The three workshops generated 30 requests for wellness appointments with the most substantial requests made for appointments in Nutrition (25) and Exercise (22). Delivery of a targeted workshop, did increase the interest, engagement, and projected participation in healthy behaviors by the Environmental Service employees at MSKCC. Data from this study will guide future development of workshops tailored to specific cohorts of the hospital employees.
34	Presenter: **Daniil Khaitov**, *Biochemistry* Co-Authors: Meagan Schlapp, Farwa Ilyas, Zara Imtiaz, Donna McGregor Faculty Mentor: Donna McGregor **Solid-Phase Peptide Synthesis of D-Amino Acids: Development of Rhenium-tripeptides for Radiotherapy** The main aim of this research project was to synthesize a tri-peptide ligand that can bind and stabilize Rhenium-188 as a radiotherapeutic drug for the treatment of cancer. While the use of L-amino acid tripeptides bound to radioactive metals for radiolabeling tumor cells has been known for a long time, the use of D-amino acids is a novel approach to the problem. A specific goal of this project is the specific design of D-amino acid tripeptide sequences that contain binding sites devised to stabilize the radio-metal. There are several notable advantages to using the D-form amino acids instead of the traditional L-forms: 1) It has been shown that the introduction of D-amino acids into a synthetic peptide can make the peptide less susceptible to enzymatic degradation, 2) the D-amino acid forms of peptides are known to metabolize more slowly in the body, and 3) D-amino acids are more resistant to proteolysis that their L-form counterparts. This presentation will focus on the development a home-made solid-phase peptide synthesizer to sequence D-amino acids, testing for proper amino-acid linkages and characterization of the final tri-peptide sequences using High Performance Liquid Chromatography (HPLC).
35	Presenter: **Prima Manandhar-Sasaki**, *Biology* Co-Authors: Mame Diop, Jake Kresge, Jill Bargonetti Faculty Mentor: Jill Bargonetti **Establishing a p53/CEP-1 Humanized Loss of Function Model to Study in Contrast with Human Mutant p53 Gain of Function in *Caenorhabditis elegans*** p53 is a tumor suppressor protein that responds to DNA damage. p53 is mutated in over 50% of human cancers. These cancers with mutant p53 have gained oncogenic

	activity due to mutant p53, however, the biochemical activity is not yet understood. In order to elucidate such functionality we have embarked on a project to replace C. elegans p53 in mtgk138 animals with human mtp53. Caenorhabditis elegans p53-1 (CEP-1) is the C. elegans ortholog to p53. We have established the cep-1(gk138) (loss of function), cep-1(gk138) ced-1::GFP (JBC1), and cep-1(gk138) glp-1(ar202gf) (JBC2) worm lines, all of which will be utilized for humanization of the worm by the insertion of a human mutant p53 sequence. Tumor growth and proliferation as a result of a loss of function of CEP-1 as well as the effects of chemotherapeutic treatment on these tumors was studied in the cep-1(gk138) ced-1::GFP worm line. The optimized human mutant p53 sequence was determined using the C. elegans Codon Adapter a codon bias tool that revised for codon-bias a sequence for expression in C. elegans. In order to study mutant p53, we created a triple cross worm line (cep-1(gk138) ced-1::GFP glp-1(ar202gf)) to study how mutant p53 effects germline tumor presence, size and growth. In addition, we studied the effect various cancer treatments had on these tumors.
36	Presenter: **Michelle Naidoo**, *Biology* Co-Authors: Habib Zahir, Abel Navarro Faculty Mentor: Derrick Brazill **On the Adsorption of Cu(II) and Zn(II) Ions by Domestic Wastes** When mining industries do not discard residues properly, waste waters contaminated with heavy metals can negatively affect living environments. Spent peppermint (PM) and green tea (GT) leaves were used as potential adsorbents of copper (II) and zinc (II) ions in aqueous solutions. Equilibrium parameters such as acidity, mass of adsorbent, heavy metal concentration, presence of crowding agents and salinity were studied to optimize the adsorption in batch experiments at room temperature. Adsorbents were characterized by TGA, FTIR and SEM techniques and their surface and porosity determined by wet experiments. It has been shown by experimental data that adsorption of copper (II) is maximized at pH 7 using PM with an adsorbent mass of 100mg. On the other hand, copper (II) adsorption with GT is maximized at pH 6, with an optimum adsorbent mass of 100mg as well. Zinc (II) was greatly adsorbed at pH 6, with optimum adsorbent masses of 150mg and 200mg for PM and GT, respectively. Furthermore, the adsorbents also reached their highest adsorption in the absence of salts and crowding agents with maximum initial concentrations of copper (II) and zinc (II) of 100ppm and 110ppm, respectively. Adsorbent characterization indicates the presence of alcohol and carboxyl groups as the most relevant active sites on the adsorbents. Surface and porosity studies also evidence a good competitiveness with the conventional adsorbents. Keywords: Adsorption, heavy metals, green tea, peppermint, pH, salinity.
37	Presenter: **Sarah Parente**, *Psychology* Macaulay Honors College Co-Authors: Laura DeRubeis, Tricia Striano Faculty Mentor: Tricia Striano **How Babies Understand Playful Intentions in Natural Contexts**

	Monitoring others' actions and expressions is an important element of social cognition. Children with autism Philipps et al (1992) often fail to seek relevant social information when they experience another's ambiguous action. By seven months of age, infants not only look to others when they encounter an ambiguous action, but they also use others' facial expressions to interpret the action (Striano & Vaish, 2006). Selective looking to faces is an important developmental milestone and dozens of research studies have documented selective looking among infants in the first year. With an eye toward developing better tools that aid parents in detecting early developmental social cognitive milestones, we developed a study to test selective social monitoring in real world contexts. To determine how robust infants' social monitoring skills are, and to determine if there are optimal contexts for social monitoring, sixteen 8-10 month old infants selective looking skills were tested in a standard laboratory context and sixteen 8-10 month olds infants' selective looking skills were tested outside of the laboratory in public space in New York City. Preliminary results with 10 infants were compared to results of 10 infants tested in a laboratory situation. The results reveal no difference between infants' looking patterns in a natural outside city environment and the laboratory ($p>.05$). These results show that infants engage in selective looking even when in complex environments. These results will be discussed considering the role of natural context in developing optimal tools for parents and practitioners to assess developmental milestones in the first year.
38	Presenter: **Michalis Petrou**, *Biology* Faculty Mentor: Jayne Raper **Immunity Against African Trypanosomes: How to Create a Trypanosome-resistant Cow?**
39	Presenter: **Elena Pires**, *Biochemistry* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program) Co-Authors: John Schimenti, Vera Rinaldi, Ewelina Bolcun-Filas Faculty Mentor: Victoria Luine **Who Killed the Sperm? Exploring the Involvement of Checkpoint Genes on Male Fertility** Flawless meiosis is crucial for fertility, for maintaining genome integrity, and for securing the normal development of offspring in all sexually reproducing organisms. Genetic errors that occur during meiosis are a major cause of infertility among couples and birth defects found in offspring. A better understanding of meiosis and how it works can ultimately lead to pharmaceutical advances in fertilization methods, treatments for infertility, and prevention of birth defects. In the search for understanding the genetic mechanisms behind meiosis, researchers often use the mouse as a model organism. In this study, we utilized mutant male mice to investigate the contribution of checkpoint genes on male fertility. Checkpoint genes are responsible for monitoring DNA damage and for discarding defective sperm. Since the checkpoint genes Chk2 (checkpoint kinase 2) and p63 (protein 63) have key roles in monitoring mitotic cells with DNA damage, those genes and their potential roles in meiosis were investigated. To examine

	the involvement of checkpoint genes on fertility, infertile mice were crossed with Chk2 or p63 knockout mice. We hypothesized that the loss of Chk2 or p63 would allow for DNA-damaged meiotic cells to be rescued through the evasion of cell death induced by checkpoint pathways. Through the use of histology, we examined meiotic progression and DNA damage of germ cells within the testes via H&E and immunohistochemical staining. Our preliminary results suggest that in contrast to mitotic cell division, Chk2 and p63 are not the major players for monitoring DNA damage in male mammalian meiosis.
40	Presenter: **Elena Pires**, *Biochemistry* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program) Faculty Mentor: Mandë Holford **Exploring the Neural Origins of Shell Patterning in Marine Snails Through 3D Printing** The seashells of aquatic mollusks such as marine snails exhibit abundant diversity in regards to their colorful and intricate patterns. This patterning is controlled by neurosecretory means in the mantle of the shell, the organ that forms the shell and improves its strength and size over time. Recent published laboratory data have presented a model that describes this neural behavior and attempts to predict the outcome of these patterns. This model is mathematically derived and extremely dense. Hence, development of a 3D visual model from these equations would better enhance the understanding of this model. 3D printing is an innovative, ideal process that has the potential to advance the findings of shell structure and patterning recently reported. Through 3D printing, patterned shell replicas will be created using additive manufacturing, where a solid, dimensional object is assembled by adding material in layers. The success of this procedure will allow the neural origins of shell pattern and structure in marine snails to be tested and analyzed for accuracy of replication. Results from this project will be applicable to understanding neural development of other organs in different organisms, such as the human brain.
41	Presenter: **Yasmin Rajendran,** *Biology* Co-Authors: Yasmine Karma, Polina Mikhelzon, Jose Quinonez, Ramakrishnan Srinivasan, Mandë Holford Faculty Mentor: Mandë Holford **Examining Bioactivity of Venomous Snails Peptides Using a Polychaete Assay** The Conoidea superfamily, containing Conidae, Terebridae and Turridae, is a group of marine gastropods that produce numerous peptide toxins. The peptide toxins produced by these snails function on specific molecular targets in the nervous system to affect normal mobility. Known Conoidean peptide toxins are used to manipulate cell signaling via ion channels, noradrenaline transporters, 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 Conidae and its peptide toxins, conopeptides, have been investigated extensively, very little is known about Terebridae and its peptide toxins, teretoxins. This project examines the activity of three novel terebrid peptides obtained from Terebra argosyia (ArgT5 and Arg58) and Terebra anilis (Ta1) using a

