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and Performance.
Adelphi University, Garden City, NY

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MACUB 2012 Conference Poster Abstracts

More of a Good Thing: the Positive Relationship Between Vertebral Number and Performance. Kerri L. Ackerly and Andrea B. Ward, Adelphi University, Garden City, NY.

Environmental conditions significantly affect the development, morphology, and performance of aquatic vertebrates, as shown by previous research in diverse groups including fishes and amphibians. Studies have shown that temperature during development affects vertebral morphology, such that individuals reared at higher temperatures tend to develop a lower number of vertebrae than individuals reared at lower temperatures. Studies have also displayed the impact of vertebral morphology on performance. In order to demonstrate the relationship between environmental conditions and performance through morphology, we investigated the relationship between the effect of temperature on vertebral development, and the subsequent effect of any discrepancy on burst swimming performance in two model aquatic vertebrates, zebrafish (*Danio rerio*) and axolotls (*Ambystoma mexicanum*). Embryos of both species were collected and evenly distributed among a range of species appropriate temperatures prior to the onset of somitogenesis. Following development, startle responses were recorded and individuals were analyzed for either vertebral number or muscle fiber composition. Our results indicate that small fluctuations in temperature can significantly influence an individual's vertebral development, which can then subsequently impact survival. We found that individuals reared in higher temperatures develop a lower number of total vertebrae and a less favorable ratio of pre-caudal to caudal vertebrae for maximum performance. As a result of these morphological discrepancies, these individuals were found to have decreased burst swimming performance, as they achieved significantly less velocity and a slower overall response time. In the context of a changing climate, these results indicate the significant impacts of rising temperatures on aquatic vertebrates.

Evidence of Sublethal Injury in *Campylobacter* spp. after exposure to Grape Seed Extract. J. Alexander, E. Noriega, A.V. Carrascosa and A.J Martínez-Rodríguez, Instituto de Investigación en Ciencias de la Alimentación (CIAL), CSIC-UAM, Universidad Autónoma de Madrid, Madrid, Spain.

One of the forerunners for gastrointestinal infections with diarrhetic symptoms worldwide is *Campylobacter* spp, a food borne bacterial pathogen. Polyphenolic rich compounds such as Grape Seed Extract (GSE), a plant extract, have been pursued in order to improve food safety assurance systems. In this work, the occurrence of sublethal injury, a crucial aspect in the assessment of food preservation strategies, was studied. It's occurrence in injured cells of *C. jejuni*, after exposure to different GSE concentrations was examined. Sublethal damage is known to pose major public health concerns. A mechanism of cumulative damage, which triggers lethal instead of sublethal injury has been suggested

from injury profiles that illustrate GSE exposure times. The maximum value of SI was similar for both GSE concentrations, but injury distribution profiles were significantly different. In accordance with the survival curves, the highest GSE concentration reduced the treatment times critically. Additionally, propidium iodide staining of GSE-treated cells identified a loss of membrane integrity caused by GSE exposure. The information provided here is essential for the optimal design of combined hurdle technologies, emphasizing the transition from sublethal damage to lethal damage. This work was supported by NIH grant #MD001429 of SUNY College at Old Westbury's, Neuroscience International Program. A Minority and Health Disparities International Research Training Program sponsored by the National Institutes of Health's National Center on Minority Health and Health Disparities.

Genetic Determination of Next Generation Sequencing Technology Error Rates Within Microsatellite Sequences. Kimaada Allette¹, Kristin Eckert² and Suzanne Hile², ¹Long Island University, Brooklyn, NY and ²Penn State College of Medicine, PA.

Microsatellites, also referred to as small tandem repeats, have been known to be associated with many diseases. Several publications have shown that microsatellite sequences are underrepresented after massively parallel, Next Generation (NextGen), sequencing approaches compared to the known number of microsatellites detected in the human genome project. The goal of this project is to identify the accuracy and efficiency in reading repeat sequences, in both the previous and new technologies used in sequencing. To study this, tri-nucleotide sequences ([TTC/AAG]_n) with varying number of repeats were constructed. All microsatellite sequences are inserted in-frame at the same location within the *Herpes Simplex Virus 1-thymidine kinase (HSV-tk)* gene. Sanger sequencing and selective plating verified correct vector constructions. In addition, we specifically determined the mutation frequencies obtained during NextGen DNA library preparation at mono-, di- and tetra-nucleotide repeat plasmids, [A/T]₈, [AT/TA]₈ and [TTCC/AAGG]₉. The starting background mutational frequencies (MF_B) of all plasmids were determined by electroporation of *E-coli* and selective plating. The NextGen library preparation steps were mimicked with each of the plasmids. DNA fragments were isolated by Qiaquick gel purification, amplified by PCR, and electroporated in *E-coli* to determine the MF_Q and MF_{Q+PCR}. The degrees of technology - introduced errors were calculated by comparing MF after amplification to background MF. From this we determined that all microsatellites were susceptible to technology-introduced errors. The experimental design developed can be used in the future to compare errors introduced during DNA library preparation for various sequencing platforms. The extent of these errors can be incorporated into new computational programs to enable the increased recovery and accuracy of microsatellite DNA sequencing using massively parallel technologies.

Potential Usage of EGCG-Stearate as a Synergistic Agent for Antibiotic Therapy. Mariella Antialon, Leticia Gonzalez, Umme Habiba and Lee H. Lee, Montclair State University, Montclair, New Jersey.

Green tea contains antioxidant catechins that have been studied for medicinal purposes. Out of the six catechin compounds found in green tea, EGCG has powerful anti-tumor, anti-viral, and anti-bacterial activity. The original form of EGCG is not stable. In this study, the lipophilic tea polyphenol EGCG-Stearate was used to study antimicrobial activity via the Kirby-Bauer disk diffusion Method. 1% EGCG-Stearate was used in synergism with twelve selected antibiotics; Ampicillin (AM10), Bacitracin (B10), Cephalothin (CF30), Chloramphenicol (C30), Doxycycline (D30), Erythromycin (E15), Gentamicin (GM10), Penicillin (P10), Polymyxin (PB300), Rifampin (RA5), Streptomycin (S10), and Tetracycline (TE30). The gram negative bacteria: *Escherichia coli*; *Pseudomonas aeruginosa*, *Serratia marcescens*, *Enterobacter aerogenes*, ampicillin resistant *Escherichia coli*; gram positive bacteria: *Bacillus megaterium*, *Staphylococcus aureus*, and *Staphylococcus epidermidis*, and acid-fast bacteria: *Mycobacterium smegmatis* were observed. The bacteria were categorized as being resistant (R), intermediate (I), or susceptible (S) toward different antibiotics both with and without 1% EGCG-Stearate. Results demonstrated a different percentage of inhibition for select microorganisms. In the presence of 1% EGCG-Stearate, 9 antibiotics showed increased (5% to 100%) antimicrobial activity on *S. epidermidis*. 10 antibiotics showed increased (13% to 104%) antimicrobial activity for *B. megaterium*. For *E. coli* 10 antibiotics showed an increase (17% to 167%) in antimicrobial activity compared to the control. *Staph aureus* also showed increased antimicrobial activity with 9 antibiotics (3-100%). *Serratia* had the greatest synergistic antimicrobial activity with CF30 at (350%) increase. Ampicillin resistant *E. coli* showed similar antimicrobial activity as *E. coli*. EGCG-Stearate increased 194% efficacy of P10 on *M. smegmatis*, which was 94% greater than the previous study with LTP. This study suggests that EGCG-Stearate affects the antimicrobial activity similar to LTP. This stable lipophilic compound has great potential as a drug target for antibiotic therapy. Future studies will observe the mode of action of EGCG-Stearate as an antimicrobial agent.

The Effect of Polyclonal Antibodies on *Streptococcus mutans* Biofilm Formation on Calcium Hydroxyapatite and Porcelain Fused to Metal Surfaces. Anthony Arena¹, Thomas Owen¹ and Donna Leonardi², ¹Ramapo College of New Jersey, Mahwah, NJ and ²Bergen County Academies, Hackensack, NJ.

The purpose of this study was to test the effect of polyclonal antibodies on oral bacterial biofilm formation. With antibody serum therapy newly emerging in microbiology, there is scant research on its application on oral flora. *Streptococcus mutans*, one of the leading cariogenic strains, colonizes via quorum sensing and forms a biofilm. The bacteria in these biofilms secrete glycosyltransferase (GTF), an enzyme that converts extracellular sucrose to glucans, allowing bacteria to adhere to each other and the substrate. For oral bacteria, adhesion to teeth is majorly responsible for caries. This study used an immunoglobulin G antibody, ab31181, that inhibits the function of glycosyltransferase, and studied its effects on *S. mutans* growing on calcium hydroxyapatite and porcelain fused to metal (PFM) discs. Various concentrations of antibody were added to bacterial cultures growing on both PFM and calcium hydroxyapatite discs. A dose response relationship was found: higher concentrations of antibody reduced biofilm formation for both hydroxyapatite and PFM samples. Data was found to be statistically significant for the hydroxyapatite ($p < 0.05$). This shows that antibody therapy may be a viable option for the prevention of dental caries. Future research would need to be conducted clinically to test the effects on humans and its practical implications.

Impact of Alcohol Abuse on Macrophage Effector Functions in *Acinetobacter baumannii* Infection. Melissa B. Asplund¹, Jay Gandhi¹, Carolina Coelho², Radames J. B. Cordero² and Luis R. Martinez^{1,2}, ¹Long Island University-Post, Brookville, NY and ²Albert Einstein College of Medicine, Bronx, NY.

Acinetobacter baumannii (*Ab*) is a multi-drug resistant pathogen that causes a multitude of infections primarily in immunodeficient patients and traumatic wound victims. This bacterium has the ability to colonize the skin and oropharyngeal mucosa of immunocompetent patients, creating asymptomatic carriers which aids in the spread worldwide as well making it an extremely successful opportunistic pathogen. *Ab* has an abundance of genomic resistance islands which

render single antibiotics useless in the treatment of infections. In tropical countries, *Ab* is a common cause of nosocomial pneumonia as well as a primary agent for community-acquired pneumonia in chronic alcoholic patients and is associated with a >50% mortality rate. Alcohol abuse causes adverse effects on the host's immune system in acute and chronic episodes. Hence, using J774.16 macrophage-like cells, we hypothesized that physiological alcohol levels impair macrophage effector functions against *Ab* infection. Flow cytometry and microscopic analyses show that increasing doses of alcohol reduce bacterial phagocytosis by J774.16 cells. Bacterial phagocytosis is a highly ordered process orchestrated by signaling through RhoA GTPase after the bacterium's interaction with complement receptor 3 (CR3) to locally organize the actin cytoskeleton and drive cell uptake. Notably, western blot analysis shows a dose-dependent decrease in RhoA expression suggesting that alcohol inhibits the signaling pathway requires for *Ab* phagocytosis. Also, alcohol-treated J774.16 cells show inability to kill *Ab* and dysregulation in pro-inflammatory cytokine production, specifically, TNF- α and IL-6. Together, these data suggests that alcohol abuse may affect macrophage effector functions exacerbating *Ab* infections. We believe this project is of considerable significance in the fields of infectious diseases and alcohol abuse. Our findings may provide understanding of the mechanisms for the increased severity of *Ab* disease in alcohol abusers and lead to the development of more effective public health strategies to deal with this problem in our society.

Effect of Very High Fat Diet on Hormone Levels and Body Weight. Sathyapriya Babu and Tandra R Chakraborty, Adelphi University, Garden City, NY.

Obesity is a multifactorial disease determined by many factors including dietary intake, environmental, genetic and psychosocial factors leading to a chronic energy surplus in which energy intake exceeds energy expenditure and causing the accumulation of excess adipose tissue. It has a far-ranging negative effect on health including high blood cholesterol, dyslipidemia, Insulin resistance, glucose intolerance, cardiovascular disease, some type of cancers and poor female reproductive health. The aim of this study is to analyze the effect of high fat induced obesity on the biochemical marker & adipose derived hormone leptin in male mice model. Male mice were fed with normal & very

high fat food and the levels of the hormone were measured during 2 weeks, 3 months and 6 months diet course. Within the first two weeks, drastic change in the body weight has been observed which continued throughout the course of the experiment. Preliminary study results show changes in the hormone levels of very high fat fed mice within the first two weeks. Further the histology profile examination of different organs of very high fat fed mice revealed signs of distinct changes compared to the normal diet fed mice indicating the effect of hormones on the high fat induced obesity. More notably among the organs, there is excessive fat surrounded by liver hepatocyte cells and observable hepatocyte degeneration with marked fatty acid changes. Since there is a limited number of studies available on male mice models this study is very interesting and helps to understand the effect of high fat on males. Additionally, a comparative study on the effect of high fat induced obesity using male and female mice models can give a better insight for further research study.

Characterization of a Secondary Metabolite with Antimicrobial Activity Isolated from of MTE4a. Boriana Baric¹, Diego Montenegro², Akira Kawamura² and Monica Trujillo¹, ¹Queensborough Community College, CUNY and ²Hunter College, CUNY, NY.

Actinomycetes are bacteria from the soil known for their capacity to produce secondary metabolites. MTE4a is an Actinomycetes isolated from New York State soil. A metabolite with antimicrobial activity was produced by this strain both in solid and liquid media. The n-butanol extract of the fermentation media showed strong antibiotic activity against Gram positive bacteria. This poster presents the preliminary results of the purification of the antimicrobial compound. This work was supported by a Community College Collaborative Incentive Research Grant Program Award "Biological characterization of a Streptomyces strain isolated from NY soil."

Population Decline of Horseshoes Crab (*Limulus polyphemus*) Eggs and Hatchlings at Plum Beach Jamaica Bay. Dennis Bejarano and Christina P. Colon, Kingsborough Community College, Brooklyn, NY.

Atlantic horseshoe crabs (*Limulus polyphemus*) at Plum Beach appear to be declining. This may be due to loss of spawning habitat and/or harvest for bait or for the

pharmaceutical and medical device industries. It was hypothesized that the 2012 spawning season would yield fewer eggs and trilobites compared to 2011. Using GPS coordinates to relocate each site, sand cores were collected at 5cm and 20cm in depth. At each location, ten random samples from each depth were collected. Eggs were sieved using a 0.5mm mesh sieve, placed on a tray and counted. The data show the spawning season 2012, only yielded 16,481 eggs, nearly half the number of eggs observed in 2011, which yielded 33,202 eggs. These data support our hypothesis. There was a higher concentration of horseshoes crab eggs at 5cm depth in 2012 (n=212) versus 2011 (n=133). The beach area with less erosion and fewer pedestrians consistently had more eggs at 20cm in both years. Because the 2012 spawning season started earlier, egg numbers peaked in early May rather than mid June in 2011. Another key finding was that the population of trilobites in 2012 was 82% lower (n=1,052) than 2011 (n=5,700). Based on analysis of these data, we further corroborated our hypothesis. While it is possible that the observed decline in eggs and hatchlings resulted from natural variability between years, there is a clear need for future evaluation at this and other locations, and greater focus on the circadian patterns of horseshoes crab spawning. This project was made possible through a Kingsborough President's Faculty Innovation grant, grant 2R25GM06003-05 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537101091 of the CSTEP Program of the NYS Dept. of Education and NOAA Seagrant. Gratitude is due to Dr. Sarinsky, Dr. Botton, and Dr. Rowden.

The Use of Nano Fibrillated Cellulose as a Barrier Property in Packaging. Delisha Bella¹ and Doug Bousfield², ¹Medgar Evers College, Brooklyn, NY and ²University of Maine, Orono, MA.

The main purpose of my research was to test to see if nano fibrillated cellulose (NFC, a natural substance) would be a good barrier to water to use in packaging. We hypothesized that NFC would be a good candidate for packaging. We explored whether NFC would pass a water permeability and water transmission test, which is to see whether NFC is permeable to water and/or water vapor. We used standard copy paper to do the research. We placed different NFC consistencies, with and without clay additions, (3 - 6%) as well as different rod sizes (1 - 8 cm) to

coat the papers. Papers were left overnight in at a temperature of 25° C. The coated papers were weighted and samples were placed over jars of water for various times (1 - 3 days) at 25° C. Other samples were placed over jars of water in an oven at 45° for the same time periods. The amounts of water transmissions were calculated for each sample and plotted on graphs. We found that using NFC by itself as a water barrier was not promising. Using a higher consistency of NFC with clay additions more promising results were obtained. As the percent of clay increased the water permeability decreased. Further testing should be done to expand the study by using other natural alternative such as starch or latex to mix with NFC. The study thus far reveals that NFC with additions can be a good permeability barrier for packaging. Other tests of oxygen and grease permeability remain to be tested.

Sleep Deprivation's Effects on Mental, Emotional, and Physical Functioning. Olivia Blase, Jessica Cottings and Damaris-Lois Yamoah Lang, Nyack College, Nyack, NY.