	polychaete bioassay. Polychaetes are a natural prey for terebrid snails, providing a viable assay for determining the bioactivity of teretoxins. Twenty micromolar solutions of each peptide were injected into the ventral nerve cord of Nereis virens. The tracking software Wormlab 3.0 was used to analyze worm activity. Based on phenotypic paralysis caused upon injection, preliminary results indicate that Ta1 is the most bioactive peptide of the three analyzed. While the polychaete assay can provide phenotypic information about teretoxins Ta1, ArgT5, and Arg58, additional experiments using electrophysiology are needed to determine ion channel and receptor specificity and potency. The polychaete assay developed will be used to screen an array of teretoxins expressed in the venom of terebrid snails.
42	Presenter: **Girish Ramrattan**, *Biology/Quantitative Biology* HHMI (Howard Hughes Medical Institute), QuBi (The Quantitative Biology Project) Co-Authors: Elizabeth Wright, Ramakrishnan Srinivasan, Daniel Packer, Weigang Qiu Mandë Holford Faculty Mentor: Weigang Qiu **De Novo Transcriptome Assembly and Analysis of *Terebra anilis* to Identify Novel Neuropeptides** Terebrids, cone snails, and turrids, are part of a diverse superfamily of venomous marine snails known as the Conoidea. These organisms use a harpoon-like radular tooth to inject their venom, which is a mixture of short, disulfide-rich neuropeptides, into their prey of marine worms, fish, and other mollusks. Neuropeptides in Conoidean venoms are useful biochemical tools for investigating specific neuronal circuits, and for developing pharmaceutical drugs to treat chronic pain. The complex venom of Conoidean snails includes up to 200 peptide toxins, many of which are highly selective for specific ion channels and receptors in the nervous system. This project is focused on identifying novel terebrid neuropeptides, teretoxins, which are an understudied area of investigation. Illumina high-throughput sequencing of the venom duct of Terebra anilis was used to generate a de novo transcriptome, to identify and characterize novel teretoxins and their gene superfamilies. As there is not a solved genome for terebrid snails, assembly and annotation of T. anilis sequences required the development of a new pipeline in which several bioinformatics programs were analyzed for feasibility and robust performance. After experimentation with Trinity, TransAbys, and Velvet Oasis, it was determined that assembly of T. anilis Illumina reads using Trinity software was most effective. To identify candidate teretoxins, the Trinity assembly was subjected to a series of BLAST searches against a comprehensive dataset of conotoxins and teretoxins assembled from Conoserver and inhouse sequences. The assembled sequences were also BLASTed against NCBI and UniProt databases to acquire a broad overview of all the proteins expressed in the T. anilis transcriptome. Preliminary characterization has identified 62 novel teretoxin transcripts and several housekeeping genes related to protein folding and other physiological processes.
43	Presenter: **Katherina Soto**, *Psychology* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program) Faculty Mentor: Peter Serrano

	Methamphetamine Induced Inflammation in the Hippocampus Following Acute High Dose Methamphetamine (METH) is a drug of abuse known to be neurotoxic to dopaminergic neurons, and to cause cell death in various brain areas. The hippocampus, cortex and striatum are particularly vulnerable to METH-induced cell death. We sought to elucidate how METH affected apoptosis over time within the hippocampus. Specifically, we examined cell death in the dentate gyrus because it is an active site of neurogenesis in vivo. Using the fluorescent neurodegeneration marker Fluoro-Jade C, co-localized with the nuclear marker Hoechst 33258, we examined the different sub-regions of the dentate gyrus 8 weeks after a 30mg/kg bolus dose of METH, seeking evidence for neurodegeneration. Compared to saline treated mice (n=3), subjects treated with METH (n=3) showed significant degeneration in : 1. the outer molecular layer of the dentate gyrus, 2. the pyramidal cell layer in CA1, 3. the stratum radiatum layer in CA1, 4. the pyramidal cell layer in CA3 and 5. stratum lucidum in CA3. Given its localization within the hippocampus, the cell death observed here could be indicative of glial and/or interneuron death; both of these cell types serve important functions in the modulation of activity and maintenance of circuit junctions within the outer molecular layer. Our results demonstrate that a single dose of METH can have long-term effects on cells within the hippocampus and may give insight into the cognitive deficits associated with METH abuse. Ongoing work aims to examine METH induced inflammation and changes in synaptic plasticity markers involving COX2, IBA-1, HO-1, Ubiquitin, GluA2 and PSD-95.
44	Presenter: **Shaneka Whittick**, *Psychology* MARC (Minority Access to Research Careers Program) Faculty Mentor: James Gordon **A Comparative Electrophysiological Analysis of Visual Acuity in Males and Females** The objective of this research is to test whether there are differences in visuospatial processing between male and female brains. Previous research has shown that there are marked sex differences in other sensory functions such as the audition and olfaction. Sex hormones, specifically androgens, have been identified as a significant component in these marked differences. The visual cortex has the highest density of androgen receptors in the brain but visual cortical neurophysiology has been the least studied of the senses. In order to assess these potential differences visual evoked potentials were used. The stimuli were square-wave contrast reversed at 7Hz and presented in a sweep at 6 different spatial frequencies, 1.6, 3.2, 6.4, 12.8, 25.6 and 51.2 cycles/degree. Relevant temporal frequency responses were extracted using Fourier analysis, and the acuity was generated by computing the spatial frequency at which the signal/noise ratio became less than 1. Mean acuities were then computed for males and females as well as spatial frequency of maximum amplitude response. Males showed significantly higher acuity responses. Mean acuity for males= 42.9 cycles/degree and females= 39.0 cycles/degree ($t(49)=2.148$, $P<.05$). Also, males showed maximum amplitude response at higher spatial frequencies than females. In conclusion, there are marked sex differences in the neural responses in primary visual cortex between males and females. This suggest that behaviorally measured acuity differences may be due to androgen receptors, which likely play a significant role in visual processing.

Thursday, March 6th, 2014
Poster Session #3
10:00 am -12:00 pm

45	Presenter: **Anibelky Almanzar**, *Biology* HHMI (Howard Hughes Medical Institute) Faculty Mentor: Jayne Raper **Antimicrobial High Density Lipoprotein** Humans and some primates are resistant to most 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 is defined by the presence of apolipoprotein A-I (Apo A-I), haptoglobin related protein (Hpr), and apolipoprotein L-I (ApoL-I). ApoL-I is the pore-forming protein that kills the parasite. TLF is delivered and activated in the acidic lysosome within the parasite, causing the release of the pore forming protein, ApoL-I, and the lysis of the parasite. Besides killing parasites, we aim 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 reduces phagocytosis. As a model we study encapsulated and non-encapsulated Bacillus cereus, which is genetically similar to B. anthracis and safe to work with. We show that TLF can lyse vegetative non-encapsulated B. cereus but not its spores and are currently testing encapsulated B. cereus. We are screening for any morphological changes or disruptions in the bacterial plasma membrane by staining the cells with a lipophilic membrane dye, FM4-64, after treatment with TLF.
46	Presenter: **Wally Alrowhani**, *Biochemistry* Co-Authors: David R. Mootoo, Ahmad Altiti Faculty Mentor: David R. Mootoo **An Organocatalytic Synthesis of Fluorinated Carbohydrates** Many features of organofluorine compounds make them attractive for use as therapeutic agents and biomechanistic probes. For example, substitution of hydrogen with fluorine in a C-H bond can increase the metabolic stability of a drug molecule and increase its bioavailability. The high electronegativity of fluorine can also lead to stabilizing polar interactions when a drug interacts with its receptor, thereby altering its binding, and consequently, its activity. For the same reason the pKa of neighboring groups can also be significantly affected, leading to changes in pharmacokinetic properties. Counter-intuitively, the C-H for C-F change also increases drug hydrophobicity, which may result in enhanced binding to protein receptors. The general theme of this research is the synthesis of fluorinated derivatives of bioactive carbohydrates. Specifically, we are interested in fluorinated analogues of the developed by the Jorgensen group. Because of the instability of fluoro-aldehyde

	products, immunostimulatory glycolipid KRN7000. The starting material was a derivative of galactose in which the anomeric carbon is attached to the C2 position of acetaldehyde. This material was reacted with N-fluoro-benzensulfonimide (NFSI) as the fluorination source, using the (R) or (S) enantiomers of the enamine catalyst they were converted without purification to unsaturated ester derivatives by reaction with a stabilized Wittig reagent. The enantiomeric catalysts were selective for one or the other epimeric mono-fluoride products, which were obtained in approximately 50% overall yield from the aldehyde. These materials are being transformed to more functionalized fluorinated analogues of KRN7000.
47	Presenter: **Laura Craciun**, *Neuroscience* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Faculty Mentor: Vanya Quinones-Jenab **Viral Injections Show Septal Inputs on the Prefrontal Cortex** The thalamic reticular nucleus (TRN) plays an important role in the regulation of information transfer between the cortex and the rest of the thalamus, controlling the firing pattern in a complex negative feedback loop. Nicknamed "the attentional gate," it has been proposed that the TRN has the ability to process and attend sensory information. All cells in the TRN are GABAergic, and therefore inhibitory. Nearly all inhibitory interneurons can be classified into one of three categories: calcium-binding protein parvalbumin (PV) cells, neuropeptide hormone somatostatin (SOM) cells, and ionotropic serotonin receptor (5HT3aR) cells. The purpose of this project was to look at TRN interneuron subtypes based on these biomarkers; this would lead us to a better understanding of its poorly-understood function. Using the mouse as a model, brain slices were obtained from different angles and marked by immonofluorescence staining to show the expression of the different inhibitory interneurons in the TRN. It was found that parvalbumin was highly concentrated throughout the TRN, somatostatin expression was patchier and dorsally concentrated, and 5HT3aR was completely absent. Future studies should examine the correlation between the mappings of the TRN's interneurons and their physiological and cellular properties. This project was supported in part by the BP-Endure NIH-NINDS Grant # R25-NS080686 and by Brown University.
48	Presenter: **Trisha Emborgo**, *Biology: Behavioral Neuroscience Concentration* Faculty Mentor: Rebecca Farmer Huselid **Validity and Acceptance of Color vision Testing on Smartphones** Color vision testing (CVT) is an important part of the neuro- ophthalmic examination. The validity of CVT may be affected by the quality of the displayed image, background illuminance, image distance, and visual acuity. iPhone® and Android® smartphones provide diagnostic testing applications including CVT. There is minimal evidence to support the validity of these non-standardized smartphone applications. The purpose is to assess the validity of smartphone CVT by comparing results using the Eye Handbook (EHB) CVT application with Ishihara color plates (ICP). An IRB-approved prospective, randomized study was performed of 193 patients with near visual acuity of ≥ 20/60 at 14 inches. The study group included patients with ocular pathology. The control group included patients with no known pathology.

	CVT was performed with both ICP and EHB under a standardized background illuminance, randomized by order of testing and phone model. OD was the study eye. The testing was scored by number of correct plates out of eleven test plates for each modality. A paired-samples t-test was performed. For all subjects, 60% preferred EHB, 12% preferred ICP, and 29% had no preference. In patients with ocular pathology, there was a statistically significant difference in CVT results comparing EHB with ICP. In control patients, this difference was not statistically significant. The majority of subjects preferred EHB to ICP testing.
49	Presenter: **Laura Fonseca**, *Psychology* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program) Co-Authors: Emmanuel Garcia, Jean Quintero, Douglas Mennin Faculty Mentor: Douglas Mennin **Temporal Dynamics of Self-Referential Processing** Background: Self-referential processing (SRP) refers to how individuals reflect on their own person, and can be indexed by examining their processing of personally relevant valenced stimuli. (Northoff et al., 2006). Emotion dysregulation in individuals with anxiety and depression has been associated with increased negative SRP (nSRP) and decreased positive SRP (pSRP), indicating a tendency to perseverate on negative reflections, rather than to reflect on experiences in such a way that increases or maintains positive affect (Mennin & Fresco, 2013). However, how this processing affects temporal dynamics of emotional responding has been little explored. Methods: Healthy participants (n=25) passively viewed emotional images from the International Affective Picture System (IAPS; Lang et al., 2008) while connected to an electroencephalogram (EEG). Stimulus-locked event-related potentials (ERPs) were extracted from the raw EEG data and correlated with self-report questionnaire measures such as the Responses to Positive Affect questionnaire (Feldman et al., 2008) in order to evaluate the impact of pSRP on the time course of electrocortical responding to emotional stimuli. Results: Electrode mean activations were examined for the late positive potential (LPP, occurring 400- 1000ms post stimulus onset). A significant main effect for image type was found, with emotional images eliciting a greater mean activation than neutral images. Significant interactions were found between the emotional image type and high verses low levels of pSRP. The interactions were primarily driven by group difference on neutral versus mutilation images. Conclusion: Preliminary results suggest that the LPP may reflect the impact of SRP on electrocortical response to emotion.
50	Presenter: **Stephen K. Formel**, *Biology* HHMI (Howard Hughes Medical Institute) Co-Authors: Scott Brady, Gerardo Morfini, Yuyu Song Faculty Mentor: Diana Bratu

	Searching for the Missing Link in the Pathogenic Pathway of Mutant SOD1 in ALS Mutations in Superoxide Dismutase (SOD1) cause about 2% of cases of Amyotrophic Lateral Sclerosis (ALS). Like many other neurodegenerative diseases, ALS has a "dying back" neuropathy, indicating an impairment of axonal transport. A well-studied example is the misfolded SOD1 protein, G85R, which abnormally activates a Mitogen Activated Protein Kinase (MAPK) cascade ending in kinesin protein motor phosphorylation via p38 MAPK. Vesicle motility assays in squid giant axons, allowed us to explore this pathway further, attempting to find the putative link between SOD1 and the MAPK cascade. Using competitive inhibitors, we found evidence to suggest the pathway includes the kinases ASK1 and MKK3/MKK6 upstream of p38. Accordingly, we began to explore the link between SOD1 mutants and ASK1 by examining the effects of known upstream ASK1 regulators on axonal transport. Finding this missing link will aid in understanding the pathogenesis of ALS and shed light on potential therapeutic targets.
51	Presenter: **Ashley Friedman**, *Anthropology* Undergraduate Research Fellow Faculty Mentor: Christopher Gilbert **3D Morphometric Analysis of the Sivapithecus distal humerus: A Reanalysis of Locomotor Behavior** It has long been noted that the postcranial remains of Sivapithecus, an extinct ape from the Miocene of India and Pakistan, present a perplexing mosaic of locomotor behaviors. Although a close phylogenetic relationship between Sivapithecus and modern orangutans is generally accepted based on similarities in craniofacial morphology, the postcranial morphology of Sivapithecus does not present as clear of an association with orangutan-like suspensory locomotion. Past studies have presented Sivapithecus postcranial features as being most similar to African apes: with a mixture of morphological similarities to both arboreal quadrupeds and terrestrial knuckle-walkers. To reexamine this combination of postcranial features, I present a 3D morphometric analysis of the Sivapithecus distal humerus. Because humeral morphology is closely tied to locomotor behavior, it is important to understand how differences in skeletal features associated with the mechanical demands of various locomotor behaviors can be interpreted on a three-dimensional, multivariate scale. The distal humerus of Sivapithecus and 35 specimens of the living great apes were digitized using a set of 22 landmarks and subsequently subjected to generalized procrustes analysis followed by a principal components analysis (PCA). Results suggest Sivapithecus exhibited a unique combination of features such as a proximally extended supinator crest and a distally oriented articular surface. In our PCA, the Sivapithecus specimen continuously plotted outside the normal range of variation of extant great ape specimens and although a discriminant functional analysis classified Sivapithecus as most similar to knuckle-walking chimpanzees, the overall evidence suggest that Sivapithecus moved unlike any modern ape.

52	Presenter: **Jennifer Garraway**, *Psychology and Sociology* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Faculty Mentor: James Gordon **Mechanisms of PTSD and TBI Studied with Visual Evoked Potentials** 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. This stimulus allowed 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. Specifically, we are studying whether these frequency bands increase or decrease in individuals who have been clinically diagnosed with PTSD or TBI. We recruited n =11 age matched 20 ‰ÛÒ 50 year old male participants and controls. Participants were administered a set of visual stimuli, that were repeated ten times. Our data indicated there was no significant effect of bands, F (5,4) = 2.566, p =.191, no significant effect of interaction, F (10,10) = 1.736, p =.199 and a significant effect of conditions, F (2,8) =.071, p =.932. A comparison between the three conditions; PTSD, TBI and control suggested a trend in Band 2 in which the coherence for both pathological conditions was less than that for controls.
53	Presenter: **Eddie Grinman,** *Biology* Thomas Hunter Honors Program Co-Authors: Lisa Liu, Ariela Hazan, Jesus A. Angulo Faculty Mentor: Jesus A. Angulo **Exploring the Effects of Neurotensin on Meth Induced Striatal Apoptosis and Hypothermia** Methamphetamine (METH) is a psychostimulant prevalent in parts of the United States, Europe, and Southeast Asia. In addition to its devastating effects on communities and public policy, prolonged METH use exerts a toxic biochemical effect, including, but not limited to, hyperthermia, inflammation in synaptic terminals, and neuronal apoptosis. Neurotensin, an endogenous neuropeptide, has emerged as a potential modulator of these toxic effects. Focusing on the striatum, we have shown an increase in neurotensin transcription 6 hours post METH injection in mice, compared to saline treated mice, suggesting a programmed cellular response to METH. Utilizing a neurotensin receptor (NTSR1) agonist, known as PD149163, we have shown that mice pretreated with IP injected PD display a reduced hyperthermic response to METH as well as reduced neuronal apoptosis in the striatum, as compared to mice pretreated with saline. To isolate the effects of