The human body needs sleep in order to function properly. It uses sleep to build up energy for the next day as well as to repair itself. According to Smith *et al*, 2012 in "How Much Sleep do You Need?" sleep allows for the maintenance of one's health, stimulates growth and development, repairs tissues and muscles, and boosts the immune system. Moreover, sleep affects a person's physical, mental, and behavioral state (CSMR vol 43, 2006). The sleep cycle is composed of five stages of sleep that progress cyclically throughout the night. The most crucial stage for the body to reach is the 5th stage, rapid eye movement (REM), because this is when the body undergoes most of its restoration. Sleep-wake patterns are controlled by the circadian rhythms, which respond to time of day/light versus dark. In order to gain all the benefits of sleep, an average adult needs 7.5-8.5 hours of sleep a night. Unfortunately, sleep deficit has become one of the most pervading health problems in the United States. According to the Committee of Sleep Medicine and Research, many people have begun taking on night-shifts, consequently disrupting their sleep patterns. Similarly, a study performed on college students revealed that full-time students who had jobs got less than six hours of sleep a night (Soares, 2012). As a result, they had less energy and focus, making learning more of a challenge. Even minimal sleep loss can affect a person's energy, ability to handle stress, and

mood. There are several consequences that stem from sleep deprivation, both short-term and long-term. A person suffering from short-term repercussions of deprived sleep is likely to experience decreased alertness during the daytime, emotional strain, impaired immunity, memory, and cognitive ability. Long-term consequences are more serious. They include cardiovascular disease, high blood pressure, stroke, psychiatric problems (such as severe depression), mental impairment, shortened life expectancy, and obesity (Smith *et al*, 2012).

Do Female Mosquitofish (*Gambusia affinis*, Poeciliidae) Possess Sensory Biases for Male Coloration? Ariel Casner, Heather Fackelman, Olga Degtyareva and Scott Kight. Montclair State University, Montclair, NJ.

Unlike other species in the family Poeciliidae, male mosquitofish, *Gambusia affinis*, lack mating coloration and courtship behavior, and instead often employ harassment of females as a mating strategy. This departure from the sexually selected dimorphism found in other poeciliid species raises the possibility that females might retain ancestral preferences for colorful males, but that males have evolutionarily lost or avoided the production of mating coloration. We conducted several experiments, each with a non-colored control stimulus object and a colored stimulus object including (a) male *Gambusia* artificially colored with blue pigment (b) female *Gambusia* artificially colored with blue pigment (c) metal “spinners” artificially colored with blue pigment and (d) male *Gambusia* artificially colored with red pigment. Females exhibited no preferences in trials that did not involve male stimuli, and exhibited significant preferences for blue-pigmented males and significant avoidance of red-pigmented males. These results support the hypothesis that females possess sensory biases for male coloration, but males either never evolved the corresponding signals, or have evolutionarily lost them.

Manganese Treatments Decreases Immunofluorescence Emissions of Post-Synaptic Dopamine D2 Receptors. Yelena Chekayev, Rachael Opoku, Margaret A. Carroll, and Edward J. Catapane, Medgar Evers College, Brooklyn, NY.

Manganese a neurotoxin causing Manganism, a Parkinsons-like disease, disrupts dopamine neurotransmission. Gill lateral cell cilia of *Crassostrea virginica* are controlled by

serotonergic-dopaminergic innervations. Dopamine causes cilio-inhibition, serotonin cilio-excitation. Our lab showed post-synaptic dopamine receptors in gill cells are D2 type and manganese blocks cilio-inhibitory effects of dopamine by blocking dopamine post-synaptic receptors. Questions exist in the literature if manganese decreases the number of D2 receptors in brain. To test that we used antibody-antigen histoimmunofluorescence techniques to visualize dopamine D2 receptors in gill and ganglia of *C. virginica*. We used a primary antibody against D2 receptors followed by FITC linked secondary antibody. Animals were treated with 500 μ M of manganese for 5 days. Gill, cerebral and visceral ganglia were excised and exposed to primary and secondary antibodies. Paraffin embedded sections were viewed with a phase contrast Zeiss epilume fluorescence microscope with a ProgRes C3 Peltier cooled camera. Antibody treated sections showed bright FITC fluorescence in lateral ciliated cells and other areas of gill and ganglia. Sections lacking primary antibody treatment did not display similar fluorescence. We analyzed fluorescence intensity of 120 control and 80 gill lateral cells from animals treated with manganese using ImageJ software. Intensity of manganese treated cells was 70% less than controls. The study identifies dopamine D2 receptors in gill cells and cerebral and visceral ganglia, and shows a negative correlation between fluorescence intensity of dopamine D2 receptors in manganese treated animals and controls. The question if the decrease in intensity is due to decrease in actual number of receptors or if manganese alters protein conformation of D2 receptor and D2-ligand binding sites needs to be further explored.

Distribution of Evolutionarily Conserved *CIS-regulatory* G-quadruplex Motifs in 5'-Untranslated Regions of Human Genes. Matt Crum, Camille Menendez, Scott Frees and Paramjeet S. Bagga, Ramapo College of New Jersey, NJ.

G-quadruplexes are three-dimensional structures formed by nucleic acids containing guanine rich tracts. These structures are implicated in important biological processes, human disease, and as therapeutic targets. RNA G-quadruplexes have recently gained attention as potential *cis-regulatory* elements of post-transcriptional gene expression. Our goal has been to study the prevalence and distribution of conserved G-quadruplex motifs in the 5'-UTR

(untranslated regions). We have used the QGRS-H Predictor, which was developed in our laboratory in 2011, to map and analyze evolutionarily conserved quadruplex forming 'G'-Rich Sequences (QGRS; Potential G-quadruplexes) in 89 mammalian mRNAs. The QGRS-H Predictor uses a computational algorithm for evaluating conservation of mapped G-quadruplexes between aligned mRNA orthologs. Overall distribution patterns of conserved G-quadruplexes varied with the length of the untranslated region, and were categorized into three clusters based on the 5' UTR length: small (1-180 nt), medium (181-380 nt) and large (>381 nt). We mapped 94 homologous G-quadruplex motifs and more than 75% were located in close proximity (within 180b nt) of the translation initiation site. This suggests a regulatory role of G-quadruplexes in protein synthesis. Genes in this category include those which code for transcription factors and tumor repressor proteins, or are involved in regulation of insulin, regulation of peroxisomes and metastatic growth of tumors. This project revealed important clues about the overall distribution of conserved G-quadruplexes in the 5'-untranslated regions of mammalian genes. While this data increases our understanding of the importance of G-quadruplexes on its own, it also serves as a primer for our future work. We intend to aggregate the analysis of thousands of mammalian orthologs using the QGRS-H Predictor through automated computational processes. This research provide important insights into the composition, prevalence and distribution of G-quadruplexes in 5'- and 3'-UTRs, coding regions, and their relationship with other *cis*-regulatory motifs across the entire human genome.

Investigation of Carnitine Analogs as Potential Cancer Therapies. Deandra Dacosta, Anthony Fernandez, John Regan and Regina Sullivan, Queensborough Community College, Bayside, NY.

Many cancer cells rely on glycolysis for ATP production even in the presence of oxygen, a phenomenon known as the "Warburg Effect". A number of studies have suggested that ATP production via aerobic glycolysis may alter the production of reactive oxygen species leading to evasion of apoptotic pathways. In our studies we investigated the ability of O-Acetyl L- Carnitine Hydrochloride and Etodolac (derivatives of L-Carnitine) to induce cell death in MDA-MB 231

cells, a metastatic human cell line. L-Carnitine is a quaternary amine with important mitochondrial functions including the transport of lipids into mitochondria for oxidation and the export of toxic compounds from the mitochondria. Preliminary results show MDA-MB 231 cell death is increased at L-Carnitine concentration of 100 μ M. The effect of O-acetyl L-Carnitine Hydrochloride and Etodolac on cell death was investigated. Further studies will determine if this metabolic pathway could be a target for cancer drug development.

Synthesis, Purification and Characterization of HIV Peptide Using Fmoc-based Solid Phase Peptide Synthesis. Sébastien Delva and Sanjai Kumar², ¹Queensborough Community College of CUNY, Bayside, NY and ²Queens College of CUNY, Flushing, NY.

A peptide containing a HIV sequence has been synthesized using Fmoc-based solid phase peptide synthesis procedure. The choice of solid support utilized here for this synthesis is Rink-Amide resin. After completion of the synthesis, the peptide is purified using a reverse-phase C18-based High Performance Liquid Chromatography system. Mobile phase utilized here is a linear gradient of water and acetonitrile containing 0.1% trifluoroacetic acid. Finally, a successful characterization of the target peptide is achieved using Electrospray Ionization Mass Spectrometry (ESI-MS). The synthesized peptide will be employed as an internal standard during the mass spectrometric analysis of complex biological samples, especially in the detection of post translational modification of proteins. Sébastien is a participant in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (R25 GM65096-05).

Synergistic Antimicrobial Activity of Theaflavins and Antiseptics. Aline de Oliveira and Tin-Chun Chu, Seton Hall University, South Orange, NJ.

Black tea is rich in theaflavin polyphenols, in particular theaflavin (TF1), theaflavin-3-monogallate (TF2A), theaflavin-3'-monogallate (TF2B), and theaflavin-3,3'-digallate (TF3). A mixture of theaflavins was used to evaluate its antimicrobial activity against 10 different bacteria, its possible synergistic effect with both alcohol and non-alcohol based antiseptics, and its ability to prevent spore germination. Serial dilutions of tea extract (1.0, 2.5, 5.0, and 10.0 mg/ml) were conducted in order to determine the minimum

inhibitory concentration (MIC). Five gram negative bacteria: *Escherichia coli*, *Enterobacter aerogenes*, *Micrococcus luteus*, *Proteus vulgaris*, *Pseudomonas aeruginosa*; Five gram positive bacteria: *Bacillus megaterium*, *Lactobacillus acidophilus*, *Sporosarcina ureae*, *Staphylococcus epidermidis* and *Streptococcus griseus* were used in this study. The disc diffusion method was used to test the synergistic effect and microplate bioassay was used to test antimicrobial activity of black tea. Black tea polyphenols showed antibacterial activity against all bacteria tested in this study and the MIC was of 2.5 mg/ml for all. The black tea compound improved the antimicrobial effects of alcohol-based hand sanitizers in all the bacteria tested. It also enhanced the antimicrobial activity of non-alcohol based hand sanitizer against *P. vulgaris*, *P. aeruginosa*, *L. acidophilus*, *S. griseus*, *S. ureae*, and *M. luteus*. Non-alcohol based hand sanitizer worked well by itself against *E. coli*, *E. aerogenes*, *B. megaterium*, *S. epidermidis*. The black tea extract also improved the antimicrobial effects of alcohol-based mouthwashes in most of the bacteria tested. In addition, black tea compound had a profound effect on spore forming bacteria. Spore germination was greatly inhibited by black tea polyphenols in both *B. megaterium* and *S. ureae*.

Adhesion and Biofilm Forming Capacity *in Vivo* Determines the Cutaneous Tropism of *Cryptococcus neoformans* var. *neoformans* (serotype D) strains. Gunjan Desai¹, Jade M. Greco¹, Radames J. B. Cordero³, Carlos DeLeon-Rodriguez³, Joshua D. Nosanchuk^{2,3} and Luis R. Martinez^{1,2}, ¹Long Island University-Post, Brookville, NY and ²Albert Einstein College of Medicine, Bronx, NY.

Cryptococcus neoformans (*Cn*) is an opportunistic fungus that is a relatively common cause of life-threatening meningoencephalitis in individuals with impaired immunity. In fact, there are ~1 million infections and >600,000 deaths/year due to cryptococcosis globally. Antigenic differences resulting from structural variation of the major capsular polysaccharide and studies on genetic differences led to the classification of *Cn* var. *neoformans* into two varieties: *Cn* var. *grubii* (serotype A) and *Cn* var. *neoformans* (serotype D). Serotypes A and D differ in geographic prevalence and dermatotropism, with serotype D strains being more prevalent among isolates from temperate countries as well as from skin infections. Analysis of serotype A and serotype D strains have revealed wide variations in thermal susceptibility, with the serotype D strains being more susceptible to heat

killing. Because *Cn* is an environmental fungus and only an opportunistic pathogen, it is not surprising that biofilm formation constitutes an important survival strategy for the organism in hostile environmental conditions (e.g. ultraviolet light) as well as against predation. Serotype D strains are found to produce more robust and sticky biofilms than serotype A due to differences in the composition and local release of their polysaccharide capsule. Given its enhanced adhesive and biofilm forming capacity, we hypothesized that *Cn* serotype D strains have an increased predilection for skin tissue. We show significant differences in capsular polysaccharide release, adhesion and biofilm formation using both *in vivo* and *in vitro* methods. Additionally, skin infection studies show that the cryptococcal serotypes stimulated different immune responses suggesting that each serotype evolved a variable survival capacity following diverse infection routes. The histological results demonstrated that the dermatotropic predilection associated with serotype D strains is related to biofilm formation on the stratum corneum which may provide latency and prolong survival to fungal cells by protecting them from high body temperature.

Newtown Creek: Potential for Bioremediation of a Superfund Site, Long Island City, New York. Yara Diaz, Ismail Mhaber, Claire Taylor, Holly Porter-Morgan and Sarah E. Durand, LaGuardia Community College, Queens, NY.

Newtown Creek is a tidal waterway between Brooklyn and Queens, New York. For over a century, industries along the Creek exploited the waterway for dumping industrial waste; additionally, the Creek was the site of the largest oil spill in US history prior to the BP disaster. Combined sewer overflow (CSO) pipes deliver sewage and street runoff. This study examines the hypothesis that a "green infrastructure" project, construction of wetland habitat along Creek bulkheads, could supplement current "gray infrastructure" remediation proposals. The study was conducted at two NC sites: the terminus of the Dutch Kills (DK) branch, the site of a large CSO outfall, and the Nature Walk (NW), a site on the main waterway opposite the DK mouth. Tests for dissolved oxygen (DO) and salinity (conductivity) were performed with a Hach HQ₄₀D meter and connected probes at the levels of surface, one and two meter depths. Measurement for turbidity, pH and *Enterococcus* contamination (IDEXX Enterolert protocol) were conducted in the lab. Plankton samples were collected with surface horizontal and vertical tows and benthic organisms

inhabiting the bulkhead surfaces at each site were identified. Daily precipitation data was obtained from the National Oceanographic and Atmospheric Administration. Similar results obtained at both sites: levels of DO and phytoplankton varied inversely, whereas turbidity and *Enterococcus* varied directly, with CSO outflow events; DO declined with depth and varied directly with diatom and/or dinoflagellate abundance. Flora and fauna common to native salt marsh habitat were observed within both the plankton tow contents and within the intertidal zone. We conclude that physical constraints, and not water toxicity, prevent salt marsh restoration and propose using Creek bulkheads as a foundation to support hanging sediment basins and terraced steps for colonization by salt marsh organisms. This project is being funded by NIH Bridges to the Future, CTEP and LSAMP.

Concentration Dependent, CuSO₄ mediated cell death in *Saccharomyces cerevisiae* involves Lipid peroxidation in the Cell Membrane. Qing Yao Ding and Nidhi Gadura, Queensborough Community College, Bayside, NY.

The broad goal of our study is to understand the mechanism(s) by which copper alloy surfaces kill microorganisms. Our results indicate that copper surface mediated cell death of *E. coli* correlates with increased levels of lipid peroxidation at the plasma membrane. We want to use *Saccharomyces cerevisiae*, a powerful eukaryotic model system, to understand the mechanisms of cell death further. Our working hypothesis, based on our preliminary results is that upon exposure to copper, toxicity is triggered by the increased lipid peroxidation of unsaturated fatty acids in the plasma membrane. In order to determine the relationship between exposure to different CuSO₄ concentrations, lipid peroxidation, and cell death in *S. cerevisiae* quantitative dilutions series were performed to test for *S. cerevisiae* cell death levels. Our results indicate that *S. cerevisiae* cell death kinetics is dependent of the CuSO₄ concentration. TBARS assay was used to measure the lipid peroxidation levels. There seems to be a strong correlation between increased lipid peroxidation and cell death. In addition to looking at how copper effects the membrane we characterized the impact of exposure to copper alloy surface by using FM4-64, an amphiphilic styryl dye followed by fluorescent microscopy to study the structural integrity of the plasma membrane. Genomic DNA

degradation data indicates a necrotic cell death pattern. This project was funded by Copper Development Association grant to Dr. Gadura. Qing Yao Ding is funded by QCC NSF-STEP.

Antibacterial Activity of Polymethoxylated Flavones (PMFs). Franzie Edquilag, Evan Venino and Tin-Chun Chu, Seton Hall University, South Orange, NJ.