	PD to the striatum, we injected both the compound and aCSF, respectively, into the right and left hemispheres intracranially. There was no decreased hyperthermic response to METH as compared to saline. Preliminary results suggest no significant difference in apoptosis between the hemisphere injected with PD and aCSF in METH-treated mice. These results are consistent with the hypothesis that neurotensin dampens dopaminergic responses in the striatum and, therefore, is neuroprotective.
54	Presenter: **Themasap Ahmand Khan**, *Neuroscience* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Authors: Nick Harris, Alfred L. George, Christine Simmons Faculty Mentor: Vanya Quinones-Jenab **Discovering a Therapeutic Drug for Alternating Hemiplegia of Childhood** Alternating Hemiplegia of Childhood is a rare, yet especially devastating pediatric neurological disorder characterized by dystonic attacks, dyspnea, nystagmus, and other developmental cognitive impairments all presenting before 18 months of age. The disorder is characterized by recurrent hemiplegic episodes, or paralysis of one side of the body, among other deficits such as Parkinsonism like movements and cognitive development delay. AHC has been theorized to be a de novo missense mutation in the ATP1A3 gene which codes for the α3 subunit of the Na,K-ATPase, a neuron-specific isoform. We developed and optimized a thallium flux protocol, previously utilized in the study of potassium channels and transporters, for a high throughput drug screen on HEK cells overexpressing the α3 isoform of the Na,K-ATPase. The goal of this assay development is the eventual performance of a high throughput screen on a candidate library of potential pharmaceuticals. Two mutations (D801N, E815K), which accounted for 67% of all cases, were integrated into HEK cells to make stable cell lines and were then tested using Ouabain, a cardiac glycoside, drug resistance and sensitivity. Previous research has shown α3-specific concentrations of Ouabain disrupt neuronal firing concluding the importance of α3 function in the central nervous system. Therefore, discovery of a drug that can act either as an activator or an inducer of successful transportation of the protein to the cell membrane could potentially act as a therapeutic agent in this neurological disease. This project was funded by BP-ENDURE grant # R25-NS080686 and The Alternating Hemiplegia of Childhood Foundation.
55	Presenters: **Lyle Kingsbury & Saraf Mehjabeen**, *Biology* Thomas Hunter Honors Program Faculty Mentor: Carmen Melendez -Vasquez **Increased Extracellular Matrix Stiffness Inhibits Differentiation in Oligodendrocytes and Induces Differentiation in Schwann Cells** Myelinating glia play an important role in the nervous system by ensheathing axons with myelin segments that increase the speed by which action potentials can propagate via by promoting saltatory conduction. Impairment caused by demyelinating diseases such as Multiple Sclerosis demonstrates that successful myelination of nerve axons by Schwann cells (SC) in the PNS and oligodendrocytes

	(OL) in the CNS is essential for proper function. Previous studies from our laboratory have shown that morphological changes in SC and OL that are necessary for myelin sheath formation are, in part, directed by a non-muscle myosin II (NMII)-dependent response to extracellular matrix (ECM) stiffness, which is more rigid in the PNS than in the CNS. While both SC and oligodendrocyte precursor cells (OPC) grown on low-stiffness substrates exhibit increased branching and elongation compared to cells grown on high-stiffness substrates, inhibition of NMII significantly diminishes the effect of substrate stiffness on morphological changes in both cell types. Here, we report decreased expression of the pro-myelinating transcription factor Krox20 in SC grown on low-stiffness substrate. We also demonstrate increased cytoplasmic translocation of the transcription factor Olig1 -- an event that correlates strongly with OL maturation -- in OPC grown on low-stiffness substrate. These results indicate that in addition to influencing NMII-dependent morphological changes in SC and OPC, mechanical queues from the ECM can also affect cell fate decisions in myelinating glia by changing the expression of key transcription factors in each cell type.
56	Presenter: **Kornelia Malaczek**, *Biology* Undergraduate Research Fellow Faculty Mentor: Diana P. Bratu **Determine the Role of Drongo in Yolk Protein Endocytosis in *Drosophlia melanogaster*** The HIV-1 virus is known to be utilizing proteins, such as AGFG1, for replication. One way to circumvent viral adaptation to drugs inhibiting viral proteins is to develop drugs that target cellular proteins required for viral replication, but not essential for cell viability. Recently, it was reported that AGFG1, essential for efficient viral replication, is involved in clathrin-mediated endocytosis. Drosophila melanogaster egg chamber is an ideal model system to study clathrin-mediated yolk endocytosis. Here we show that endogenous Drongo (the D. melanogaster homolog of AGFG1) and Drongo-EGFP co-localize with Rab5 at the oocyte cortex, and discrete Drongo-EGFP particles are associated with yolk spheres in oocytes of stage 10 egg chambers. This suggests the Drongo may participate in yolk endocytosis. To detect whether Drongo overexpression and/or down-regulation affect yolk protein endocytosis, confocal microscopy and endocytosis assays were conducted. FM4-64 and Trypan Blue uptake, as well as yolk sphere streaming in egg chambers isolated from D. melanogaster, were used to determine if drongo manipulation alters endocytosis in live egg chambers.
57	Presenter: **Wenona Lok,** *Biochemistry* Co-Authors: Sihui Man, Prakash Subramanyam, Henry Colecraft Faculty Mentor: Karen Phillips **Determinants of Surface Trafficking of a1c in HEK Cells** Calcium ion channels regulate the heart and brain by allowing calcium ions to pass through the cell, causing muscle contractions and synaptic transmissions. Dysfunctional channels can lead to cardiovascular and neurological diseases. Since

	RGK proteins inhibit channels by blocking currents in several ways, understanding how they work can help discover therapy for diseases. The purpose of this study was to examine the effect of RGK proteins, especially Rem and Rem2, on the surface expression of the a1c subunit. HEK cells have been transfected with BBS-tagged a1c and b2a along with either a RGK protein or a chimeric construct. A chimeric construct containing Rem's N-terminus and C-terminus with Rem2's core and a chimeric construct containing Rem2's N-terminus and C-terminus with Rem's core have been created using PCR. To measure the amount of transmembrane channels, Q-Dot labeling was used to attach fluorescent quantum dots to BBS-tagged a1c and fluorescence signals were measured using flow cytometry. All RGK proteins, except Rem2, decrease the surface expression of a1c. Both chimeric constructs increased it. The one containing Rem2's core increased it more than the one containing Rem2's termini. However, neither increased it as much as the pure Rem2 protein, indicating that Rem and Rem2 have very different effects on the surface expression of a1c. Since both of the chimeric constructs increased the surface expression of a1c, the entire Rem2 protein is responsible for the increase. However, since the construct with Rem2's core increased it more, Rem2's core plays a bigger role than Rem2's termini.
58	Presenter: **Jennifer Nam**, *Biology* RAISE-W (Resource Assisted Initiatives in Science Empowerment for Women) Co-Authors: Tomasz Rusielewicz, Evangelos Damanakis, Gareth R. John, Cedric S. Raine, Carmen Melendez-Vasquez Faculty Mentor: Carmen Melendez-Vasquez **Conditional Knockout of NMIIB Affects Myelin Development in Neonatal Mice** Myelination is the formation of a myelin sheath around a neuronal axon, increasing the rate at which impulses move along the axon. It is critical for nervous system function, and performed by glial cells called oligodendrocytes in the central nervous system. However, it is not clear how they are able to myelinate nerve fibers. NMIIB is a motor protein involved in cytoskeletal motility of cells, and the focus of our lab is to characterize mechanisms of myelination by studying this protein in a neurodegenerative mouse model. This may help us understand and treat diseases like multiple sclerosis, where the immune system attacks and degrades myelin sheaths. My project studies the consequences of NMIIB knockout on myelin development in neonatal mice. Our lab previously found that inhibiting NMIIB expression increases differentiation of oligodendrocytes in vitro, and in vivo findings of greater remyelination in mice with NMIIB knocked out by cre-loxP recombination. Since this promotes differentiation, my project focused on whether myelination could be enhanced by knocking out NMIIB expression in younger mice. After inducing conditional NMII ablation in neonatal mice and comparing them to wild-type mice, we initially found greater myelination in the knockout cerebellum along with higher numbers of mature oligodendrocytes. Additional studies revealed a myelination gradient decreasing from the anterior cerebellar lobes to the posterior lobes, opposite a pattern of recombination which appeared to decrease from the posterior lobes towards the anterior lobes. From this ongoing project, we are understanding how losing NMIIB expression affects myelination in developing mice.
59	Presenter: **Martha Ordonez**, *Psychology* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for

	Scientific Enhancement program) Faculty Mentor: Peter Moller **Electric Memories: Is Electric Organ Discharge (EOD) Necessary for Memory Acquisition and Consolidation?** Previous studies have shown that weakly electric fish can find a goal in a complex maze. While learning the trajectory they generate a unique electric organ discharge pattern, EOD scalloping. The structural and functional homology between the mammalian hippocampus and the dorsal lateral gray mantle of teleost fish telencephalon in these fish has encouraged an investigation of PKMë¦ in Gnathonemus petersii, a weakly electric fish. PKMë¦ has a catalytic subunit making it constituently active and also necessary for long-term memory. G. petersii were trained for 3 days with 6 trials/day and retested on day 4. Their telencephalon was removed, the dorsal lateral (DL) and dorsal medial pallium (DM) were excised and prepared for Western blot analysis. The results revealed and remarkable correlation between successful maze learning and the expression of PKMë¦ and GluA2. We conclude that the increased expression of these two molecular markers in the synaptic region is important for memory consolidation in G. petersii. Future work will design experiments to further strengthen the role of EOD scalloping in spatial learning and associated changes in PSD-95 and GluA2 markers.
60	Presenter: **Yevgeniy Ostrovskiy**, *Physics and Astronomy* Macaulay Honors College Co-Authors: Kartik Pilar, Armando Rua, Sophia Suarez, Jasmine Hatcher, James F. Wishart, Steve Greenbaum Faculty Mentor: Steve Greenbaum **Nuclear Magnetic Resonance Studies of Transport Properties in Ionic Liquids** Ionic liquids (ILs) have unique physical properties (negligible vapor pressure, thermal and electrochemical stability, and high ionic conductivity) that make them a perfect fit for applications in radioactive material handling, batteries, capacitors, and electrochemical solar cells. There are in excess of 1016 possible ionic liquids but most of their physical properties arise from the structure and length of their cation sidechains and the anion. Changing these allows the optimization of IL's for different applications. For this research we investigated a series of IL's that consist of EMIM and BMIM cations and the TFSI anion with partially deuterated cation sidechains, using Nuclear Magnetic Resonance (NMR). The self-diffusion coefficient (D) and spin-lattice relaxation time (T1) were measured as functions of pressure and temperature to determine activation parameters of the alkyl chains. Cation was measured with 1H NMR and anion diffusion was measured with 19F NMR. For partially deuterated alkyl chains, 2H NMR T1 measurements were performed. The goal of this investigation is to better understand transport properties of ILs, in particular the effect of alkyl chain length on molecular reorientation and cation translational diffusion.
61	Presenter: **Karina Perlaza**, *Biology* MARC (Minority Access to Research Careers Program) Co-Authors: Marlon Jansen, Thomas Schmidt-Glenewinkel

	Faculty Mentor: Thomas Schmidt-Glenewinkel **The Effects of Energy Metabolism Perturbation's on Protein Degradation in *Drosophila melanogaster*** A prominent characteristic of many neurodegenerative diseases is formation of protein aggregates. The presence of ubiquitinated proteins in 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 may therefore 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 peroxisome proliferator- activated receptor- γ coactivator 1 α (pGC 1 α). PGC 1 α is known to activate the expression of the subunits of the the electron transport chain and mitochondrial transcription factor (mt TFA), a key activator of mitochondrial transcription and participant in mitochondrial DNA replication. We hypothesize that reduced expression of pGC 1 α will decrease the efficiency of transcription in the mitochondria and may disrupt the function of the respiratory complexes, thereby decreasing ATP synthesis and increasing free radical (ROS) production. As hypothesized, ATP levels decreased in a dose dependent manner compared to control flies and we will now proceed to measure proteasome activity and protein aggregates.
62	Presenter: **Mirjana Persaud**, *Biochemistry* MARC (Minority Access to Research Careers Program) Co-Authors: Claudio Scuoppo, Riccardo Dalla-Favera Faculty Mentor: Claudio Scuoppo **Exploring the Therapeutic Potential of Nf-κB Suppression in Diffuse Large B-Cell Lymphoma** Diffuse Large B Cell Lymphoma (DLBCL), the most common B-cell lymphoma, is a heterogeneous disease that can be classified into two subtypes: the Germinal Centre B-cell like (GCB) and Activated B-Cell like (ABC) subtype, which are distinct for genetic mutations and cellular origin. The ABC subtype is associated with an inferior prognosis and is characterized by the deregulation of the Nuclear factor kappa-B (Nf-κB) pathway. The Nf-κB family includes several transcription factors that regulate tumor progression, inflammation, cell survival and apoptosis. Here we explored the therapeutic potential of Nf- κB suppression by taking advantage of TPCA-1, a recently developed inhibitor of I-κB kinases. First, we tested the ability of TPCA-1 to suppress IKB kinases. Next, we tested the response of a panel of DLBCL lines to TPCA-1 and assessed whether ABC-GCB subtypes or specific DLBCL genetic alteration predicts sensitivity or resistance to TPCA-1. Finally we performed systematic Gene Set Enrichment Analysis (GSEA) between TPCA-1 sensitive and resistant lines to identify molecular pathways associated to TPCA-1 sensitivity. Our results indicate that while ABC lines are predicted to be more sensitive to TPCA-1 than GCB lines, TPCA-1 was also able to suppress the growth of some GCB lines, which do not harbor known Nf-

	κB alterations. In addition, CREBBP mutations, a frequent event in DLBCL pathogenesis, correlate with resistance to TPCA-1, and several transcriptional signatures are enriched in TPCA-1 sensitive lines. Taken together, our results highlight the potential of TPCA-1 in DLBCL treatment and provide a framework in identifying the subset of patients that would benefit from TPCA-1 treatment.
63	Presenter: **Saneisha Roberts**, *Anthropology* Undergraduate Research Fellow Faculty Mentor: Jessica Rothman **Antioxidants in the Diets of African Monkeys and Gorillas** Antioxidants serve important health functions by decreasing the amount of free radicals formed in the body. These free radicals may cause cell damage, and are linked to cancer, heart disease, and memory loss in humans. Much is known about the role of antioxidants in diets of humans, but we know little about the distribution of antioxidants in wild primate diets. We screened forty foods frequently eaten by colobus monkeys (Colobus guereza and Procolobus rufomitritis) and twenty-seven foods frequently eaten by mountain gorillas (Gorilla beringei) in Uganda for the presence of antioxidants in the Primate Nutritional Ecology Lab, Hunter College. We used a 2,2-Diphenyl-1-picrylhydrazyl assay (DPPH) bioassay whereby antioxidant levels in plant foods were determined in comparison to a known powerful antioxidant, Rutin. In this assay, DPPH free oxygen radicals were reduced through electron donation from the antioxidants within the solution, if the plant sample had an antioxidant. We found that 22% of the tested plants contain antioxidants that are likely to be beneficial for colobus monkey health, and 4% of the tested plants were positive for antioxidants in mountain gorilla diets. Primates may unintentionally consume antioxidant foods prophylactically, which may help protect them from hazardous health problems such as cancer.
64	Presenter: **Haley Rosenberg**, *Art History* Yalow Scholar Co-Authors: Smita C. Banerjee Faculty Mentor: Karen Phillips **Framing Smokeless Tobacco Control Messages for South Asian Immigrants** Tambaku paan (P) and gutka (G) are smokeless tobacco products from South Asia (SA) that are unique to the culture. The World Health Organization states that smokeless tobacco is "carcinogenic to humans." P and G contain areca nut (a carcinogen) and tobacco, substances linked to high oral cancer rates in SAs. Worldwide, 228,000 of 390,000 oral cancers diagnosed occur in SAs. For SAs in the US, the oral cancer rate is 5-6 times that of the general population. Despite these risks, SAs still use P and G. Dr. Banerjee and colleagues sought to answer the following question: what factors motivate SAs to begin, continue, and cease using P and G? Six focus groups were conducted in 3 languages: Bengali, Gujarati, and Urdu. Participants were immigrants recruited by the SA Council for Social Services (SACSS). Focus groups revealed factors motivating initiation, continuation, and cessation of smokeless tobacco use, such as (1) Initiation: peer pressure/motivation, perceived

	physical or psychological benefit, and sensory satisfaction; (2) Continuation: addiction/habit, misunderstanding risks, and doctors' failure to warn against use; and (3) Cessation: users' fear of harming children. Using prospect theory, we utilized the results to design evidence-based messages for posters aimed at SAs in NYC. SAs would benefit from screenings for P and G use, and need interventions to discourage use. Our findings have implications for framing evidence-based smokeless tobacco control messages that may lower SAs' oral cancer risk.
65	Presenter: **Paulina Toro**, *Statistics* Faculty Mentor: Marnia Lazreg **Legitimate Super-Power and Authority: A Weberian Analysis of America's Attraction to Vigilantes and Superheroes** This paper explores the role played by the American superhero myth in the American public's imagination of power in a democratic society. If Americans boast of a government whose authority legally derives from the people, why are they so enamored with these fictional individuals who take justice out of the hands of the government and into their own? To answer this question, I examine Max Weber's theory of legitimate authority, power, and the role of the state. I argue that America's superhero myth represents a desire for charismatic authority in a primarily legal-rational authority system; a mistrust of the state's monopoly of force; and a reaction against the effects of the further rationalization of society. The superhero fantasy becomes a medium through which the public can participate in a discourse about forms of domination that have been legitimized on their own terms.
66	Presenter: **Vlad Velicu**, *Biochemistry* Macaulay Honors College Faculty Mentor: James McNamara **The Glycemia Reduction Approaches in Diabetes: A Comparative Effectiveness Study (GRADE)** The epidemic of type 2 diabetes that has affected the US and other populations in the last half of the 20th and first part of the 21st centuries threatens to become the major public health problem of this century, affecting up to 1 in 3 Americans if current trends continue. The most recent estimates in the US include a prevalence of more than 24.5 million persons with type 2 diabetes, with an incidence of 1.9 million new cases per year. One of the major challenges for practitioners is to choose, from the glucose-lowering medications at their disposal, the best means for achieving and then maintaining an appropriate level of glycemic control over time. The study will address this issue in a randomized clinical trial in patients with recent-onset (<5 years duration) type 2 diabetes that will compare the metabolic effects of four common anti-diabetic drugs when combined with metformin. The four randomly assigned medications are the sulfonylurea glimepiride, the DPP-4 inhibitor sitagliptin, the GLP-1 agonist liraglutide, and the basal insulin glargine. A total of 5000 patients who are being treated with metformin at the time of recruitment will be enrolled. The proposed study compares these drug combinations over a clinically meaningful duration, with a possible mean follow-up of 4.8 years, allowing for a lag in recruitment and losses to