Polymethoxylated flavones (PMFs) are compounds found in citrus fruits that are suggested to have anticancer, antioxidant, and cholesterol lowering effects. The possible antibacterial effect of two specific PMFs, tangeretin and nobiletin, are the focus of this study. PMFs are relatively large organic molecules. The molar mass of tangeretin is 372.37 g/mol and the molar mass of nobiletin is 402.39 g/mol. Previous study determined the minimal inhibitory concentration to be between 2 mg/ml and 3.6 mg/ml. In this study, a concentration of 3 mg/ml was used. Four gram positive bacteria including *Bacillus megaterium*, *Sporosarcina ureae*, *Staphylococcus epidermis*, and *Streptomyces griseus*; three gram negative bacteria including *Enterobacter aerogenes*, *Proteus vulgaris*, and *Acinetobacter calcoaceticus* were used. Two different strains of *Acinetobacter calcoaceticus*: streptomycin resistant (Str^r *A. calcoaceticus*) and streptomycin-sensitive (Str^s *A. calcoaceticus*) are used to determine if PMFs process the antibacterial activity against antibiotic-resistant bacteria. Cell growth was monitored by using a microplate reader Spectromax 105. Both tangeretin and nobiletin showed significant inhibition of bacterial growth inhibition. Furthermore, PMFs were also assayed for spore germination inhibition in *B. megaterium* and *S. ureae*.

The Influence of Antioxidants and Oxidants on Expression of Genes in the Daf-2 Pathway and Telomere Length in *Caenorhabditis elegans*. Obiora E. Egbo¹, Emily Oquendo¹, Kaminie Narainsamy¹, and Kristen La Magna², ¹Queensborough Community College, South Ozone Park, NY and ²Stony Brook University, Stony Brook, NY.

Aging is a natural phenomenon which occurs in many organisms and is a field of study that has gained researchers' interest over the past decade. Studies have shown that the production of oxidants or free radicals during cellular metabolism can cause cellular damage, leading to

aging. The purpose of this research is to use various compounds and examine their effect on the aging of *Caenorhabditis elegans*. This study examines the effect of antioxidants including pterostilbene, resveratrol, and blueberry extract and an oxidant, hydrogen peroxide, in the enhancement and declination of the life expectancy in a soil nematode *C. elegans*. Telomere length, an indicator for aging, was measured using DNA extraction and Polymerase Chain Reaction. The expression of genes associated with aging in the Daf-2 pathway, Sod-3, Fkb-3 and Daf-2, were analyzed using RNA extraction and rtPCR. The results reveal that antioxidants decrease the expression of these genes which indicates an increase in longevity of *C. elegans*. Although hydrogen peroxide did not show an effect on gene expression, decreases in the number of base pairs in the length of the telomeres were detected. In future studies, examining the development of *C. elegans* when treated with both antioxidants and oxidants simultaneously may be significant towards understanding aging and life expectancy in humans.

Methamphetamine Alters Phagocytosis and Killing of *Cryptococcus neoformans* by J774.16 Macrophage-like cells. Vaibhav Ekhar¹ and Luis R. Martinez^{1,2}, ¹Long Island University -Post, Brookville, NY and ²Albert Einstein College of Medicine, Bronx, NY.

Methamphetamine (METH) is a major public health and safety problem in the United States. METH is a strong addictive central nervous system stimulant that mimics the pharmacological effects of cocaine. Although there is substantial information on the physical and cognitive defects caused by METH there is a dearth of knowledge regarding its impact on host immunity. METH abuse can alter biological processes and immune functions necessary for host defense. Antigen presenting cells (APCs) play major roles as sentinels for first line alerts or as mediators that shape the adaptive immune response. We have shown that METH abrogates normal macrophage function. As a weak base, METH collapses the pH gradient across acidic organelles, including lysosomes and associated autophagic organelles. This in turn inhibits receptor-mediated phagocytosis of antibody-coated particles, MHC class II antigen processing by the endosomal-lysosomal pathway, and antigen presentation to splenic T cells by APCs. The encapsulated AIDS-associated fungus *Cryptococcus neoformans* (*Cn*) is a facultative intracellular pathogen that

frequently survives inside macrophages; globally there are ~600,000 deaths every year. In addition, *Cn* is an excellent model organism for the study of macrophage-pathogen interactions due to the availability of tools such as specific antibodies and well-established animal models. Therefore, we hypothesize that METH negatively modify the effector functions of J774.16 macrophage-like cells after interaction with *Cn*. We show that METH alters phagocytosis and enhances fungal survival by modifying J774.16 cell function. Also, METH changes the ability of J774.16 cells to produce nitric oxide or pro-inflammatory cytokines during *Cn* infection. We believe this interdisciplinary project is of considerable significance in the fields of infectious diseases and drug abuse. We anticipate that our findings will result in a deeper understanding of the mechanisms for the increased severity of microbial disease in METH abusers.

Detection and Identification of Marine Phytoplankton in Barnegat Bay, New Jersey. Nicole Elia and Tin-Chun Chu, Seton Hall University, South Orange, NJ.

Barnegat Bay is a 660 square-mile watershed along the eastern coast of New Jersey. The NJDEP issued an action plan to reduce pollutants from nutrient fertilizers and runoff. Numerous organisms are affected as a result of these negative impacts, those of which include marine phytoplankton. Marine phytoplankton play a key role in the eutrophication of marine environments, especially in areas of high pollution and availability of nutrients. Algal blooms are a result of eutrophication and their effects can be harmful to the marine environment in which they occur. In this study, raw water samples from eight paired sampling sites, ranging from the northern to southern parts of the bay, were collected and filtered with pore size 500, 100 and 0.45 μm filters sequentially. Genomic DNA was extracted by chelex methods. The purity and concentration of the DNA were determined by Nanodrop ND1000. General and specific primers for marine and freshwater phytoplankton were used in PCR assays to detect the presence of cyanobacteria, diatoms, and dinoflagellates. Gel electrophoreses were carried out to verify the amplicons. Primer sets with positive results included CPC1F/R, CYA359F/781R, 27Fb/785R, OXY107F/OXY1313R for cyanobacteria and dinoSLgF/R for dinoflagellates. Once the detection of cyanobacteria was confirmed, specific primer sets were used to identify *Synechococcus* and *Prochlorococcus*.

Analyzing the Effect of Di-n-pentyl Phthalate on the Development and Viability of *Drosophila melanogaster*. Joanna Emilio and Heather Cook, Wagner College, Staten Island, NY.

The effect of endocrine disrupting chemicals (EDCs) on human and wildlife health, reproduction and development has been of growing concern over the past couple of decades. EDCs disrupt the production and/or biological activity of chemical messengers known as hormones. EDCs consist of a diverse group of molecules that are both naturally and synthetically produced. Since EDCs are found in the environment, food, and consumer products, humans are routinely exposed to these chemicals through ingestion and inhalation. The goal of this project is to test whether the putative EDC Di-n-pentyl phthalate (DPP) affects the viability and/or development of the fruit fly *Drosophila melanogaster* a classic invertebrate model organism. The fruit fly should be a very good system for studying the effects of EDC exposure because historically invertebrates have been great systems for testing chemicals for toxicity. Moreover, the *Drosophila* endocrine system shares a number of common features with vertebrate endocrine systems including endocrine glands, circulating hormones and nuclear hormone receptors (NHRs). To assess the effect of DPP on adult viability, newly eclosed 0-24 hr wild type Oregon R flies were fed 10, 100, 1000, 10,000, 50,000 and 100,000 ppm DPP over a period of 14 days and compared to control flies. The effect of developmental exposure to DPP on *Drosophila* pupation and metamorphosis were also observed. The number of pupae formed and the number of adult flies, which eclosed were counted and compared to untreated control flies. Our data indicate that 10-10,000 ppm DPP do not affect either fly development or viability. However, preliminary experiments suggest that 50,000 and 100,000 ppm DPP decrease viability and may also disrupt development. Future experiments will analyze the mechanism of DPP toxicity and further investigate the effect of DPP on *Drosophila* development.

Herbivory of Leaves from the Brooklyn Bridge Park and Marine Park in Brooklyn, New York. Mamuna Faizi, Alina Zhyvotovska, Michelle Batchu, Allen Burdowski and Kathleen Nolan, St. Francis College, Brooklyn, NY.

The Brooklyn Bridge Park and Marine Park are located in very different places and represent different ecosystems in Brooklyn. Different challenges face plants in each locale. For example, Brooklyn Bridge Park has only been

open for the past three years and many trees have been planted there. In other words, there are few native trees there. However, Marine Park is a more established park, so we hypothesized that the pattern of herbivory would be different there. We collected and photographed over 300 leaves that exhibited herbivory, most likely through insects. Using Image J, free-downloadable software from NIH, the area of herbivory was calculated and compared to that of the total leaf area. Interesting patterns have emerged that have sparked our interest to learn more about this phenomenon and what is causing it.

Detection and Identification of Phytoplankton in Delaware River near New Hope, PA and Lambertville, NJ. Annamarie Fernandes, Mohammed Junaid Alam, Jonathan Morales and Tin-Chun Chu, Seton Hall University, South Orange, NJ.

The Delaware River is known to be polluted from hazardous wastes, raw sewage, household refuse, coal mines and oil wells. In addition, natural contamination such as algal bloom has been reported as a common problem as well. Water samples were collected from six sites on Delaware River near New Hope, PA and Lambertville, NJ. GPS coordinates of all sites and water chemistry parameters including pH, temperature and dissolved oxygen content were recorded. Five out of the six samples had low dissolved oxygen (< 2 mg/L) content. The samples were filtered through a coarse filter (pore size: 2.7 µm) and a fine filter (pore size: 0.45 µm). Genomic DNA extraction was carried out by modified Chelex methods. Polymerase Chain Reaction (PCR)-based assay and gel electrophoreses were carried out to detect different phytoplankton. Primers used in this study include CYA359F/CYA781R, PSf/Ur, ANAf/ANAr, CPC1f/CPC1r and 27Fb/781R. The best Gel electrophoreses results showed that cyanobacteria and other photosynthetic bacteria are present in the Delaware samples.

A Study to Determine Microsatellite DNA Markers for Population Identification of Summer Flounder (*Paralichthys dentatus*). Pablo C. Figueroa, Arshad Mahmood and Z.M.G. Sarwar Jahangir, Kingsborough Community College, Brooklyn, NY.

A microsatellite DNA represents segment of DNA in the genome containing a mono- di- tri- or tetra- nucleotide non-genic repeats such as as (A)₃₀, (AT)₁₅, (GC)₁₅ and (ATGC)₈. Several such microsatellites were found to identify populations of brown trout (*Salmo trutta*), Pacific trout

(*Oncorhynchus mykiss*), marble trout (*Salmo marmoratus*), two cichlids (*Pseudotropheus zebra* and *Haplochromis nigricans*), California red abalone (*Haliotis rufescens*) and rainbow trout (*Oncorhynchus mykiss*). Recently, populations of several other fishes, Alaska Pacific cod (*Gadus morhua*), Northern European plaice (*Pleuronectes platessa* L.), and Northern Pacific starry flounder (*Platichthys stellatus*), were determined using microsatellite DNA. Our study aims to develop a microsatellite DNA motif as a marker to identify summer flounder populations present in the east coast of USA. Summer flounder constitutes an important food fishery and recreational fishery mainly from Maine to North Carolina in USA. Due to overfishing in the past, the commercial landings of summer flounder declined from 18,000 mt in 1979 to 6,081 mt in 2012. Since, the structure of summer flounder populations are still not known with certainty, determination of a microsatellite DNA to identify its populations will help in its scientific management. We are reporting here the work in progress to identify summer flounder microsatellite DNA for its population identification. We collected several samples of summer flounder originated from the coast of Connecticut to Massachusetts, isolated their nuclear DNA separately using homogenizing and solubilizing buffers following phenol extraction method. The purity of the DNA samples were determined by reading the OD₂₆₀/OD₂₈₀ ratio reaching ≥ 1.8 . Using a standard PCR protocol, forward primer (5'-CCGCTTAACTCTCAGCCATC-3'), reverse primer (5'-TCAGGGTGACCAAAGAATCA-3') and Ready-To-Go PCR beads we were able to amplify a microsatellite DNA. The sequence of the microsatellite DNA will be presented at the MACUB conference.

Utilizing a Community Cichlid Fish Tank for Animal Behavior Studies. Francine Foo, James Foo, Andrew Salzillo and Kathleen Nolan, St. Francis College, Brooklyn, NY.

A large 100 gallon fish tank, prominently placed in a public place on display at St. Francis College, has served as a unique opportunity for our students to study animal behavior using cichlids. The tank can be partitioned into 3 viewing regions using vertical stripes of clear adhesive tape. Students can, using timers, view the movement of the fish, one fish at a time. They can record each time a fish moves into a different partition. They might find that some fish are more territorial than others. Separate smaller ten-gallon tanks can then be set up to house individual cichlids. Fish A was introduced into a tank with Fish B, only to see Fish B chase and bite Fish

A. The experiment was repeated, but Fish A did not even attempt to face Fish B; it only exhibited avoidance behavior. The reverse experiment was attempted a few days later, in which Fish B was introduced into a tank with Fish A, who became the new aggressor. The fish also changed colors, and their stripes became more prominent.

Analysis of Profenofos Exposure in Egyptian Agricultural Workers. Danielle Forde-Riddick¹, James Olson², Barb McGarrigle², Steve Singleton² and Oswald Dadson², ¹Medgar Evers College, Brooklyn, NY and ²University of Buffalo, Buffalo, NY.

Organophosphates are the basis of many insecticides, herbicides and nerve gases. Organophosphate pesticides (OPs) are commonly used pesticides worldwide and act by irreversibly inactivating acetylcholinesterase (AChE), an enzyme inactivating acetylcholine. The ability of OPs to inhibit AChE increases potential for neurotoxicity in humans exposed to these pesticides. The OPs, profenofos, is active in its native form, and following dermal absorption, is biotransformed and detoxified to metabolites, including 4-bromo-2-chlorophenol (BCP), which is excreted in urine. Male adolescent pesticide applicators aged 12-21 were enrolled in this study from 2 villages in the Menoufia governorate in Egypt. They spray profenofos in cotton fields in the Nile delta. This study assessed extent of human exposure to profenofos in this setting. It was hypothesized urinary levels of BCP can serve as a sensitive and specific biomarker of exposure to profenofos. Urine samples were collected shipped to the Univ. at Buffalo for analysis of BCP. 1 mL aliquots of each urine sample were thawed and mixed prior to addition of 50 ng of an internal standard, 2,4,5-trichlorophenol. Samples were hydrolyzed at 80°C for 1 hour with 100µl of 12 N HCl, and extracted with 1 mL of toluene. Extracts were derivatized with N, O-Bis(trimethylsilyl)trifluoroacetamide at 70°C and analyzed by gas chromatography-electron capture detection. Urine creatinine concentrations ranged from 0.7 – 4.1 mg/ml and urine BCP concentrations for each worker were expressed as µg BCP/g creatinine. BCP was detected in urine of most applicators, indicating that most but not all workers were exposed to OPs. The results indicate exposures to profenofos varied widely in a group of agricultural workers classified as applicators. Future studies investigating associations of adverse health effects with profenofos exposure should utilize urine BCP as a quantitative biomarker of profenofos exposure, rather than simply relying on job classification to designate an exposed group.

Rat Model of Alzheimer's Disease with Measures in Sleep-Wake EEG and Memory Deficits Elizabeth Franco¹, Danish Bissessar², Alcides Hernandez², Cynthia Castro² and Francisco Villegas², Queensborough Community College¹, Bayside, NY and ²York College of CUNY, Jamaica, NY.

Alzheimer's disease (AD) is one of the most common neurodegenerative disorders affecting over 5.5 million people in the United States. Patients with AD exhibit a decline in cognitive functions and often results in death 3 to 9 years after diagnosis. In addition to memory deficits AD patients exhibit severe sleep/wake disturbances, insomnia, nighttime awakenings, and increases daytime sleep. Amyloid β -peptides play an important role in the pathophysiology of AD causing alterations in sleep-wake patterns, and deficits in cognitive functions. A rat model of AD is used to investigate the effects of intracerebroventricular (icv) infusions of Amyloid β -Peptide 25-35 [$A\beta$ (25-35)] on measures of cognitive behaviors and electroencephalograph (EEG) sleep-wake patterns. Twenty four male Sprague-Dawley rats are divided into three experimental groups and injected with $A\beta$ (25-35) or $A\beta$ (35-25). Fourteen day post operation the rats are connected to the EEG recording system to assess sleep-wake patterns. The Social Discrimination Test is administered to assess short term olfactory memory processes. Sections of the hippocampus are used to detect neural cell loss with cresyl violet staining and thioflavin-S is used to confirm positive Amyloid deposits. We would like to thank Dr. Panayiotis Meleties and the students that participated in the Summer Research Program, funded by the U.S Department of Education. We would also like to thank Dr. Patricia Schneider and the support of the Bridges to the Baccalaureate Program of NIGMS.