	follow-up. Given the importance of achieving and maintaining adequate glycemic control over time, it is critical to understand the relative effectiveness of the different medications and their combinations.
67	Presenter: **Crismeldy Veloz**, *Psychology* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Faculty Mentor: James Gordon **Sex Differences in Cortical Lateral Interactions Assessed Using Visual Evoked Potentials** 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 looked 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 tested this hypothesis using the visual evoked potential (VEP) with visual patterns that enable the examination of long and short lateral range inhibitory processes. We observed 45 participants, 30 males and 15 females, within the ages of 18-40. The stimuli consisted of windmill dartboard or partial windmill patterns presented at 4.29 Hz, 10 times each for 2-second periods. The electrical activity of the brain was recorded and signal averaged to yield VEPs. A Fourier analysis was done for each response, and the significance measured with amplitude (microvolts). Previous research 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 supported the previous studies. However, we found no significant difference between males and females in long and short-range lateral interactions.
68	Presenter: **Tamar K. Winer**, *Psychology* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Faculty Mentor: Glenn E. Schafe **The Effects of Dietary Curcumin on Stress-Related Modulation of a Fear Memory** ☐The development of post-traumatic stress disorder (PTSD) has been associated with chronic stress exposure, yet little is known about the long-term consequences of stress on amygdala dependent memory formation. Our lab has recently shown that a history of chronic exposure to the stress-associated adrenal steroid corticosterone (CORT) persistently enhances the expression of memory-related immediate early genes (IEGs) in the lateral nucleus of the amygdala (LA) and enhances the consolidation of a Pavlovian fear memory. Given that the CORT-related changes in IEG expression in the LA are long-lasting, we have hypothesized that one mechanism by which chronic CORT exposure regulates fear memories is by promoting alterations in epigenetic processes on memory related IEGs in the LA. The aim of the present

	experiment is twofold. First, we aim to replicate the molecular and behavioral effects observed in the chronic CORT model using a chronic unpredictable stress (CUS) paradigm. Second, we aim to explore whether dietary exposure to curcumin, a naturally occurring histone acetyltransferase (HAT) inhibitor, can prevent these effects. Investigation into the molecular mechanisms by which stress modulates fear memory formation has potential consequences for the treatment of PTSD as a disorder in which unusually strong fear memories are a prominent symptom.

Thursday, March 6th, 2014
Poster Presentation Session #4
1:30pm-3:30pm

69	Presenter: **Danyal Alam**, *Psychology* BP-ENDURE (The Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Education) Co-Authors: William Vanderheyden, Gina R. Poe Faculty Mentor: Vanya Quinones-Jenab **The Effects of Single Prolonged Stress on Reversal Learning** Post-traumatic stress disorder (PTSD) is a trauma and stress related disorder partially characterized by a lessened ability to sleep and by learning and memory deficits. The locus coeruleus (LC) and hypothalamic- pituitary-adrenal axis are hyper responsive in PTSD patients. Hippocampus volume in PTSD patients is significantly reduced, which may lead to differences in spatial learning. The goal of this study is to determine the relationship between neural activation in the LC, amygdala, paraventricular nucleus (PVN) and PTSD induced learning and memory deficits. To this end we are using the SPS rat model--which mimics PTSD symptoms in rats. We assessed neural activation in these areas through activation of FOS protein, an early intermediary gene. Reversal learning deficits were determined by measuring errors made on an 8 box maze. Preliminary analysis shows lowered activation in SPS rats than in non-stressed rats. The average errors made per lap on days 3 and 4 of the reversal learning. There was lowered FOS activation in the LC and amygdala. Future research will focus on measuring the firing rates of the LC using microelectrodes as well as exploring the relationship between the circuit and behavior.
70	Presenter: **Sara Camnasio**, *Physics and Astronomy* Macaulay Honors College Co-Authors: Emily Rice, Munazza Alam Faculty Mentor: Kelle Cruz **Understanding Red Brown Dwarfs** 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. Some of these substellar objects are labeled “red” or “blue”, although this color is not physical; the former refers to an object whose spectrum peaks at longer wavelengths while the latter to an object peaking at shorter wavelengths. My current project with the BDNYC (Brown Dwarfs New York City) research group involves the study of extremely "red"

	brown dwarfs, whose colors are not yet explained by spectral features related to physical properties of the object, such as low surface gravity caused by a young age. Previous studies that correlated spectral features of "red" dwarfs to young age cannot explain the characteristics of objects that lack these features. We are interested in analyzing these inexplicably red objects in hopes of understanding their characteristics and their differences with their red but young counterparts. I have compiled a sample of "red" objects that do not present the aforementioned spectral features; we are now studying them in attempt to explain extreme colors by comparing their spectroscopic data we have with objects of the same type but that are either explicably red or have standard colors (non-red). The study of these objects would provide brand new insights on the nature of these peculiar objects, as well as further correlations between spectral features, color and age, the latter being one of the most problematic aspect of studying brown dwarfs. Furthermore, the results of this study could contribute to the understanding of very similar objects such as exoplanets, which are currently the main focus in the hunt for alien life.
71	Presenter: **Jennifer Demel**, *English* Undergraduate Research Fellow Faculty Mentor: Kate Parry **Games in Morphology for Vocabulary Growth** Vocabulary growth for ESL, ENL, and EFL students has been a major concern for both institutions and the students. Successful ways of developing vocabulary are limited, but one of the more recent proven methods is the study of morphology (Soifer, 2005). The English lexicon is in constant flux and development; two of the key elements facilitating this change being derivational morphology and social interaction. Combining these two elements, we have begun developing marketable, educational games for vocabulary development that can be used both in and out of the classroom. By playing the games students gain valuable hands-on experience, which, being pleasurable, helps them to retain the information and the principles that underlie it. The games are based on cards that provide easy to understand morphological information and are versatile enough to be used at most levels of English competence. They were tested in focus groups, enabling the researcher to identify superfluous and successful information on the cards and to determine player preferences in game styles and reward systems. Focus group participants found the games relatively easy because they could recognize the rules, which are similar to those of such popular games as Wheel of Fortune and Scategories. This hands-on poster will exhibit one set of tools (affix cards) being used in different game versions which are each geared toward different levels of English speaking ability.
72	Presenter: **Olga Gulyayeva**, *Psychology* Thomas Hunter Honors Program Faculty Mentor: Tracy Dennis **The Late Positive Potential as a Predictor of Spontaneously Generated Emotion**

	Regulation Behaviors Emotion regulation (ER), the ability to reduce intensity of emotional reactions, is a crucial developmental capacity in childhood. Problems in ER have been linked to disorders such as anxiety and depression. Thus, research identifying sensitive measures of ER in children may aid in development of early detection and prevention of affective psychopathology. One measure of ER is the use of scalp-recorded event-related potentials (ERPs), derived from electroencephalography. One ERP, the late positive potential (LPP), has been used in both children and adults to measure ER in the absence of explicit behavioral responses: LPP amplitudes decrease when ER strategies, such as cognitive reappraisal, are used, suggesting reduced emotional responding. Few studies, however, have tested whether the LPP can be used to predict spontaneously-generated ER behaviors during emotional challenges, which would provide converging evidence that the LPP is a clinically-relevant marker for ER capacity. The present study addressed this question in 60 five- to seven- year- old children who participated in two identical lab visits spaced two years apart (T1, T2). During T1, EEG was recorded during a computerized reappraisal task; children viewed negative images paired with either reappraisal or negative stories. LPP reductions to reappraisal versus negative stories indicated reappraisal effects. During T2, participants completed two frustrating tasks during which ER behaviors were observed. Effective ER was indexed by the degree to which a participant evidenced more persistence than frustration behaviors. We predicted that if reappraisal reduces LPP amplitudes (indicating more effective ER) then ER will be more effective at T2.
73	Presenter: **Hira Gulzar**, *Medical Laboratory Sciences* Faculty Mentor: Shahana Mahajan **Inhibition of Glutamate-Dependent Growth in Osteosarcomas with Riluzole** Osteosarcoma is the most common bone cancer in children and people over age 60. It occurs in large bones particularly in areas with fastest growth rate. Glutamate modulates invasive growth in many cancers. We hypotheized that glutamate stimulates proliferation in osteosarcomas. Using a model of LM7 cell line, we have demonstrated that treatment of LM7 cells by riluzole inhibits cell proliferation. The inhibition of proliferation of LM7 cells with riluzole was demonstrated in 0.5% as well as 10% serum environment as indicated by DAPI and Ki-67 immunostaining. Riluzole also induced apoptosis in LM7 cells as analyzed by TUNNEL assay. Migration characteristics are determined by sratch assasy to determine the metastic ability of LM7 cells in the presence of riluzole. Lastly, we will investigate the mechanism by which riluzole inhibits proliferation in LM7 cells. Phospholyration status of EGFR, PLC gamma, Akt at serine 475 & serine 308 will be analyzed to determine which of these pathways is targeted by riluzole in inhibiting glutamate-dependent growth in LM7 cells.
74	Presenter: **Daniel Hart**, *Biochemistry* Macaulay Honors College Co-Authors: Xinxu Shi, Junior Gonzales Faculty Mentor: Charles M. Drain **Design and Synthesis of Water Soluble Chlorins with Active Linker to Biological Targets**