Engineering the Coiled-coil Domain of Cartilage Oligomeric Matrix Protein for Dual Delivery of Small Molecules and Nucleic Acids. Joseph A. Frezzo^{1*}, Haresh More¹ and Jin Kim Montclare^{1,2}, ¹Polytechnic Institute of New York University, Brooklyn, NY and ²SUNY Downstate Medical Center, Brooklyn, NY.

With the discovery of naturally occurring cell penetrating peptides, research has been directed at engineering similar peptides and proteins for transport of cargo into cells to invoke biochemical

and genetic changes. In mimicking the evolution of cell penetrating peptides, peptides and proteins are engineered to exhibit an external surface rich in positive charges which is theorized to electrostatically interact with negatively charged residues present on the extracellular face of cell membranes. Compared to cell penetrating peptides, this interaction is enhanced in inherently larger and more structured proteins endowed with positively charged residues spread out over a larger surface area. Presented here is evidence of the N-terminal coiled coil domain of Cartilage Oligomeric Matrix Protein (COMPcc) engineered by mutating the solvent exposed residues to arginine which endow its translocation through plasma membrane. The resultant highly positively charged COMPcc exhibits binding to DNA and siRNA. The homopentameric COMPcc with hydrophobic core can bind to the small molecules such as vitamin D, vitamin A and antiproliferative agent, curcumin. With this small molecule-binding pore kept functionally intact, this engineered COMPcc protein thus exhibits the ability to bypass the cell membrane and transport both small molecules and nucleic acid into the cell. This work was supported by the GK-12 Fellows Grant DGE-0741714.

A Successful DNA Extraction and Sequencing of American Shad (*Alosa sapidissima*) Co1 Mitochondrial DNA from Twenty-year-old Scales. Michael Friedman and Kathleen Nolan, St. Francis College, Brooklyn, NY.

DNA from twenty-year-old shad scales was extracted successfully with a phenol-chloroform-isoamyl alcohol mixture. The authors were reluctant to use this method as it produces toxic fumes and needs to be conducted under a hood. However, two commonly-used extraction methods, DNeasy Kits by Qiagen and a chelex method were attempted unsuccessfully. A Co1 mitochondrial DNA fragment was successfully amplified by PCR using universal herring primers. These samples were sequenced, and, so far seven sequences have been obtained that successfully matched with *Alosa sapidissima* in a BLAST. The authors have isolated DNA from 120 scale samples from five different rivers and will attempt to use Co1 genes as well as genes that might yield more variation to help delineate population structure of this depleted migratory species.

Presence of Manganese in Store Bought Fertilizers Which Do Not List It As Present. Shannel Galloway, Melissa Stapelton, Emmanuel Cenord, Karl Ruddock and Dereck Skeete, Medgar Evers College, Brooklyn, NY.

Manganese is a naturally occurring element, essential in trace amounts for living organisms, but is potentially toxic in high concentrations. Certain occupations including mining, welding and steel manufacturing can expose workers to chronically high levels of manganese, leading to a clinical condition known as Manganism, which has Parkinson like symptoms. The mechanism of manganese toxicity is not fully understood, and effective treatments for this condition are still being developed. During the summer many homeowners use fertilizers to increase the productivity of their gardens and to protect the gardens from overgrowth of weeds. Some fertilizers may contain manganese which if it become airborne can be a health hazard. Also it is possible that manganese can accumulate in vegetables and fruits grown where these fertilizers are being used. We hypothesized that store bought fertilizers may contain levels of manganese even when their content label does not indicate it. This research aimed to ascertain whether or not manganese was present in three different brands of fertilizers which did not list manganese on their content labels. Samples (0.5 g) of each of the fertilizers were digested with nitric acid in a CEM Discovery Microwave Digester. Digested samples were analyzed for manganese levels using electrothermal vaporization with deuterium lamp background correction in a Perkin Elmer AA800 Atomic Absorption spectrophotometer with a THGA graphite furnace. We found that each of the 3 different fertilizers contained measurable amounts of manganese, ranging from 46 - 68 µg manganese/g, even though manganese was not listed on their content labels. The study shows the presence of manganese in fertilizers and this indicates that further studies of the possible accumulations of manganese in produce should be conducted.

Effect of Alcohol Abuse on *Acinetobacter baumannii* Pneumonia. Jay Gandhi¹, Melissa B. Asplund¹ and Luis R. Martinez^{1,2}, ¹Long Island University-Post, Brookville, NY and ²Albert Einstein College of Medicine, Bronx, NY.

The medically relevant pathogen *Acinetobacter baumannii* (*Ab*) is a Gram-negative bacterium that has gained particular notoriety as one of the leading causes of opportunistic hospital-related infections worldwide. As a consequence of its infamous ability to acquire or upregulate antibiotic drug resistance

determinants, it has justifiably been propelled to the forefront of medical attention. The organism commonly targets the most vulnerable hospitalized patients, those who are critically ill with breaches in skin integrity and airway protection. A particular at risk group for *Ab*-associated pneumonia are individuals with a history of alcohol abuse who characteristically have a fulminant clinical course with secondary bloodstream infection and mortality rate of >50%. The source of infection may be carriage in the nasopharynx, which occurs in up to 10% of community residents with excessive alcohol consumption. Our study is important because the effect of alcohol abuse on the human body's immune response to an opportunistic pathogen has not been extensively investigated. Therefore, we hypothesize that alcohol abuse enhances *Ab*-mediated pneumonia leading to systemic infection. Using a mouse model of alcohol abuse, we show that alcohol decreases survival in treated mice compared to control. Alcohol enhances *Ab*-mediated pneumonia causing profound effects on the animal's immune system; this substance of abuse abrogates normal neutrophil function, resulting in an inability to control the disease. *Ab* disseminates from the lungs to the liver in 24 h and to the kidneys in 72 h after intranasal infection. We observe that alcohol administration and *Ab* infection alter pro-inflammatory cytokine release leading to serious microbial disease. The ability of *Ab* to cause disease in alcoholics makes the study of its virulence mechanisms and host interactions crucial in order to develop better public health strategies to decrease the susceptibility to disease of individuals at risk as well as generate novel approaches to patient care.

Modification of a Yeast Strain Towards the Creation of a Light Activated Elongation Factor. Corey Gaylets, Basil Hussain, Rebecca Zordan and Brendan Cormack, Johns Hopkins University School of Medicine, Baltimore MD.

Elongation Factor 2 plays a critical role in protein synthesis. During the elongation step of translation Elongation Factor 2 catalyzes the movement of the ribosome downstream the mRNA strand allowing the binding of additional tRNAs and extension of the growing polypeptide chain. Through deletion of the Elongation Factor genes on *Saccharomyces cerevisiae* genome and the introduction of the EFT1 gene into a plasmid vector, a mutagenized copy of EFT1 modified with a transposon containing a LOV (Light, Oxygen, or Voltage) domain will be introduced into the cell creating a light activated Elongation Factor. The strain of *S. cerevisiae* with this protein will be dependent upon light for growth.

Morphological Technique to Analyze Mast Cell Distribution in Surviving Organotypic Culture of Zebrafish (*Danio rerio*) Optic Tectum. Maria Gomez¹, Kadeem Lambert¹, Kristin Polizzotto¹, Christopher Corbo² and Zoltan Fulop². ¹Kingsborough Community College, Brooklyn, NY and ²Wagner College, Staten Island, NY.

Mast cells are granular cells found in connective tissue that secrete histamine, heparin, and serotonin, in response to allergic reactions, inflammation, or injuries. More recently mast cells have been identified in the central nervous system of several different animals including zebra fish (*Danio rerio*). Previous work from our lab has shown that mast cells are present in cultured zebrafish optic tectum and may play a role in tissue regeneration. We hypothesize that the distribution of mast cells will vary spatially and temporally in regenerating zebra fish brain tissue. In our study, we used morphometrical techniques to analyze mast cell distribution in surviving organotypic cultures of zebrafish brains. The optic tectum, which functions in visual processing, had been previously cultured in vitro. Earlier research included sectioning and staining the surviving cultures at 2,6,12,24,48,96 hours and 7 days. The tissue sections were stained with toluidine blue, a dye specific to mast cells. We examined sections from 3 fish, from the different time points mentioned above. Using Image J and Photoshop, we constructed montages of each tissue sample from images taken at 20x with an Olympus compound light microscope equipped with a digital camera. We then superimposed a grid on the montage and randomly selected 10 squares on the grid. In these squares we counted the mast cells and summarized their distribution over time in culture. The results demonstrated that mast cells were distributed in larger numbers in the later time points.

Mapping Determinants in the gp41 CT of HIV-1 Env that Mediate Resistance to Antibody Neutralization During Cell-cell Infection. Essanna Gray¹, Natasha Durham² and Benjamin Ch6en², ¹Long Island University, Brooklyn, NY and ²Mount Sinai School of Medicine, New York, NY.

Human Immunodeficiency Virus Type 1 (HIV-1) uses its surface envelope glycoprotein (Env) to mediate entry into CD4+ T-cells. Env is made up of a surface domain, gp120 and a transmembrane domain, gp41. Env plays a crucial role in the fusion of the viral membrane to a target cell

membrane. During direct T-cell to T-cell infection mediated by the virological synapse (VS), Env also initiates cell-cell adhesion in a CD4 dependent manner. Entry of viral capsids into a target cell resulting from this fusion can be blocked by neutralizing antibodies. However VS-mediated infection is more resistant to neutralization compared to cell-free infection. The transmembrane region of Env, gp41 has a cytoplasmic tail (CT) made up of 151 amino acids that has been shown to aid in the fusion process and play a role in HIV-1's resistance to neutralizing antibodies during cell-cell infection by regulating the exposure of neutralizing epitopes on the cell surface. Complete truncation of the gp41 CT makes VS-mediated infection more sensitive to antibody neutralization. Our goal is to determine which region of the gp41 CT aids in the resistance of HIV-1 to neutralizing antibodies. We hypothesize that specific structural features in the CT regulate HIV-1 neutralization and certain amino acids correspond to the exposure of neutralizing epitopes. To map these putative conformation altering motifs, we constructed a series of C-terminal truncations in the gp41 CT. After verification by restriction digests and sequence analysis, the mutant viral clones were transfected into 293T cells to produce virus for infectious assays. The efficiency of virus production was quantified by p24 ELISA and the size of the mutant Env were confirmed by Western blots. Infectivity and neutralization assays are being performed to evaluate how these truncations affect HIV-1's infectivity and its resistance to neutralizing antibodies during cell free and cell-cell infection.

The Impact of Japanese Knotweed on Stream Water Content of the Peckman River, NJ. Masha Guzner, Mariany Segura, Josh Galster and Dirk Vanderklein, Montclair State University, Montclair, NJ.

With New Jersey's ever growing population, it is imperative to preserve as much fresh water as possible in its watersheds. In the last decade New Jersey has experienced several droughts and we are interested in finding ways to reduce fresh water resource depletion. Data collected in previous years show that there may be a significant correlation between the prevalence of an invasive plant species, Japanese knotweed, and water loss in streams belonging to the Passaic River watershed. To assess the impact of Japanese knotweed on stream water loss, we estimated total knotweed distribution at five sites

along the Peckman River, a tributary of the Passaic River. At four sub-plots within these sites, physiological measurements were taken from randomly selected plants from sunrise to sunset once every hour to observe transpiration rates per unit leaf area. In order to scale these transpiration rates to the stand level, we determined total leaf area for each stand and multiplied this by transpiration rate. Additionally, for all plots, we measured the diameters of all of the Japanese knotweed stems within two or three 4m² patches. The leaves were collected per stem for surface area measurements to find a relationship between stem diameter and total leaf area, and average leaf area per stem diameter. These data were used to determine total leaf area for each plot and Leaf Area Index (LAI, leaf area per unit ground area). We report the results of our findings in this poster. This work was supported by a Sokol Student Faculty Research Award granted to Drs. Galster and Vanderklein.

Synergistic Effect of Epigallocatechin Gallate (EGCG) and (EGCG)-Stearate with Ampicillin on Bacterial Growth Inhibition. Umme Habiba, Hassan Tahir and Lee H. Lee. Montclair State University, Montclair, NJ.

The anti-cariogenic, anti-inflammation, anti-cancerous, and antioxidant properties of green tea polyphenols have been studied for decades. The green tea polyphenol, epigallocatechin gallate (EGCG) is the most active molecule involved in these beneficial effects. With the ever growing concern of antibiotic resistance and the search for novel antibiotic treatments, EGCG and its derivatives are potential candidates of alternative therapy. Nine selected bacteria separated into gram negative bacteria: *Escherichia coli*, *Pseudomonas aeruginosa*, *Serratia marcescens*, *Enterobacter areogenes*, ampicillin resistant *E. coli*; gram positive bacteria: *Bacillus megaterium*, *Staphylococcus aureus*, and *Staphylococcus epidermidis*, and acid-fast bacteria: *Mycobacterium smegmatis*, were observed in this study. The bacterial cultures were treated with various concentration of EGCG (0.5%, 0.75%, 1% and 5%) or EGCG-Stearate (0.5%, 0.75%, 1% and 5%) separately or in combination with different concentrations of Ampicillin (0.1 %, 0.5%, 0.75%, 1% and 5%). The growth was monitored by turbidity study using microplate readers at 650nm for a 24 hour period. The effect of EGCG and EGCG-Stearate with or without Ampicillin was determined by percentage of inhibition in comparison with the control. The results indicated that the gram positive bacteria are more sensitive to the treatment than gram negative and acid-fast

bacteria. With EGCG or EGCG-Stearate concentrations lower than 1%, the percentage of inhibition was less than 50%. 1% EGCG or EGCG-Stearate with or without 1% ampicillin inhibited the growth for more than 50%. 5% EGCG or EGCG-Stearate in the presence or absence of ampicillin severely inhibited the growth of most bacteria with a percentage inhibition of 90 to 100%. This profiling study demonstrates that EGCG and EGCG-Stearate in combination with ampicillin can efficiently inhibit the growth of bacteria. Future studies will examine their effect at a molecular level on specific bacteria: *E. coli*; *P. aeruginosa* *S. aureus*, and *S. epidermidis*.

The Role of SIT-1 in Osteoblast Differentiation. Afzal Hussain¹, Akhlema Haidar¹, Steven Popoff² and Thomas Owen¹, ¹Ramapo College of New Jersey, Mahwah, NJ and ²Temple University School of Medicine, Philadelphia, PA.

In our studies to discover novel genes involved in bone formation, SIT-1, or signaling threshold regulating transmembrane adaptor 1, was identified as being potentially involved in regulating bone mass. SIT-1 is a transmembrane adapter protein which interacts with and is phosphorylated by the non-receptor tyrosine kinase c-src. SIT-1 has been studied by others only in terms of its immunological properties, specifically in its negative regulation of T-cell receptor (TCR) signaling. However, its phosphorylation by the c-src kinase in the context of TCR signaling strongly suggests that it might also be involved in signaling in osteoblasts. This is because knocking out the c-src gene in mice leads to increased osteoblast activity and bone mass. Thus, the SIT-1 gene may be an important component of the c-src signaling pathway in bone. We are studying the role of SIT-1 in osteoblast function by transfecting human SaOS osteosarcoma cells with a vector from which the SIT-1 protein is overexpressed. The effects of SIT-1 overexpression are being analyzed in these cells by determining changes in alkaline phosphatase, an enzyme whose expression increases with osteoblast differentiation. Preliminary data suggest that indeed, overexpression of SIT-1 in osteoblasts increases alkaline phosphatase enzyme activity. We are also analyzing the expression of SIT-1 on the mRNA level at various times during the differentiation of osteoblasts in order to begin to further elucidate its role in the process. This work was supported by the Ramapo College TAS Research Honors Program and the Ramapo College Foundation.

Neurotoxic Effects of Manganese on GABAergic Innervation in the Bivalve Mollusc *Crassostrea virginica*. Kelly Jackson¹, Jumoike Ogunnoiki², Edward J. Catapane² and Margaret A. Carroll², ¹Kingsborough Community College, Brooklyn, NY and ²Medgar Evers College, Brooklyn, NY.