	The chlorin macrocycle is an ideal core platform for the development of multifunctional molecular agents as fluorescent trackers and imaging agents in the life sciences because both the dye and targeting motifs can be designed to be stable under physiological conditions; the dyes do not readily bleach, and the photophysical properties are tuned to the optimal photo diagnostic window (650-850 nm). Pyrrolidine functionalized chlorin has an active secondary amine group, allowing a bio-targeting motif to be appended to the macrocycle. However this molecule is not normally water-soluble, causing issues in biological application. Therefore, the goals of this project were to: (1) Synthesize pyrrolidine functionalized chlorin; (2) Make the aforementioned molecule water-soluble (3) Add a linker to chlorin and (4) activate the linker with a bio-targeting motif for testing in bio-applications. Results show that by utilizing the appropriate conditions, pyrrolidine-activated chlorin can be effectively synthesized. In addition, by introducing a thiol substitution to chlorin using a protected thio-glucose, the macrocycle becomes water-soluble and can be used as an agent in photodynamic therapy (PDT). Furthermore, bio-targeting motifs can successfully be appended to the macrocycle allowing it to localize in specific cells.
75	Presenter: **Ashley Haynes,** *Biochemistry* Co-Author: Jaya Satagopan Faculty Mentor: Karen Phillips **Fundamental Contributions of Statistics to Cancer Screening & Intervention** Both genetic and environmental factors contribute to cancer. Variation in genetic factors may cause people to respond differently to environmental exposures. A gene-environment interaction informs whether the simultaneous occurrence of genetic and environmental factors substantially increases cancer risk more than the presence of each factor alone. Therefore, a pivotal question is: Can detection of a significant gene-environment interaction impact on lifestyle or cancer screening recommendations? Here, we conducted a statistical analysis on published data from the Gene-Environment Melanoma Case Control Study. We tested for additive and multiplicative interaction between pigment score and ultraviolet light exposure (UV) for Multiple Primary Melanoma (MPM) on the head, neck, trunk and limbs. In this study, “pigment score” was calculated based on ability to tan, propensity to burn, childhood freckling, skin, eye, and hair color. Our results showed significant additive interaction between early and annual lifetime ambient UV with pigment score for MPM on the head and neck. Our findings may have substantial public health implications, potentially impacting on personalized lifestyle recommendations (e.g., reducing UV exposure among those with high pigment scores) and skin cancer screening protocols.
76	Presenter: **Kelly Huang**, *Biochemistry* Co-Authors: Emily Lin, Prachi Anand, Mandë Holford Faculty Mentor: Mandë Holford **Investigating Anticancer Activity of Two Novel Marine Snail Peptide** Compared with traditional cancer treatments, such as chemotherapy or radioactive treatment, peptidic compounds with high specificity for cancer cells provide a route of killing cancer cells while protecting normal cells. A major resource for providing natural

	peptides that may target cancer cells are venomous marine snails, such as terebrid snails. Research in the Holford laboratory is focused on the discovery, characterization and biological activity of novel terebrid snail peptides. Terebrid snails belong to superfamily Conoideae and are known to produce venom which consists of 50-200 peptide toxins in with each species. In the proposed project, two chemically synthesized terebrid peptides were analyzed for anticancer activity. Three different cancerous cell lines (HeLa, HCT and SkNSh) were maintained and anticancer activity was tested using MTT colorimetric assay and Trypan blue cell viability assay at different time points using different concentrations of peptide toxins.
77	Presenter: **Pawel Kuczaj**, *Biochemistry* Co-Authors: Frida Kleiman, Jorge Baquero Faculty Mentor: Frida Kleiman **Pin1 Regulates mRNA 3' End Processing During DNA Damage Response** Regulation of mRNA 3' end processing, as part of the cellular DNA damage response (DDR), is linked to cancer. Now, it is important to gain a better understanding of the factors involved in this process to develop new therapies and to find new connections to other diseases. Poly(A)-specific ribonuclease (PARN) is the major nuclear deadenylase that regulates the length of mRNAs 3' end poly(A) tail and, consequently, mRNA stability and gene expression. PARN was previously shown to be functionally connected to the tumor suppressor p53. While PARN keeps p53 levels low by destabilizing p53 mRNA in non-stress conditions; the increase in p53 levels after UV treatment results in PARN deadenylase activation in a transcription-independent manner. Together these results show a feedback loop between PARN deadenylase and its target p53. To identify other factors involved in this response we extended our studies to Pin1, a prolyl isomerase that catalyzes the cis/trans isomerization of peptidyl-prolyl peptide bonds in phosphoproteins. Pin1 is involved in cell cycle regulation and has been proposed as a potential factor that regulates mRNA 3' end processing. Interestingly, Pin1 controls phosphorylated p53 cellular functions, suggesting a potential role of Pin1 regulating PARN activity. Consistent with this, our studies reveal that Pin1 forms a complex with PARN through p53. We also show that Pin1 inactivation by Juglone treatment or by siRNA-mediated knockdown decreases PARN-dependent deadenylation after UV treatment. Although these results are preliminary, they suggest that Pin1-associated p53 regulates mRNA 3' processing, and therefore gene expression, during the DDR.
78	Presenter: **Franklin Lema**, *Psychology* MBRS-RISE (The Minority Biomedical Research Support-Research Initiative for Scientific Enhancement program) Co-Author: Feliksas F. Bukauskas Faculty Mentor: Victoria Luine **The Role of Cx43 Gap Junction Channels in Propagation of Cell Death** Gap junctions (GJ), which are formed by transmembrane proteins known as Connexins (Cxs), facilitate electrical intercellular communication and exchange of metabolites and

	small ions. GJs have also been associated with the spread of apoptotic/necrotic agents generated in cells damaged by ischemia or stroke, to healthy cells. Conversely, other studies show that intercellular exchange through GJs may prevent toxicity build-up of oxidative radicals or calcium, by reducing the accumulation of such metabolites. Therefore the question arises of whether the transfer of cell-death-inducing agents through GJs is detrimental or advantageous, particularly in ischemic environments. Previous studies have measured the spread of cell death by applying fluorescent dyes after artificial ischemia was induced in animal hearts or cultured astrocytes. Our novel in vivo approach induced damage to a single cell by focused UV light and measured transfer of damage to adjacent cells connected through GJs. We used HeLa cells transfected to exogenously express Cx43. Propagation of cell death was observed: in the presence of functional GJPs, in the absence of GJPs and in the presence of inhibited GJPs, using the GJ inhibitor carbenoxolone. Progression towards cell death was determined by measuring changes in fluorescence intensity emitted from DAPI dye over time. Preliminary data shows that transferred damage assumed by neighboring cells was insufficient to cause significant progression towards death. Possibly, GJPs may allow for the diffusion of necrotic/apoptotic agents from damaged cells to healthier neighboring cells, reducing overall cell death.
79	Presenter: **Pascal Maguin**, *Biology* HHMI (Howard Hughes Medical Institute) Co-Authors: Sampada Kalan, Diego Loayza Faculty Mentor: Diego Loayza **Interactions Between LIM and OB Fold-Containing Proteins** DNA repair pathways are essential for genomic stability and cell survival. Specifically, the ATR kinase is activated by DNA replication stress, accumulation of single stranded DNA or UV irradiation. An early event in this activation is the phosphorylation and local recruitment of RPA, the single strand DNA binding protein. Our lab has shown that the LIM protein Ajuba associates with OB fold-containing protein RPA, and prevents an unscheduled ATR response. Our hypothesis is that Ajuba represses the ATR pathway through direct interaction with the OB folds of RPA. In addition, our lab has discovered an interaction between TRIP6, a LIM protein part of the same family as Ajuba, and POT1, the single strand telomeric overhang binding protein. Similar to RPA, POT1 binds DNA through two N-terminal OB folds. We speculate that, in some cases, OB folds provide a docking platform for LIM proteins. Our goal is to test this hypothesis by studying the interactions between the LIM proteins TRIP6 and Ajuba, and the OB fold proteins POT1 and RPA using recombinant proteins produced in E. coli. Here, we present our preliminary results on the purification of recombinant POT1 protein tagged with GST from E. coli. We show that the purified GST-POT1 possessed binding activity to the single stranded telomeric repeat TTAGGG. 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.
80	Presenter: **Anastasiya Matveyenko**, *Biology* Co-Authors: Sampada Kalan, Diego Loayza Faculty Mentor: Diego Loayza **Role of LIM Protein Ajuba in Human Telomere Function** Telomeres have an essential role in protecting and maintaining chromosomes. They are composed of TTAGGG repeats ranging from 2 - 12 kb in 5' to 3' direction towards the chromosome end and contain a 50 - 300 nt single stranded overhang. In tumor cells, telomeres can be maintained by telomerase allowing for cell immortalization. Telomeres are coated with a six protein complex called shelterin, which prevents them from being recognized as DNA damage sites. In the shelterin complex, TRF2 represses ATM and POT1 ATR, thereby ensuring effective telomere protection. Previous research in our laboratory has shown that LIM-proteins part of the Zyxin family, LPP and TRIP6, interact with the shelterin complex. Depletion of either LPP or TRIP6 by siRNA leads to induction of the DNA damage response, which suggests a role in telomere protection. Our lab has also shown that another member of the Zyxin family, Ajuba, plays a role in preventing global activation of ATR mediated DNA damage. Here we show that Ajuba associates with a subset of telomeres by fluorescent in situ hybridization (FISH). We also found that Ajuba associates with telomerase and POT1 by co-immunoprecipitation. Based on our results, Ajuba plays an important role in telomere maintenance by regulation of telomerase and protection of telomeres through interaction with POT1.
81	Presenter: **Rosa Mejia**, *Biology* Undergraduate Research Fellow Co-Authors: Martina Kucerova-Levisohn, Michael Wilkinson, Benjamin D. Ortiz Faculty Mentor: Benjamin D. Ortiz **Role of HS1 and HS1' on TCRa Locus Control Region** The T-cells of the immune system produce various cell surface receptors that are unique to their cell lineage, and necessary for effective immunity. The gene that encodes for one such receptor, the T-Cell Receptor Alpha (TCRa) has been shown to contain a cis-acting DNA regulatory element known as the locus control region (LCR). The LCR is characterized by its ability to regulate the expression of a linked gene in a tissue specific, copy number-dependent and integration site-independent manner. The effects of the LCR allow the TCRa to be expressed at high levels in thymic and peripheral T cells. Located within the endogenous TCRë±/Dad1 gene region, the TCRa LCR contains nine DNAse I hypersensitivity sites (HS) two of which are HS1, an enhancer, and HS1‰Û^{a} which supports many activities related to epigenetic regulation of chromatin. Previous experiments have shown that deletion of both HS1 and HS1' affects TCRa gene function. However the specific regulatory roles of either HS1 or HS1' in LCR activity have not been fully explored. To address this question, LCR constructs that are mutant for either HS1 or HS1‰Û^{a}will be linked to an upstream reporter gene and transfected into mouse embryonic stem cells (mESC). Transfected