High levels of airborne manganese cause Manganism, a neurotoxic, Parkinsons-like disease in humans by interfering with dopaminergic neurotransmission in brain. Recent studies are showing GABAergic neurons also are damaged by manganese. *C. virginica* contains a dopaminergic and serotonergic innervation of its gill. It is a simple system to study manganese toxicity. Previously we showed manganese disrupts dopaminergic innervation. We also showed the cerebral ganglia of *C. virginica* contains GABA and within the cerebral ganglia GABA inhibits serotonergic innervation of gill lateral cell cilia. Here we studied if ganglia and peripheral tissues contain GABA receptors, and if manganese has effects on GABA neurons within cerebral ganglia of *C. virginica*. We used primary antibodies (GABAA Ra1-6) and secondary antibodies (IgG-FITC) to detect GABA receptors with paraformaldehyde fixed, paraffin embedded tissues using a Zeiss epilume fluorescence microscope and ProgRes C3 Peltier cooled camera. We found fluorescence due to GABA receptors in cerebral ganglia, visceral ganglia, palps and digestive tract. We also examined effects of manganese treatments on GABAergic inhibition of serotonin neurons in cerebral ganglia. Beating of lateral cilia in gill cells were measured by stroboscopic microscopy. Applying serotonin to cerebral ganglia caused a dose-dependent increase in cilia beating. Applying GABA prior to serotonin prevented the increase. Acute applications of manganese (50 and 500 μ M) prior to GABA prevented GABA from inhibiting serotonin. The study is showing GABA receptors are present in ganglia and peripheral tissues in *C. virginica*, and acute manganese treatments damage GABA neurons. *C. virginica* preparations are good, simple test preparation to study the GABAergic system and the mechanism underlying the neurotoxic effects of manganese.

Assessing the Microbial Diversity of Soil Samples Using Molecular Approaches. Joyce Jahnke and Fernando Nieto, SUNY College at Old Westbury, Old Westbury, NY.

Soil microorganisms play a critical role in the detrital food web as the main constituents of the decomposers trophic level in terrestrial

ecosystems. Nutrient cycling and energy flow processes in the soil ecosystem is mainly driven by the trophic interactions of these microorganisms. Understanding the structure and biodiversity of the microbial community can help us understand better these critical ecosystem level processes. The purpose of this study was to estimate the microbial biodiversity of the soil using a molecular approach. Total DNA from soil samples was extracted, and purified. Universal primers were used to amplify the prokaryotic 16S and eukaryotic 18s rDNA genes from the metagenomic sample. The PCR products were then cloned into competent *Escherichia coli* cells and the plasmid DNA of transformed clones carrying inserts was extracted purified and sequenced. The sequences of a total of 47 clones with prokaryotic inserts were uploaded as FASTA formatted text files into the Michigan State University's Ribosomal Database Project (MRDP) for identification and phylogenetic analysis. All the sequences were successfully uploaded and aligned to known database sequences. The program's classification tool uses Naive Bayesian rRNA Classifier version 2.2 and the taxonomical hierarchy was based on Bergey's Manual. We were able to classify our clones into twenty-one different bacterial genera. We are currently creating a phylogenetic tree using tools available at MRDP. In addition the same approach is currently being used to study eukaryotic plasmid clones.

Impacts Of Beach Nourishment On Asiatic Sand Sedge Invasion. D. Patrick James, Andrew M. Bohackyj and Pedram P. Daneshgar, Monmouth University, West Long Branch, New Jersey.

Beach nourishment or artificial addition of sediment to a beach, a common practice for rebuilding beaches for recreation and storm protection, can have positive or negative effects on the flora and fauna of dune communities. Little work has demonstrated the consequences of beach nourishment on the impacts of invasive plant species that thrive on dunes. Beach nourishment could lead to either extirpation of invasive species or supply new niches that facilitate further invasions. We explored the impacts of beach nourishment on the invasion of Asiatic sand sedge (*Carex kobomugi*) at three study sites at Island Beach State Park in New Jersey. We tested the hypothesis that nourishment promotes sedge invasion by subjecting dune communities of sedge, American beach grass and seaside goldenrod to 5 burial

depth treatments ranging from 0 burial (control) to 24 inch burial. Growth responses were monitored by quantifying emergent individuals in each of the treatments and by collecting all biomass within each treatment area at the end of the season. Physiological responses were evaluated using an infrared gas analyzer to quantify photosynthesis rates. Photosynthesis rates and burial depth were positively correlated in sedge and negatively correlated in goldenrod. In addition, goldenrod within the invaded area exhibited significantly lower photosynthesis rates than those individuals in non-invaded communities. Burials lead to a reduction in community diversity and native species biomass, while favoring the invasive species. The results suggest that beach nourishment will promote Asiatic sand sedge invasion to the detriment of native species.

Determination of Whether a Small Population of Eastern Oysters (*Crassostrea virginica*) Discovered in Jamaica Bay, NY is a Natural or Introduced Population. Claude Jean-Guillaume, Gary Sarinsky and Craig Hinkley, Kingsborough Community College, Brooklyn, NY.

The Eastern oyster (*Crassostrea virginica*) is a bivalve mollusk once present in large numbers in bays along eastern coast of North America. Eastern oysters were once abundant in Jamaica Bay, New York, but there are no longer any known natural oyster beds. Recently, a small population of oysters was discovered in Jamaica Bay. Since the only known oysters in the bay for the past years have been those experimentally introduced, the question we asked is where did these oysters originate? In 2001, oysters were introduced into Jamaica Bay in an experiment to determine if the water quality and environmental conditions in the bay were suitable for their survival. Our hypothesis is that the newly discovered oysters are offspring of the oysters from the 2001 experiment. To test this hypothesis, we isolated DNA from gill and mantle tissues of five oysters from this small population in Jamaica Bay and used the DNA to amplify a 700 base pair region of the mitochondrial cytochrome c oxidase I (mtCOI) gene. The correct size of the PCR-amplified DNA was verified by agarose gel electrophoresis and the DNA was sequenced by Elim Biopharmaceuticals. The mtCOI genes from 69% of oysters in the 2001 study contain a single nucleotide polymorphism that distinguishes them from eastern oysters of other geographic regions. Comparison of sequences from the five new oysters to sequences of oysters from the 2001 study showed that none of the new oyster sequences contained this distinguishing polymorphism. While it is still possible they are

offspring of oysters from the 2001 experiment, our hypothesis has to be rejected since it is not supported by our results. In the future, we would like to examine more oysters from Jamaica Bay to be more certain whether they are offspring of oysters from the 2001 study. This work was supported by grant 0537121091 of the CSTEP Program of the NYS&ED.

Octopamine Has a Dual Effect on Heart Rate of *Crassostrea virginica*. Addy Jean Louis, Ruma Hoque, Margaret A. Carroll and Edward J. Catapane, ¹Kingsborough Community College, and ²Medgar Evers College, Brooklyn, NY.

Octopamine, a biogenic amine first identified in octopus, is well studied in arthropods and gastropods serving as a neurotransmitter and hormone. Its presence and functions have rarely been reported in bivalves. We identified octopamine in cerebral and visceral ganglia, gill, palps and hemolymph of the oyster *Crassostrea virginica*. We found octopamine is cardio-acceleratory applied to animal preparations and speculated it acted as a neuro or endocrine agent. The heart in *C. virginica* is innervated by a nerve from the visceral ganglia and also responds to hormones. We examined effects of octopamine on heart rate of *C. virginica* when applied to the visceral ganglia of animal preparations or to isolated hearts. Heart rates were monitored with a Narco Systems Physiograph. Data were collected and analyzed with a DATAQ DI-700 Data Acquisition System. Average heart rate of animal preparations was 5.5 beats/min. Superfusion of octopamine (10^{-6} - 10^{-3} M) onto visceral ganglia increased the rate to 9.3 in a dose dependent manner. Average rate of isolated heart preparations was 13.4. Bath applications of octopamine (10^{-6} - 10^{-3} M) decreased it to 0. The actions of octopamine were prevented by using the antagonist phentolamine. The study shows octopamine affects heart rate in two different fashions, depending on the site of application. Bath applications to isolated heart decreases heart rate. When applied to visceral ganglia octopamine increases heart rate. An explanation for the divergent results is if octopamine is activating different receptors in the different locations. Superfusing octopamine to ganglia causes it to stimulate receptors on different neurons at the same time, the end result would be due to the various nerves that were being simultaneously stimulated, which would not be what happens in the animal's normal physiological actions. Under normal conditions octopamine would be discretely released to stimulate discrete neuronal circuits at a particular time.

Correlations Between Adults, Eggs, Hatchlings, and Juveniles: A Metadata Analysis on Horseshoe Crabs (*Limulus polythemus*) on Plumb Beach, Brooklyn, New York. Emilia Jerez and Christina Colon, Kingsborough Community College, Brooklyn, NY.

The purpose of this research was to examine what environmental factors affect horseshoe crab spawning success. It was hypothesized that conducting a metadata analysis using spawning data summaries collected from Plumb Beach would reveal consistent correlations. Egg, hatchling, and juvenile data were collected May to June 2011 and 2012. Sand core samples, 5cm and 20cm, were collected and sifted in lab. Timed visual surveys and line transects conducted at low tides counted hatchlings and juveniles. Spawning horseshoe crabs were surveyed between April and June 2009 through 2012, during new and full moon high tides. Spawning adult counts peaked during the 2011 and 2012 solar eclipses. However, 2009 and 2010 had no such event. Counts were highest when water temperatures passed 10 degrees Celsius during April 2009 and 2011. Therefore, early spring does not bring more horseshoe crabs. In 2011, despite relatively fewer females, viable egg counts were higher than nonviable eggs. For 2012, larger female proportion had higher nonviable eggs percentage. This suggests that more spawning adults mean more eggs, but does not mean more viable eggs. In 2011, there was a higher egg count (33202), but <1% proceeded trilobite stage. In 2012, viable egg count was lower (16481) with 6% proceeding trilobite stage. There is no correlation between high viable egg counts and high trilobite percentage. Also, despite low percentage eggs maturing to trilobites in 2011 and 2012, high trilobite percentage matured to hatchlings. In conclusion, it is evident that more eggs do not yield more trilobites but corresponds to more hatchlings. This project was made possible through a Kingsborough President's Faculty Innovation grant, grant 2R25GM06003-05 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537101091 of the CSTEP Program of the NYSED and NOAA Sea-grant. Gratitude is due to Dr. Sarinsky, Dr. Botton, and Dr. Rowden.

The Effect of Bayberry Extract to Enhance the Activity of Antibacterial Antibiotics. Nyeasha N. Johnson, Mary T. Ortiz and Loretta Brancaccio-Taras, Kingsborough Community College, Brooklyn, NY.

Prior to modern medicine, herbal supplements were used to treat certain health conditions. The focus of this study was bayberry extract (BE), an herbal supplement advertised as possessing antibacterial properties. This result was confirmed in our laboratory. The hypothesis of the study was the combination of BE and selected antibiotics would be more effective in inhibiting bacterial growth. BE was tested for antibacterial activity against two Gram-positives, *Streptococcus pyogenes* and *Staphylococcus aureus* and one Gram-negative, *Klebsiella pneumoniae*. Mueller-Hinton agar plates were swabbed with these cultures. Disks of bacitracin, penicillin, erythromycin, gentamycin, and tetracycline were placed on inoculated agar surfaces. In addition, disks of BE alone and in combination with the aforementioned antibiotics were placed on the plates. Plates were incubated at 37°C for 24-48 h. Zones of inhibition were measured (mm) and statistically compared using the Friedman Test ($p=0.05$). BE produced an average zone size ($n=6$) of $19.83 \pm 1.76\text{mm}$ ($\pm\text{SEM}$) against *S. pyogenes*. This value was found not to be statistically better than any of the antibiotics. For *K. pneumoniae*, BE produced an average zone size ($n=9$) of $16.11 \pm 0.63\text{mm}$; this value was found not to be statistically better than any of the antibiotics. For *S. aureus*, BE produced an average zone size ($n=18$) of $16.73 \pm 0.80\text{mm}$. This value was found not to be statistically better than any of the antibiotics. These results show BE was statistically less effective both alone and in combination with bacitracin. The antibiotics (penicillin, erythromycin, tetracycline, gentamycin) are more effective alone, compared to BE and antibiotic together. These results show herbal supplements have antibacterial activity, but this activity is less than regularly prescribed antibiotics. The hypothesis is rejected. This work was supported by Grant 1R25GM62003 of the Bridges to the Baccalaureate Program of NIGMS and Grant 0516051091 of the CSTEP Program of the NYS Dept. of Educ.

The Biological Role of a Bacterial Diterpene Isolated from MTE4a. Kenya Joseph¹, Monica Trujillo¹, Edith Blackman² and Akira Kawamura². ¹Queensborough Community College, Bayside, NY and ² Hunter College, New York, NY.

MTE4a is an Actinomycetes strain we have isolated from New York State soil that produces, 17-hydroxy-cyclooctatin, a diterpene, with putative anti-inflammatory properties. We are interested both in elucidating this compound's biosynthesis and its biological role. We hypothesize that 17-hydroxy-cyclooctatin is responsible for anti-inflammatory properties and bacterial cell signaling. Cell to cell signaling is a complex phenomenon that is especially significant in bacteria that respond to a changing environment. The 17-hydroxy-cyclooctatin production in MTE4a is correlated to the early production of blue pigment from MT33, another Actinomycetes strain in our collection, and we have used this link to develop an assay to test cell signaling based on the pigment presence. Our experiments are targeted to both identify 17-hydroxy-cyclooctatin as a produced compound involved in MTE4a's cell signaling and also to observe its anti-inflammatory effects. Results show cellular interaction between MTE4A and MT33, evidenced by early pigment production from MT33.

Functional Expression of Plant Golgi Heme-binding Protein in *Escherichia coli*. Ryan Katz¹, Mngala Tawde² and Paul Freimuth³, ¹SUNY Binghamton, Binghamton, NY, ²Queensborough Community College, Bayside, NY and ³Brookhaven National Laboratory, Upton, NY.

Hemicellulose and other cell wall carbohydrate polymers are synthesized in the plant Golgi complex, although the mechanisms are not completely understood. Heme-binding proteins function in electron transfer reactions and thus play critical roles in maintaining redox balance, crucial to reaction conditions in the Golgi as well as in other organelles. The *Arabidopsis thaliana* Golgi contains a conserved, membrane-anchored heme-binding protein which is closely related in amino acid sequence to heme-binding proteins that mediate oxidative cross-linking of chitin polymers in insect cuticles and generation of bactericidal superoxide radicals by human

macrophages. Therefore we hypothesized the protein may function in electron transfer reactions during synthesis of cell wall precursors. We expressed this protein in *E. coli* to facilitate the study of its structure and function. Remarkably, cell division was arrested immediately after induction of expression, but the growth-arrested cells remained viable. Deletion mutants implicated the heme-binding domain in the toxic mechanism. A non-toxic, insoluble form of the protein also was produced and was refolded *in vitro*. The refolded protein bound heme in a stoichiometric manner *in vitro* but the spectroscopic signature suggested that the redox activity was damaged. We are now optimizing refolding conditions to produce high quality preparations that can be crystallized for structural analysis.

New Locality Record – Temporary Escapee or Colonizing Area. Chuen Yan Lau and Valerie Schawaroch, Baruch College, Manhattan, NY.

A survey was conducted to determine fruit flies in the New York Metropolitan Area. Collections were initially made from August – October 2011 in Canarsie, Brooklyn. Traps were hung in a magnolia tree that grows above a fig tree in a private backyard. Traps that could capture and retain live flies were set out. Each trap contained a fruit with yeast mixture as a food source. Various fruits (orange, watermelon, mango, figs, apple, and banana) were tested. Traps were set out for approximately 3 – 5 days on average. One of the several experiments conducted during this period purpose was to determine if fruit flies were able to successfully reproduce in the traps. Once adults were removed these traps were maintained at field temperatures for two weeks and then any emerged adults and pupae were collected. Over the course of these experiments 7 morphotypes representing approximately 8 species of fruit flies were collected. One of these morphotypes represents a species not native to this area. Is this species an escapee from a fruit shipment to New York and a one season accidental collection or is this species able to survive in the area and is beginning to colonize the New York Metropolitan Area. This Fall season's traps are being set out in the same habitat to see if this species is still present in the New York Metropolitan Area.

The Role of mTORC1 and mTORC2 in UVB-induced Proliferation and Apoptosis. Martha Lewis¹, Theresa D. Carr² and Lisa M. Shantz¹, ¹LIU– Brooklyn Campus, Brooklyn, NY and ²Pennsylvania State University College of Medicine, Hershey, PA.

Mammalian target of rapamycin (mTOR) plays an important role in cell proliferation and survival. mTOR has been shown to exist in at least two complexes, mTORC1 and mTORC2. mTORC1 is inhibited by rapamycin, contains the mTOR catalytic subunit as well as the proteins RAPTOR and mLST8. It shows that mTORC1 phosphorylates p70 S6 kinase 1 (S6K1) and eukaryotic initiation factor 4E binding protein 1 (4EBP1). mTORC2 is known to be the kinase responsible for AKT phosphorylation on Serine 473 (S473). Based on previous research, we hypothesize that mTOR is a useful target in the prevention and treatment of nonmelanoma skin cancer. The goal of this project is to expand those results using wild-type (WT) and RICTOR-null (Rictor^{-/-}) mouse embryo fibroblasts (MEFs). Since phosphorylation of AKT on Threonine 308 (T308) has been reported to be facilitated by S473 phosphorylation, Aim: is to determine the phosphorylation state of AKT T308 in WT and Rictor^{-/-} cells, both with and without UVB treatment and to examine the effect of Torin-2, which inhibits both complex on proliferation in WT and Rictor^{-/-} MEFs. RESULTS : Western blot analysis demonstrated that UVB exposure induces AKT phosphorylation at T308 in both cells suggesting that the absence of mTORC2 signaling does not prevent T308 phosphorylation in response to UVB. MTS analysis showed that mTORC1 inhibition with rapamycin had no significant effect on cell proliferation. Treatment of WT and Rictor^{-/-} cells with Torin-2 decreased proliferation in a dose-dependent manner. Since TORC2 activity is absent in MEFs lacking Rictor, this result suggests the presence of a rapamycin-insensitive mTORC1 activity that may play a role in cell proliferation.

Expression and Purification of Carbohydrate Binding Domain of *Arabidopsis thaliana* Protein Involved in Cell Wall Polymers Assembly. Na Li¹, Monica Rivera¹, Mangala Tawde¹ and ²Paul Freimuth, ¹Queensborough Community College, Bayside, NY and ²Brookhaven National Laboratory, Upton, NY.

Insight into how plants assemble their cell walls will help us design alternative approaches for more efficient breakdown of plant polymers such as cellulose, which can lead to production of biofuels, since the decomposition of the cell wall

polymer network is a major challenge. An increased understanding of the protein-directed mechanisms of cell wall polymer assembly will lead to improved methods of cellulose extraction and depolymerization. Our research is focused on the expression and purification of cell wall-associated enzymes from the plant *Arabidopsis thaliana*, leading to their structural and biochemical characterization. We attempted to express protein Alpha L-arabinofuranosidase (α -L-AF) with a carbohydrate binding module (CBM). The CBM domain protein was previously expressed successfully in *E. coli*, however preliminary crystallization trials produced microscopic crystals too small for diffraction. We explored strategies to purify the CBM domain protein for improved crystallization. Using DpnI mutagenesis we produced constructs with "rare codons" which facilitate ribosome stalling during translation. Also using cell lysis methods such as sonication and BugBuster® protein extraction reagent, followed by ammonium sulfate precipitation and Diethyl-aminoethyl cellulose anion exchange columns, we were able to purify the CBM protein in the soluble form and forward it for X-ray crystallography.

Polyketide Synthase Gene Found in Lichens of Urban New York City Areas but Not in Upstate New York and Rural Pennsylvania. Keith Lobban and Ivan Shun Ho, Kingsborough Community College, Brooklyn, NY.

The make-up of lichen is that of a mycobiont, a fungus responsible for the lichen's consistency, and the photobiont, being either a cyanobacteria or an alga, that deals with photosynthesis. For this, lichens are considered a symbiotic dual organism. It is believed that their relationship is both parasitic and commensalistic. Because of this special relationship they are able to thrive in harsh conditions where they cannot survive individually. Lichens are known to have the ability to produce secondary metabolites to adapt to habitats of extreme conditions. Secondary metabolites are produced by an enzyme called polyketide synthase (PKS). We examined whether the lichens of the northeastern portion of the U.S. contain the gene that codes for this enzyme. Our hypothesis is that lichens in the condense areas likely contain the PKS gene due to air pollution. Samples were collected from the State Park in the Poconos, and Upstate New York (Mount Tremper), New Rochelle, Mount Vernon, and the Bronx River Park. The DNA was extracted and then amplified by polymerase chain reaction (PCR). Gel electrophoresis was then used to

visualize products of PCR. Regions of both tubulin and transposable elements were also amplified as controls. The initial results show that lichens found in the urban setting, namely the Bronx River Park and New Rochelle areas, contain the PKS gene while those found in both the suburbia of Mount Vernon and State Parks of the Poconos and Upstate New York (Mount Tremper), because there being little to no pollution, have little use for the PKS enzyme and therefore did not show PCR product for the PKS gene. This project is made possible by Grant 2R25GM06003 of the Bridges to the Baccalaureate Program of NIGMS and Grant 0537101091 of the CSTEP Program of the New York State Department of Education.

Membrane Lipid Peroxidation Involved in Copper Alloy-Mediated Toxicity in *Bacillus subtilis*. Janet Long and Nidhi Gadura, Queensborough Community College, Bayside, NY.

Copper alloy surfaces are passive, antimicrobial, sanitizing agents that kill bacteria and some viruses. Studies of the contact killing mechanism in *Escherichia coli* implicate the membrane as the target, yet the specific component and underlying biochemistry remain unknown. Our lab is trying to understand the mechanism of copper mediated cell death in several different microorganisms. This study explores the hypothesis that because of the cell membrane differences, compared to *E. coli*, the rate of copper alloy-mediated cell death will be different in endospore forming *Bacillus subtilis*. Survival, lipid peroxidation levels, and DNA degradation were followed in cells exposed to copper alloy surfaces. Lipid peroxidation was monitored with the Thiobarbituric Acid-Reactive Substances (TBARS) assay. Cell death was quantified with a serial dilutions assay, and genomic DNA was extracted to evaluate the mode of death. The results confirm that the increase in lipid peroxidation is associated with increased cell death, and also correlates with genomic DNA degradation. Results also indicate that unlike *E. coli*, there is a rapid initial cell death seen in *Bacillus subtilis* strains; however, the endospores prolong its survival on copper for over 6 hours.

Cyclophosphamide-Induced Murine model of Immunosuppression to Study *Acinetobacter baumannii* Pathogenesis. Swetha Manepalli¹ and Luis R. Martinez^{1,2}, ¹Long Island University -Post, Brookville, NY and ²Albert Einstein College of Medicine, Bronx, NY.

Acinetobacter baumannii (*Ab*) is an opportunistic Gram-negative bacterium responsible for hospital-acquired disease. The organism commonly targets the most vulnerable hospitalized patients, those who are critically ill with breaches in skin integrity and airway protection. Moreover, there is significant morbidity and mortality associated with this opportunistic microbe. In the United States, *Ab* Intensive Care Units (ICU)-acquired pneumonia is usually encountered in 5-10% of patients receiving mechanical ventilation. More than 35% of ICU patients with bloodstream infections die. Both ICU-related conditions typically have late onsets after prolonged hospitalization and prior antibiotic exposure. Currently, there are not well-established animal models of immunosuppression to study *Ab* pathogenesis. Hence, we developed a murine model of immunosuppression using the alkylating agent cyclophosphamide to study *Ab* disease. We hypothesize that cyclophosphamide causes immunosuppression in treated mice increasing their susceptibility to develop *Ab*-mediated pneumonia followed by systemic disease. We show that immunosuppressed animals have reduced survival after intranasal *Ab*-infection. We demonstrate that cyclophosphamide enhances *Ab*-mediated pneumonia causing profound effects on the animal's immune system. Specifically, cyclophosphamide abrogates normal immune cell function, resulting in an inability to control the disease. *Ab* disseminates from the lungs to the liver and kidneys. We observe that cyclophosphamide administration and *Ab* infection alter pro-inflammatory cytokine release leading to serious microbial disease. The ability of *Ab* to cause opportunistic disease in immunosuppressed individuals makes the development of an animal model that mimics infection onset crucial in order to generate novel approaches to patient care and improve public health strategies to decrease the susceptibility to disease of individuals at risk.

Development of a Database of Homologous *Cis*-Regulatory Motifs in Mammalian mRNAs. Camille Menendez, Matt Crum, Scott Frees and Paramjeet S. Bagga, Ramapo College of New Jersey, Mahwah, NJ.

The three-dimensional G-quadruplex structures formed by guanine rich nucleic acids have a role in important biological processes, human disease, and as therapeutic targets. Recently there has been much interest in studying the potential roles of RNA G-quadruplexes as *cis*-regulatory elements of post-transcriptional gene expression. Methods of reliable detection and analysis of G-quadruplexes across entire genomes are crucial to understanding the biological roles of these structures. We have developed an interactive web application, QGRS-H Predictor, to map and analyze conserved putative Quadruplex forming 'G'-Rich Sequences (QGRS) in mRNAs. It uses a novel computational algorithm for evaluating conservation of QGRS between species. The QGRS-H Predictor is useful for mapping homologous G-quadruplex forming sequences as *cis*-regulatory elements in the context of 5'- and 3'-untranslated regions and CDS sections of aligned mRNA sequences. We are aggregating the output of QGRS-H Predictor for thousands of homologs in a database called QGRS-H DB. This is a web accessible database containing detailed information about mapped homologous G-quadruplex forming sequences in aligned mRNA sequences. The interface provides options for searching for and displaying a variety of data on composition and locations of QGRS relative to CDS in the individual as well as aligned homologous mRNA entries. QGRS-H DB is helpful in performing large-scale transcriptome wide analysis of overall occurrence and significance of phylogenetically conserved putative G-quadruplexes. We have analyzed several human genes involved in neurological disorders, cancer and apoptosis using QGRS-H Predictor. The QGRS-H database contains more than 6000 stable and highly conserved G-quadruplexes mapped to about 3000 mammalian genes, including: PAX2, PAX8, ACHE, HNF4A, ETV4, and HAP1, associated with various cancers, Osteoporosis, Alzheimer's disease, dementia, and Huntington's disease. QGRS-H Predictor and QGRS-H DB are powerful tools for investigating the functional role of G-quadruplexes as *cis*-regulatory elements in post-transcriptional as well as transcriptional gene expression.

Effects of Atypical PKC on pVHL-mediated Cellular Phenotypes. Anna Michalik, Santo Abraham, Sung Gyu Choi, Velizar Petrov and Alan Schoenfeld, Adelphi University, Garden City, NY.

Mutations in the von Hippel-Lindau (VHL) tumor suppressor gene are responsible for VHL disease, an inherited cancer syndrome that predisposes individuals to renal cell carcinoma, hemangioblastomas, and pheochromocytomas. The product of the VHL gene, pVHL, is a member of an E3 ubiquitin ligase complex that targets specific substrates for ubiquitination and subsequent degradation. The degradation of hypoxia-inducible factor alpha (HIF- α) subunits has emerged as a key pVHL function necessary for tumor suppression in renal cells. However, another reported potential target of pVHL is atypical PKC (aPKC), of which there are two isoforms in humans, PKC iota and PKC zeta. Previous studies have reported that pVHL binds and ubiquitinates the active form of aPKC. Since both VHL and aPKC promote the same cellular phenotypes such as organization of intercellular junctions, regulation of integrin levels, and maintenance of cellular differentiation and survival, we suggest that wild-type pVHL may promote proper aPKC function instead of regulating its degradation. To better understand the relationship between aPKC and pVHL function, we stably expressed 3 versions of the PKC iota isoform, wild-type or constitutively active (catalytic domain, lacking the regulatory domain) or kinase-inactive mutants in 786-O and RCC10 VHL-null renal carcinoma cells, either with or without or pVHL reintroduced. We also expressed the PKC zeta isoform (wild-type, catalytic domain and kinase-inactive versions) in 786-O cells lacking or with reintroduced VHL. The resulting cell lines were analyzed for known pVHL cellular functions in renal cells. The results to date indicate a dynamic pVHL-atypical PKC interaction, with aPKC appearing to aid in pVHL-mediated regulation of α 5 integrin and of tight junction formation, but not of other cell junctions. Moreover, the presence of pVHL influenced the subcellular localization of PKC zeta. These results support the overall notion that pVHL promotes proper aPKC function, albeit with some distinctions.

Community Gardens Select for Unique Assemblages of Wild Bees in Urban Landscapes. Alicia Miggins, Luy Khan and Timothy Leslie, Long Island University, Brooklyn, NY.

Urban areas are rapidly expanding to accommodate the growing human population. It is important to understand how urbanization impacts biodiversity in order to inform conservation practices and maintain essential ecosystem services. Here we investigated how wild bee communities are shaped by land use practices in urban community gardens. Bees are not only an important component of insect biodiversity but also contribute to the pollination of most crops grown in urban gardens. Bees were pan-trapped and net-collected from ten community gardens in Brooklyn for two years. Bee diversity was quantified using standard diversity metrics and indices. Garden characteristics related to land use patterns and floral diversity were quantified by making detailed maps and conducting plant surveys. Regression-based analyses were conducted to identify reliable predictors of bee diversity. Similarity indices were also used to assess complementarity between bee assemblages in urban gardens and other green spaces such as urban parks. A total of 1617 bees representing 55 species were collected. Bee communities varied significantly among gardens. Land use characteristics, such as floral diversity and total garden area, were identified as predictors of diversity. Bee communities collected from urban gardens also showed high levels of dissimilarity with those collected from urban parks and peri-urban locations. We provided practical suggestions for promoting bee diversity in urban gardens and discuss the importance of maintaining community gardens in urban landscapes for biological conservation. This research project was partially funded by the Long Island University Intramural Research Support Program. Student funding and support was provided by the MBRS-RISE program. We thank the Brooklyn community gardeners who graciously allowed us to use their gardens as research sites; Dr. David Biddinger (Penn State University) for supplies and consultation; and Dr. John Ascher (American Museum of Natural History) for taxonomic assistance and additional guidance.

Development of an Efficient Plastid Transformation Protocol in *Arabidopsis thaliana*. Ahsan Muhammad¹, Pal Maliga² and Kerry Lutz¹. ¹Farmingdale State College, Farmingdale, NY and ²Rutgers The State University of NJ, Piscataway, NJ.

Transformation of the plastid genome is advantageous to nuclear transformation because plastids are inherited maternally, can express genes from operons and can yield high levels of protein expression. Plastid transformation requires gradual replacement of non-transformed plastid DNA with transformed copies by cultivation in tissue culture. Plastid transformation is successful in species with an established tissue culture protocol, such as tobacco. *Arabidopsis thaliana* is the most advanced model species in flowering plants. Plastid transformation in *Arabidopsis* has not yielded fertile plants probably because the leaf tissue used for transformation was no longer diploid (2n), but polyploid (4n, 8n, etc.). Since meristematic cells are diploid, we decided to use a regulated embryogenic culture system to generate leaf tissue for plastid transformation experiments. This system was created by steroid-inducible expression of the BABY BOOM (BBM) transcription factor with the glucocorticoid receptor steroid-binding domain (GR). We describe here use of quantitative real-time PCR to identify single-insertion BBM:GR plant lines. Real-time PCR allows for quantification of PCR products as they accumulate by detecting fluorescence. We compared the number of BBM gene copies in our BBM:GR plant DNA samples relative to the single copy gene, *GIGANTEA* (*GI*). We isolated DNA from several plant lines, quantified the DNA and performed real-time PCR with the *GI* and BBM primers. Since there is a native BBM gene in the plant genome, plant lines that show two copies of BBM relative to *GI*, will indicate single insertion of BBM:GR into the nuclear genome. Plants that have more than one insertion will be crossed to wild-type plants to separate the independent insertions. The real-time approach is advantageous over Southern blotting because DNA from many plant lines can be analyzed very rapidly. Single-insertion BBM:GR plant lines identified here will be a reproducible source of diploid leaf tissue for plastid transformation experiments.

Mapping Evolutionarily Conserved Regulatory Motifs in Human CHD8 Gene Involved in Autism. Emma Murray, Lawrence D'Antonio and Paramjeet Bagga, Ramapo College of New Jersey, Mahwah, NJ.

The human CHD8, also known as Chromodomain helicase DNA binding protein 8, is a chromatin remodeling agent and aids in regulating transcription. CHD8 represses transcription by enlisting the help of histone H1 at target genes where it remodels the chromatin. CHD8 also suppresses the activity of p53/TP53-mediated apoptosis and it binds to beta-catenin, thus negatively regulating the Wnt-signaling pathway. Mutations in the transcribed region of the human CHD8 gene have been linked to autism. Studying regulation of human CHD8 gene expression is expected to enhance our understanding of its function and role in human disease. G-quadruplexes are three-dimensional structures formed in guanine rich DNA and RNA sequences. G-quadruplexes consist of square coplanar arrays and can be highly stable due to cyclic Hoogsteen bonds. RNA G-quadruplexes have received significant attention because of their importance in biological processes such as regulation of protein synthesis and mRNA turnover. The goal of this project has been to study the role of G-quadruplex forming motifs in regulating post transcriptional gene expression of human CHD8. We have mapped three evolutionarily conserved G-quadruplexes in five orthologs of the human CHD8 mRNA: chimpanzee, dog, bovine, mouse and rat. We have also mapped six conserved micro RNA target sites in CHD8 orthologs. Our analysis suggests that the conserved G-quadruplexes and micro RNA target sites found in the 3'UTR of CHD8 could potentially regulate translation efficiency, mRNA stability, and polyadenylation of the CHD8 mRNAs.