	mESC will then be differentiated into T cells in vitro. Comparing the reporter gene expression in the T cells derived from the mESC will provide further information on the roles of HS1 and HS1' on the TCRa LCR and their impact during T cell development.
82	Presenter: **John Moon**, *Biochemistry* Faculty Mentor: Mandë Holford **Developing a Reliable Recombinant Strategy for Synthesizing Disulfide Rich Peptides from Venomous Marine Snails** Peptidic neurotoxins derived from venomous marine snails (turrids, terebrids, and conids) are effective tools for investigating ion channel function and structure, and are a template for the development of potent and non-addictive analgesics for sufferers of chronic pain, such as HIV and cancer patients. The Holford lab is focused on the discovery, characterization and delivery of terebrid toxins, teretoxins, as potential therapeutic agents. Novel Terebra guttata teretoxin Tg77 was synthesized using a recombinant biology strategy. Recombinant synthesis is an effective way to produce peptides longer than 30 amino acids and aids in conservation of terebird snails as extraction of the natural products from live specimens yields insufficient amounts and involves the sacrifice of many specimens. 44 amino acid Tg77 was recombinantly expressed in a bacterial host via ligation-independent cloning and transformation. After purification of the fusion protein by His-tag affinity chromatography, enterokinase cleavage yielded the desired folded Tg77 teretoxin. Tg77 purity was confirmed by reverse-phase High Performance Liquid Chromatography and mass spectrometry. Experiments are underway to characterize the bioactivity of Tg77. Future efforts will construct a reproducible protocol for recombinant synthesis of other teretoxins to generate sufficient amounts of peptide for investigation of their bioactivity.
83	Presenters: **Juliet Prieto & Jessie Chen**, *Biochemistry* Macaulay Honors College Faculty Mentor: Dixie Goss **Synthesis of eIF4G to Understand Iron Metabolism** The eukaryotic translation initiation factor 4-Gamma(eIF4G) is a protein that plays an important role as an RNA regulator associated with iron response element (IRE), which regulates iron metabolism. Understanding the interaction of eIF4G with IRE can help us learn more about a group of diseases called picornaviruses. eIF4G is synthesized and purified by transforming the 626-1166 region of the human eIF4G protein into BL21 competent cells. It is then induced using a protocol provided by Professor Christopher Fraser from the Department of Molecular and Cell Biology, College of Biological Sciences, University of California, Davis, CA. We also began purifying TEV protease to cleave off the MBP-His tag on the eIF4G. The same protocol used for eIF4G was used for the TEV protease purification, except the TEV protease‰Û^{a}s tag cleaves off on its own. We are currently purifying about 10mg EIF4G.
84	Presenter: **Audrey Renson**, *Community Health* Raab Presidential Fellow Faculty Mentor: Grace Sembajwe

	Criminalization of Sex Work as Structural Violence This is a review of evidence in industrialized countries supporting the framing of laws and policing practices that criminalize sex work as structural violence. Conclusions that sex work is an independent risk factor for disease and violence are undercut by the wide variation in prevalence of these outcomes between different sex worker populations. Many authors have argued that the social environment, including the legal context, in which sex work occurs has profound impacts on risk and vulnerability. Much evidence suggests that exposure to a criminalizing legal context is a primary determinant of poor health and safety outcomes among some groups of sex workers; yet a broad synthesis of this evidence from multiple countries has not been conducted. Using evidence from the USA, Canada, Europe, Australia, and New Zealand, we demonstrate that policies and practices that criminalize sex work amount to a deterrent strategy that uses risk of violence, disease, and death as its primary tools for maintaining social order.
85	Presenter: **Barukh Rohde,** *Biology, Chemistry, and Statistics* Rockefeller University Co-Authors: Israel Coats, James Krueger, Dan Gareau Faculty Mentor: Shirley Raps **A Novel Method for Measuring the Optical Properties of Melanin-Containing Tissue** The optical properties of pigmented lesions have been studied using diffuse reflectance spectroscopy in a noninvasive configuration on optically thick samples such as skin in vivo. However, it is difficult to un-mix the effects of absorption and scattering with diffuse reflectance spectroscopy techniques due to the complex anatomical distributions of absorbing and scattering biomolecules. We present a device and technique that enables absorption and scattering measurements of tissue volumes much smaller than the optical mean-free path. Because these measurements are taken on fresh-frozen sections, they are direct measurements of the optical properties of tissue, albeit in a different hydration state than in vivo tissue. We took absorption and scattering spectra on skin lesion (melanoma, nevi, etc) samples, consisting of fresh frozen sections that were unstained. Fitting the spectrum as an exponential decay between 500 and 1100 nm [mua = A*exp(-B*(lambda-C)) + D], we report on the fit parameters of and their variation due to biological heterogeneity as A = 4.20e4 +/- 1.57e5 [1/cm], B = 4.57e-3 +/- 1.62e-3 [1/nm], C = 210 +/- 510 [nm] , D = 613 +/- 534 [1/cm]. The variability in these results is likely due to highly heterogeneous distributions of eumelanin and pheomelanin.
86	Presenter: **Michael Sideris**, *Biology* HHMI (Howard Hughes Medical Institute) Faculty Mentor: Paul Feinstein **Generation of Induced Pluripotent Stem Cells by Cell Fusion** Nuclear reprogramming of a differentiated cell by cell fusion with an embryonic stem cell results in the creation of tetraploid cells. We are interested in using this approach to create diploid embryonic stem cells. Creating diploid stem cells, which are

	advantageous for both clinical and therapeutic purposes, involves elimination of the stem cell's nucleus prior to fusion with the differentiated cell. 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. Our current experiments revolve around optimizing conditions for this procedure. In principle, nuclear ablation could be applied to any cell in the future.
87	Presenter: **Anais Wong**, *Philosophy of Human Rights* Faculty Mentor: Carol C. Gould **Learning Freedom: Education as a Key Human Right** Education is a requirement for the development of the capability for choice and thus at the center of the problem of the fulfillment of human rights. Indeed, it is a key human right for it is related to the core of their foundation: human agency. Respect for a person's autonomy requires the development of their potential for agency, in the sense of being able to freely make informed choices. This respect for people's agency in turn implies negative and positive duties: both the absence of unnecessary burdens on people's agency and their access to information and quality education. Although it is effective agency that can truly enable choice, we can consider all humans to have, in theory, the potential for agency (Griffin, Gewirth). This potential can only be brought forward by education, which is then the central human right giving way to most other rights. Also, the problem of universalizing human rights can be solved by recognizing that agency is tied to social interdependence (Gould). Moreover, scientific accounts of freedom support a dimensional view of agency justifying the need for education as the cultivation of agency (Delgado, Dennett and Holmstrom). Lastly, education is at the core of human rights as a prerequisite for having the capability for free choice, and the capability and human rights approaches are complementary frameworks to facilitate more effective implementation strategies that take into account the various factors at play for the actual realization of the right to education (Sen and McCowan).
88	Presenter: **Habib Zahir**, *Biology* Co-Author: Abel Navarro Faculty Mentor: Diego Loayza **Bioremoval Basic Blue 99 Dye from Aqueous Solutions by Low-Cost Adsorbents: Analysis of the Equilibrium State** Spent green tea (GT), peppermint (PM), chai tea (CT), decaffeinated green tea (DGT) leaves and alginate gel beads (AB) were used as adsorbents of a hair dye to purify aqueous solutions. Basic Blue 99 (BB99) was chosen as a model dye due to its widespread use in the cosmetics industries. Equilibrium parameters such as pH, mass of adsorbent, initial dye concentration, and salinity were studied to maximize the adsorption of the dye from aqueous solution in discontinuous experiments at room temperature. Experimental data indicate that adsorption of BB99 is maximized in slightly acidic conditions (pH between 4 and 6), with optimum adsorbent masses of

	50mg for PM, 75mg for CT, GT and DGT, and 100mg for AB. The adsorbents also reached their highest adsorption in the absence of salts with maximum initial concentrations between 0.18 and 0.3g/L of the dye. All adsorbents were able to remove more than 80% of the dye from the solution, where AB reached an adsorption percentage of 95%. Finally, desorption of the dye was studied to recycle the adsorbents in repetitive adsorption cycles. BB99 was desorbed by using diluted HCl solutions. Instrumental analysis included scanning electron microscopy and FT-infrared spectroscopy and demonstrated the presence of optimum chemical and morphological conditions for the use of these materials as adsorbents of dyes. We believe this 'clean' technology will educate us to take advantage of inexpensive waste materials to improve water quality.