Effects of Zinc Chloride on Two Freshwater Microbes: *Synechococcus* sp. IU 625 and *Caulobacter crescentus* NA1000. Robert Newby, Jr. and Tin-Chun Chu, Seton Hall University, South Orange, NJ.

Heavy metal interactions in freshwater microbial communities are a subject for investigation. In particular the dynamic between cyanobacteria and prokaryotes is of interest. Previous evidence indicates that the freshwater cyanobacteria genus *Synechococcus* and freshwater bacteria *Caulobacter* might form a symbiotic relationship in a freshwater environment. The condition to which the symbiotic

relationship forms is a subject of investigation. To undertake this study, two model organisms have been selected: Cyanobacterium *Synechococcus* sp. IU 625 (S. IU 625) and aquatic bacterium *Caulobacter crescentus* NA1000 (NA1000). In this study, we have undertaken heavy metal analysis with zinc, which is a targeted metal by the EPA for its potential for threatening freshwater sources, with both species. Studies have been conducted determining the morphological effects as well as gene expression using quantitative PCR. For both species zinc toxicity results in morphological defects possibly resulting from defective cell division. Various ZnCl₂ concentrations 0, 5, 10, 15, 20, 25 and 50 mg/L were used in this study. The results indicated that S. IU 625 is capable of growing up to 25 mg/L ZnCl₂. No significant detrimental effects were observed at 10 mg/L ZnCl₂. The cells exposed to 25 mg/L ZnCl₂ exhibited prolonged lag phase and some morphological defects. The cells exposed to concentrations at 50 mg/L ZnCl₂ showed severe morphological defects resulting in arrested cell growth. NA1000 showed a greater sensitivity to zinc at the same concentrations. The results suggested NA1000 was able to survive up to 10 mg/L ZnCl₂. Concentrations greater than 15 mg/L result in an arrest of cell growth with several notable morphological defects. LIVE/DEAD® Cell Viability fluorescent assays (Life Technologies) were carried out to determine the cell viability.

Physiological Response of *Synechococcus* sp. IU 625 to Nickel Chloride. Brian Nohomovich¹, Michael Quintanilla^{1,2} and Tin-Chun Chu¹, ¹Seton Hall University, South Orange, NJ, and ²Naturex Inc., South Hackensack, NJ.

Algal blooms are an increasing problem that has severe consequences for human health and the environment. The algal blooms originate from areas of polluted water high in nitrates and heavy metals, a perfect environment for certain bacteria. Cyanobacteria manage to thrive in these polluted environments. The aim of this study is to investigate the possible mechanisms of heavy metal resistance in freshwater cyanobacteria. In the present study, nickel resistance was observed in the lab strain of *Synechococcus* sp. IU 625 (S. IU 625). Observation of cellular pigmentation and morphology provide an inexpensive and proven way to identify effects of heavy metal stress. Cell growth was monitored in various concentrations (0, 10, 25, and 50 mg/L) of nickel chloride using a direct count and turbidity study. The cells exposed to 10 mg/L NiCl₂ exhibited only slightly lower growth than that of control throughout the

entire study. The cells exposed to 25 mg/L NiCl₂ had a delayed lag phase until about day 11 and grew logarithmically, achieving cell concentrations slightly lower than control. Microscopic analysis exhibited various morphological defects for the cells with higher NiCl₂ stress. ICP-MS analysis was carried out to determine the distribution of nickel inside and out of the cells. These results suggested *S. IU 625* can survive up to a maximal NiCl₂ concentration between 25 and 50 mg/L. Real-Time PCR was also performed to study the expression of heavy metal resistant genes.

Manganese Accumulations in Gill Mitochondria of *Crassostrea virginica*. Ahmed Nuhar, Beatrix Boissette, Margaret A. Carroll and Edward J. Catapane, Medgar Evers College, Brooklyn, NY.

Manganese (Mn) is a neurotoxin causing Manganism in people chronically exposed to elevated levels in their environment. Mn targets dopamine (DA) neurons in basal ganglia. Oxidative stress has been implicated as a factor of Mn toxicity and DA dysfunction. Mitochondria play a role as cause and target of oxidative stress damage. The mechanisms of damage is attributed to Mn's capacity to produce toxic levels of free radicals and induce mitochondrial dysfunction. Others report Mn accumulates in mitochondria and represent the 1E pool of Mn in cells. Controversy exists to the extent of Mn accumulation in mitochondria. Others report Mn accumulates within nuclei and cytoplasm, but not mitochondria. Our lab is using the oyster, *Crassostrea virginica*, as a test animal to study Mn neurotoxicity. We found Mn disrupts the DA system as well as mitochondrial respiration. To study if Mn accumulates within mitochondrial of gill cells of *C. virginica* we used differential centrifugation and atomic absorption spectrometry. Gills were homogenized and centrifuged to isolate nuclear, mitochondrial and post-mitochondrial fractions. Each fraction was analyzed for Mn. To determine if isolated mitochondria accumulate Mn we prepared treated mitochondrial suspensions with up to 300 mM Mn. Results show a dose dependent accumulation of Mn in mitochondria of up to 5000%. Two day treatments of animals with 500 and 1000 µM Mn increased Mn (µg/gdw) in gill from a baseline of 5.8 to 41.6 and 133.8, respectively, and centrifugation revealed Mn accumulations were primarily in nuclear and mitochondrial fractions. The study shows mitochondria accumulate Mn. *In vivo* treatments reveal accumulations with both the nuclear and mitochondrial fractions.

Potential Synergistic Effect of Myricetin and Antiseptics. Yansel Nunez and Tin-Chun Chu, Seton Hall University, South Orange, NJ.

Previous reports have demonstrated that Myricetin has anti-oxidative properties along with potential anticarcinogen and antimutagen effects. To study the antibacterial activity of Myricetin, two gram positive bacteria, *Bacillus megaterium* and *Sporosarcina ureae*, along with the two gram negative bacteria, *Escherichia coli* and *Proteus vulgaris* were selected. Disc diffusion methods were used to evaluate the antibacterial activity and potential synergistic effect of different antiseptics with Myricetin. Both alcohol and non-alcohol based antiseptics were included in this experiment. The zone of inhibition (ZOI) was measured to evaluate increases in antibacterial effect. The results indicated that Myricetin was able to increase the ZOI of all model organisms. The majority of ZOI was increased by at least three fold with the largest increase being a twenty-five fold increase with *E. coli* and non-alcoholic mouthwash. The best synergistic effect was shown with non-alcoholic based mouthwashes.

The Effect of Grapefruit Seed Extract to Enhance the Activity of Antibacterial Antibiotics. Olabimpe Ogunmokun, Mary T. Ortiz and Loretta Brancaccio-Taras, Kingsborough Community College, Brooklyn, NY.

Herbal supplements can be used to treat some health conditions. This study focuses on the supplement grapefruit seed extract (GSE). GSE was tested since it is marketed as possessing antibacterial activity, a result confirmed in our laboratory. The hypothesis of this study was GSE combined with commonly prescribed antibiotics will have a greater inhibitory effect compared to the antibiotic and the supplement alone. GSE was tested for antibacterial activity against *Staphylococcus aureus* and *Streptococcus pyogenes* (G+), and *Klebsiella pneumoniae* (G-). Antibiotics tested were bacitracin, erythromycin, gentamycin, penicillin and tetracycline. The procedure conducted was an agar diffusion assay. Mueller-Hinton plates were inoculated, and disks containing GSE, the antibiotic, and a combination of both were placed on the agar surface. Plates were incubated 24-48 h at 37°C. Zones of inhibition were measured and compared statistically using the Friedman Test (p=0.05). GSE produced an average zone (n=2) of 35.00±0.00mm (SEM) against *S. pyogenes*. This activity was not statistically better than any of the antibiotics. The combination of any of the

antibiotics tested with GSE did not produce greater antibacterial activity than GSE alone. For *K. pneumoniae*, average zone produced by GSE was 32.78 ± 4.42 mm (n=9). Statistical analysis revealed GSE as effective as the antibiotics tested that would be used to treat *K. pneumoniae*. GSE with erythromycin, tetracycline, or gentamycin did not produce greater antibacterial activity as GSE or the antibiotics alone. Against *S. aureus*, GSE produced an average zone of 23.93 ± 2.85 mm (n=15). Statistical analysis demonstrated the antibiotics were more effective than GSE. Combination of GSE and all the antibiotics tested did not yield greater antibacterial activity. The hypothesis is rejected. This work was supported by Grant 1R25GM62003 of the Bridges to the Baccalaureate Program of NIGMS and Grant 0516051091 of the CSTEP Program of the NYS Dept. of Educ.

Chelating Agents Reverse the Neurotoxic Effects of Manganese on the Dopaminergic Innervation of the Gill of the Bivalve Mollusc, *Crassostrea virginica*. Christiana Ojo, Keisha Rogers, Trevon Adams, Edward J. Catapane and Margaret A. Carroll, Medgar Evers College, Brooklyn, NY.

Lateral cilia of gill of *Crassostrea virginica* are controlled by a serotonergic-dopaminergic innervation. Dopamine is an inhibitory transmitter at gill causing cilio-inhibition. Manganese is a neurotoxin causing Manganism in people exposed to high levels in the atmosphere. Clinical interventions for Manganism have not been successful. Recently, p-aminosalicylic acid (PAS) was reported to provide effective treatment of severe Manganism in humans. PAS is an anti-inflammatory drug which has been used to treat tuberculosis. It also has chelating properties. Previously, we showed treatments of *C. virginica* with manganese disrupts dopaminergic innervation of gill. Pre- or co-treatments with PAS or calcium disodium EDTA prevented the neurotoxic effects of manganese. We hypothesized chelating agents would be effective in reversing neurotoxic effects of manganese when applied to gills after manganese. We used gills of *C. virginica* to measure lateral cilia beating rates of preparations treated first with manganese followed by treatments with either PAS, calcium disodium EDTA or DMSA (meso-2,3-dimercaptosuccinic acid). Beating of cilia were measured by stroboscopic microscopy. Dose responses of PAS, calcium disodium EDTA and DMSA (10^{-11} - 10^{-4} M) against beating were

conducted after 100 μ M of manganese was added to gill. All 3 drugs reversed the neurotoxic effects of manganese in a dose-dependent manner. DMSA was the most potent. The study demonstrates these chelators are effective in reversing acute neurotoxicity of manganese. This information should be of interest to those designing therapeutic drug treatments for Manganism.

HMGB1 and Microglia Dysfunction in Neuro-inflammation. Adan Olivarez and Maria Entezari, LaGuardia Community College, Long Island City, NY.

Neuro-inflammation and accumulation of A β -containing amyloid plaques are critical components of the pathogenesis of Alzheimer's disease (AD). It was shown that high-mobility group box1 (HMGB1) is extracellularly associated with A β plaques in AD brain. Activated microglia are able to migrate to the sites of A β deposition and eliminate A β by phagocytosis. The impairment of microglia migration and A β phagocytosis appear to be closely involved in the progression of AD pathology. However, the underlying molecular mechanisms responsible for disease progression are still unclear. We previously demonstrated the importance of HMGB1 in the impairment of phagocytosis ability in the peritoneal macrophages. Therefore, we hypothesized that HMGB1 contributes to microglial dysfunction under neuro-inflammation condition. In this study we examined whether LPS, a potent inflammation inducer, has any effect on the expression of HMGB1 and consequently the migration and phagocytotic ability of BV2 microglial cells. The level of HMGB1 expression, migration and phagocytosis function evaluated by western blot, in vitro wound healing assay and phagocytosis assay respectively. Our data show that HMGB1 levels were significantly elevated in the extracellular space of cultured BV2 macroglia cells 24 hours after exposure to 1 μ g/ml Lipopolysaccharide (LPS) compare to untreated control cells. Exposure to 1 μ g/ml LPS also resulted in significant suppression of microglia's ability to migrate and to phagocytose. Treatment with anti-HMGB1 antibody significantly improved the LPS-induced migration and phagocytic impairment in BV2 cells. Moreover, treatment with recombinant HMGB1 not only induced impairment of migration and phagocytosis in BV2 cells but also accompanied by the expression of Toll-like receptor 4 (TLR4) on these cells. These results suggest that activation of the LPS-induced

HMGB1/TLR4 signaling pathway contributes to the microglia dysfunction. Thus, inhibiting of HMGB1 may provide a therapeutic target for enhancing of microglia's ability to migrate and phagocytose in AD.

Upregulation of Brain Glutamate Receptors During Adolescent Alcohol Consumption: Effects of Tianeptine. Krystal Orlando, Bryan Martin and Dennis Rhoads, Monmouth University, West Long Branch, NJ.

Human alcohol abuse begins frequently in adolescence. The age when alcohol consumption begins and the duration of consumption are correlated to the severity of alcohol withdrawal symptoms and dependency. The adolescent rat brain has many parallels to a human adolescent brain and serves as a model in studying alcohol withdrawal and dependency. Previous work from our lab has shown that Long-Evans (LE) rats beginning alcohol consumption as adolescents develop a more rapid and severe withdrawal syndrome in comparison to their adult counterparts. In adult rats, withdrawal symptoms associated with brain hyperactivity may occur due to the overexcitation of the brain glutamate system. Glutamate is the major excitatory neurotransmitter in the brain with two ionotropic receptors (NMDA and AMPA). Recent studies have found that the atypical antidepressant tianeptine reduces signs of alcohol withdrawal, possibly by normalizing glutamatergic function. In the present study, levels of expression of NMDA and AMPA receptors in the adolescent LE brain were studied after 4, 11, 18, and 25 days of a liquid diet containing alcohol, tianeptine, or a combination of alcohol and tianeptine. Western blotting analysis showed that adolescent LE rats had significant increases in AMPA and NMDA receptor levels, each starting at the earliest time point of alcohol administration. Tianeptine, on its own, had little or no effect on expression of AMPA or NMDA receptors. However, tianeptine blocked and/or delayed alcohol-induced increases in NMDA and AMPA expression without an effect on alcohol consumption. Thus, adolescent alcohol withdrawal symptoms may result from rapid upregulation of excitatory AMPA and NMDA glutamate receptors, and tianeptine may have clinical use in blocking or delaying these effects.

Use of a Stainless Steel Washer Platform to Study *Acinetobacter baumannii* Biofilms on Abiotic Surfaces. Samantha J. Orsinger-Jacobsen¹, Shenan S. Patel¹, Ernestine M. Vellozzi¹, Phillip Gialanella², Leonardo Nimrichter³, Kildare Miranda³ and Luis R. Martinez^{1,5}, ¹Long Island University-Post, Brookville, NY, ²Montefiore Medical Center, Bronx, NY, ³Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil, ⁵Albert Einstein College of Medicine, Bronx, NY.

Acinetobacter baumannii (*Ab*) is a frequent cause of hospital-acquired pneumonia and has recently increased in incidence as the causative agent of severe disease in troops wounded in Afghanistan and Iraq. Clinical approaches are limited since *Ab* strains isolated from patients are extremely resistant to current antimicrobials. *Ab* can survive desiccation and during outbreaks has been recovered from various sites in the patients' environment. To better understand its prevalence in hospital-settings, we used a stainless steel washer (SSW) platform to investigate *Ab* biofilm formation in abiotic surfaces. Scanning electron microscopy demonstrated that *Ab* forms strong biofilms on stainless steel surfaces. This platform was combined with a colorimetric 2, 3-bis (2-methoxy-4-nitro-5-sulfophenyl)-5-[(phenylamino) carbonyl]-2H-tetrazolium-hydroxide (XTT) reduction assay to observe the metabolic activity of bacterial cells and facilitate the manipulation and comparison of multiple *Ab* clinical strains. A strong correlation between XTT and CFU assays was demonstrated. Furthermore, the effect of commonly-used disinfectants and environmental stressors on *Ab* biofilms was characterized and a significant decrease in bacterial CFUs was shown. Nevertheless, bacterial eradication was not completely achieved explaining the high prevalence of this microbe in hospital-settings. Our results validate that SSWs are a simple, versatile, and innovative method to study *Ab* biofilms *in vitro*.

National Genome Research Initiative: A New Paradigm For Teaching Research To Undergraduates In South America. Rafael Ovallé, Queens College of CUNY, NY.

From 2007 to 2011, the Howard Hughes Medical Institute (HHMI) recruited professors across the US to test a new paradigm in undergraduate education: the National Genome Research Initiative (NGRI). Undergraduates were taught to isolate bacteriophages, characterize their findings, and report to the scientific community.

The educational goal of the NGRI program was to expose science undergraduates to an *authentic* research experience to increase graduation rates. The scientific goal was to isolate mycobacteriophages to be used as therapeutic agents against disease-causing mycobacteria. The goal of this proposal is to establish the NGRI program in South America. In a one-semester lab course undergraduates are taught to find, grow, and purify bacteriophages. In the second semester, students use bioinformatic software to annotate sequences of their bacteriophages. Ahead of data on student graduation rates, the NGRI program has generated expanded productivity for US undergraduates. Over a four year period, thousands of participants were taught to collect bacteriophages, annotate sequences, and present their findings. Those undergraduates will have isolated 2300+ phages, annotated 250+ sequences, presented hundreds of posters at conferences across the US, and are co-authors on papers published by labs participating in the NGRI program. Many professors in the US academic community are convinced that the NGRI program will have lasting impact on the US educational system. Expansion of the program to other teaching venues is now in progress. In the US the NGRI program was tested on LSAMP minority (African- and Hispanic-American) undergraduates and was found to produce results equivalent to those achieved at schools with non-minority populations. The NGRI Phage Harvesting has also been field-tested in India and South Africa to good effect. HHMI's paradigm is ready for distribution to Central and South America.

Molecular Cloning of Green Fluorescent Protein in *Escherichia coli*. Yewande Oyefolu¹, Henry Lee² and George Church², ¹Medgar Evers College, Brooklyn, NY and ²Harvard Medical School, Boston, MA.

Molecular cloning of green fluorescent protein (GFP), which can be expressed as a functional transgene, enables new avenues of investigation. It provides a detectable phenotype that can be used for biological studies. Our research was to test the functional expression of a gene coding for agglutinin from *Vibrio natriegens*. We first testing for functional expression of GFP from *Aequorea victoria* (Jellyfish) in *E. coli* because earlier work showed no positive results in the PCR or initial transformation reactions. We tried variations of the method. We ran PCR on protein coding DNA (GFP), cloned GFP into plasmids and transformed the plasmids into *E. coli* cell with different

annealing temperature, varying the number of templates, and increased denaturing time from 10 sec. to 20 sec. We ran reactions with primers designed for blunt and cohesive ends cloning, and "touch-down" PCR. We checked the quality of the PCR reagents by using positive control templates and primers. The positive control reactions were successful, which lead us to conclude the problem was between template and primer. Since the template DNA is at a high concentration and pure, we suspected primer sequence was incorrect. After obtaining a new GFP sequence, we designed new primers and the resulting PCR was successful. We obtained correct products, which were between 0.7 and 0.8 kb. Upon successful PCR, we digested the GFP product and host vector with cohesive end cutters, KpnI and HindIII. Following ligation, we transformed these plasmids into chemically competent *E. coli* cells and tested the functional expression of GFP by measuring fluorescence. The results showed *E. coli* is able to functionally express GFP and by using appropriate techniques, GFP expression in *E. coli* is possible. The next steps are to use this technique to test the functional expression of the gene coding for agglutinin from *Vibrio natriegens*.

Coenzyme CoQ10 Effects on the Respiratory Metabolism of Breast Cancer Cells. Paola Parra, Elizabeth Franco and Regina Sullivan, Queensborough Community College, Bayside, NY.

Cancer cells display alternative energy metabolism referred as the Warburg effect. Even in the presence of oxygen certain cancer cell lines prefer the inefficient anaerobic respiration pathway. The reasons for this are largely unknown. Coenzyme Q10 is located in the inner membrane of the mitochondria and plays an important role in aerobic respiration. Studies have shown lower levels of the coenzyme in patients with certain forms of cancer, including breast cancer. Our study tested the hypothesis: if cells are exposed to the high energy compound CoQ10, they will undergo a metabolic switch favoring aerobic respiration. We hypothesize the switch to aerobic respiration will change the intracellular concentration of reactive oxygen species which may increase apoptosis. The metastatic human breast cancer line MDA-MB 231 was incubated with 250µM CoQ10. The rate of migration in a wound healing assay was measured and compared to controls. A florescent indicator was used to test changes in mitochondria morphology. Our results may indicate that CoQ10 influences the respiratory metabolism of breast cancer cells.

Study the Effect of Selenium Dioxide and Zinc Chloride on the Growth of Cyanobacterial *Synechococcus* sp. SIU 625. Jagruti I. Patel and Lee H. Lee. Montclair State University, Montclair, NJ.

Synechococcus sp. SIU 625 is a unicellular, a freshwater photoautotrophic cyanobacterium. It is a good model organism to study the effects of heavy metal toxicity in polluted environment. In this study, cultures of SIU 625 were grown in the presence of 1mg/L SeO₂ and various concentrations of zinc chloride (0, 10, 25, and 50 mg/L) for 25 days. The growth of the cells was monitored using spectrophotometer at 750nm for turbidity study and direct cell count using hemocytometer. The cell morphologies were observed with a Zeiss Axiovision microscope using differential interference contrast settings. The DNA was detected via DAPI (4'6-diamidino-2-phenylindole) fluorescence. The results indicated that the growth of SIU 625 with 1mg/L SeO₂ in the presence of 10 mg/L of ZnCl₂ was very similar to the control. A slightly reduced growth was observed in the culture with 25mg/L of ZnCl₂ compare to 10mg/L of ZnCl₂ and control. The concentration of 1 mg/L of SeO₂ and 50 mg/L of ZnCl₂ inhibited the growth completely. The cell morphology changed from single short rod cell to slightly elongated in culture with 10mg/L ZnCl₂ while longer filament shape was observed in culture with 25mg/L of ZnCl₂. The cells turned pale green or almost colorless from dark green in culture containing 50 mg/L ZnCl₂ and undergo further morphological change. In addition, cell curvature and ectopic pole formation suggested that these metals alter the cyanobacterial cytoskeleton.

Adolescent Male African Elephants (*Loxodonta africana*) in Natal Herd Transition. Matthew Pennington, Seton Hall University, South Orange NJ.

Male and female African elephants, *Loxodonta africana*, do not co-reside for the majority of the year. Males leave their natal herd during mid-adolescence, usually around the age of 14. After this point they roam alone or form loose associations with other males, coming back to the females only to mate. A number of hypotheses and studies have been put forth to explain sexual segregation in elephants. However, few of these have looked at the behavior of the males as they transition out of the

natal herd. In this study, I used individualistic focal sampling of 11 male elephants in the Pongola Game Reserve, South Africa to test the prediction that as the males leave the natal herd, their behaviors undergo a transition, becoming more like the fully adult bull's actions. Specifically, I analyzed association patterns (percent of time spent in same sex and mixed sex associations, and which herd they were with), forage strategies (percent of time feeding, feeding bout length, mouthful rate, selectivity, and food type), and percent of time spent engaging dominance interactions. I analyzed these using t-tests and found that there was a gradual change in all of the behaviors that directly correlated with age. This work was funded supported by the Space for Elephants Foundation, Disney Elephant Population Management Program, Operation Wallacea, and Wildlife Ecological Investment. Additional thanks to Dr. Kathy Slater and Laura Daughy for their advice and Heike Zitzer for her assistance in data collection.

Characterization and Antibiotic Pattern of *Campylobacter* Isolates from Different Sources of the Food Chain. Kevin Perez, Joana Diaz-Gomez, Alfonso V. Carrascosa and Adolfo Martinez-Rodriguez, Instituto de Investigacion en Ciencias de la Alimentacion, Madrid, Spain.

Campylobacter is a food borne pathogen that manifests itself in food poultry worldwide. Specifically, it is *Campylobacter jejuni* who is the leader of gastroenteritis cases in the all of Europe and mostly North America. The severity of the symptoms of the disease ranges from mild inflammatory diarrhea to severe inflammatory diarrhea. It is with this small percentage of severe cases along with the rare prolonged enteritis that anti-microbial treatment is required. The problem is however, that the rise of infections caused by antibiotic-resistant strains has risen. It is imperative to find alternatives to antibiotics to fight *Campylobacter*; nonetheless, the antimicrobial treatment for the bacteria is still necessary. The main objective of this work was to profile the antibiotic susceptibility patterns of several isolates from chicken or chicken products, which is the main vehicle transmission for humans. This was first done by subculturing and growing the strains, subjecting them genre characterization Dry Spot tests, performing biochemical tests such as Pulse Field Gel Electrophoresis and Hippurate Hydrolysis test, and finally statistical analysis of

antibiotic pattern of the strains. Of the 15 antibiotics profiled for *C. jejuni*, eight to nine of the antibiotics were ineffective as the strains tested resistant for them. It was determined that methods previously mentioned are very applicable to profile the antibiotic susceptibility of strains, and that the use of antibiotics in farms affect the resistance of the strains.

Genetic Structure Analysis of Eastern Oyster (*Crassostrea virginica*) Populations Using Microsatellite DNA. Sherry Perreira, Craig Hinkley and Gary Sarinsky. Kingsborough Community College, Brooklyn, NY.

Eastern oysters (*Crassostrea virginica*) are bivalve mollusks that were present in large numbers in estuaries along the eastern coast of North America during the 1800's and early 1900's. Their numbers have been drastically reduced since then due to overharvesting, destruction of habitats and parasitic infections. A first step towards better management of oyster populations is to determine the genetic structure of existing populations. Using mitochondrial DNA sequences, our lab recently showed that eastern oysters could be divided into two populations—a northern population from Maine to Virginia and a southern population from South Carolina to Florida. In this study, we examined microsatellite DNA to determine if a similar population division was observed. Our hypothesis was that microsatellite DNA will provide further evidence for separate north and south oyster populations. To test this hypothesis, DNA was extracted from oysters and used to PCR-amplify DNA fragments from two microsatellite loci, Cvi7 and Cvi13. Among the eleven oysters tested, the Cvi7 locus had two alleles and genotypes whereas the Cvi13 locus had sixteen alleles and eleven genotypes. The expected heterozygosity of the northern population was 0.68182 and of the southern population was 0.70000. Using a two-tailed t-test with $\alpha = 0.05$, we were unable to reject the null hypothesis that the expected mean heterozygosity between the two populations was the same (p -value = 0.936). Population pair-wise F_{ST} values also indicated there was no significant difference between northern and southern populations (p -value = 0.928) and phylogenetic tree analysis showed there was no segregation of the satellite DNA based on geographic location of the oysters. Therefore, our data does not support our hypothesis that there are separate northern and southern populations of eastern oysters. This work was supported by grant 0537121091 of the CSTEP Program of the NYSED.

HpaII Site Methylation in Gill and Mantle Tissue of the Pacific Oyster (*Crassostrea gigas*). Yolanda Pina and Elizabeth Mulligan, Kingsborough Community College, Brooklyn, NY.

DNA methylation affects gene expression and serves important biological purposes, including moderating or suppressing genetic information present in many plant and animal genomes. Typically, methylation in animal genomes occurs on cytosine bases of a CpG dinucleotide. There have been many studies on cytosine methylation in mammals, but limited work on invertebrates. DERM0 (*Perkinsus marinus*), has contributed to the decline of the eastern oyster (*Crassostrea virginica*), however, the Pacific oyster (*Crassostrea gigas*) has resistance to DERM0. Our long-term goal is to determine the cytosine methylation patterns of genes with immune function in different tissues of *C. gigas* and *C. virginica*, and that doing so may help us understand the difference in resistance to DERM0 of these two species. Our initial work involves *C. gigas* individuals. Since vertebrates can exhibit tissue specific cytosine methylation, our hypothesis is that *C. gigas*, will have different patterns of cytosine methylation in their mantle and gill tissue. We analyzed extracted DNA from the gill and mantle tissue of two *C. gigas* individuals. A restriction digest of DNA with one of two isoschizomeric restriction enzymes HpaII or MspI was followed by amplification by methylation sensitive PCR. We were able to determine, for the three genes tested, Heat Shock Protein 70, Heat Shock Protein 25 and Protein Kinase C Inhibitor, that both gill and mantle tissue were methylated at HpaII sites in all three genes. These initial results refute our hypothesis. For future research, we would like to look at a larger population of *C. gigas* individuals as well comparing these results with those of *C. virginica*. This work was supported by NIH Grant #2R25GM06003. We would like to thank the head of the CSTEP program Gary Sarinsky and the head of the Bridges program Edward Catapano.

Establishing a Stable and Sustainable Environment for Fathead Minnow, *Pimephales promelas*, for Studying the Effect of Drugs. Jonathan Pinkhasov, Arshad Mahmood and Sawar Jahangir, Kingsborough Community College of CUNY, Brooklyn, NY.

When it comes to toxicological research using fish, it is necessary that the fish be maintained at full health to optimize results. The objective of this study is to develop a healthy environment for maintaining fathead minnow to study the effects of important molecules used in therapeutic applications. This fish is highly recommended for conducting tolerance levels of a wide variety of factors that are used in therapy, industry and agriculture. Fathead minnow is highly sensitive to aquatic toxicity and is recommended by the EPA for testing freshwater chronic toxicity. It is also used in several biomedical research such as, studying the effect of hyperammonia on brain functions. They may also be used to study the effects of factors that affect the endocrine systems. Another application of the fish is to determine the toxicity levels of water supplies generated by water plants in terms of various levels of pH, minerals and other pollutants and toxicants to match the EPA standards. Sensitivity of fathead minnow to these adverse factors and ease of its spawning make this fish ideal for laboratories to study their impacts. This fish response to these factors by showing disturbances, avoidance to schooling, hampered mobility, impaired linearity due to muscle/joint impairments, and also death shortly after exposure due to the toxicity of the environment. In our study, we tried to develop a self sustaining environment for the fathead minnow without any food supplied from external sources. This will reduce the number of variables in any study otherwise added by the factors present in the feed. Thus this study generated a condition to maintain fathead minnow in captivity in good health in a cost efficient manner.

Arriving Early and Leaving No Trace: Hatchling Decline in the Atlantic Horseshoe Crab (*Limulus polyphemus*) on Plumb Beach, Brooklyn, New York. Jessenia Preciado and Christina Colon, Kingsborough Community College, Brooklyn, NY.

The Atlantic horseshoe crab is a marine arthropod found on the Eastern coast of North America. A study was conducted to determine juvenile numbers and distribution between intact and eroded portions of Plumb Beach and

changes from 2011 to 2012 for the intact region. Because spawning began earlier in 2012, it was hypothesized that hatchlings would emerge earlier. It was also hypothesized that fewer young would be found on tidal flats on the eroded beach compared to those on the intact beach. Visual surveys and line transects (using 1/4m quadrats) were conducted and replicated on both areas. The sixty-one juveniles observed on the intact beach in 2012 appeared about a month earlier than expected. They were estimated to be 3 to 4 years old based on prosomal width (16-36cm), and not from 2012 cohort. Juveniles (n=108) in 2011 were smaller (6-23cm) and thus younger. Additionally, in 2011, 100 hatchlings were seen on the intact beach, yet this year none were found. Given the number of eggs (n=18,304), more hatchlings were expected. However, the only hatchlings from 2012 were observed on the eroded beach (n = 7). These findings support neither hypothesis. These observed differences between years may have resulted from inter-year variability, or may be linked to a phenological shift in response to climate change. The lower number of hatchlings and juveniles may also correspond to fewer spawning adults and fewer eggs compared to 2011. Other factors may include poor water quality, tidal anomalies, or higher levels of predation. This project was made possible through a Kingsborough President's Faculty Innovation grant, grant 2R25GM06003 of the Bridges to the Baccalaureate Program of NIGMS, grant 0537101091 of the CSTEP Program of the NYS Dept. of Education and NOAA Sea-Grant. Gratitude is due to Dr. Sarinsky, Dr. Botton, and Dr. Rowden.

The Impact of Drug Resistance Mutations on the Crystallizability of HIV-1. Gheorghe Proteasa, Queensborough Community College, Bayside, NY.

Crystallographic analysis plays a key role in understanding the mechanisms that result in decreased binding affinity of current HIV-1 protease inhibitors to their target. Single well-recognized drug resistance mutations (I10F, I10R, I10V, L46I, V54M, A82F, A82S or A82T) were introduced into the multi-drug resistant 769 HIV-1 protease variant. Requirements for crystallization of the protease mutants obtained showed unexpectedly wide variations with regard to protein concentration, NaCl concentration, and pH. Our results indicate that multi-drug resistance mutations exert a dramatic effect on the

crystallization properties of multi drug resistant HIV-1 proteases by altering the solubility of the proteins. We thank to Martinez, J.L, Vickrey, J.F., Martin, P., and Kovari, L.C. at Wayne State University for support and advice.

The Periwinkle Snail (*Littorina littorea*) from Plum Beach in Jamaica Bay, NY and from Fort Wadsworth in the Lower Bay, NY Belong to the Same Population. Tejanand Ramdass, Gary Sarinsky and Craig Hinkley, Kingsborough Community College, Brooklyn, NY.

Periwinkles (*Littorina littorea*) are marine snails found in many estuaries and intertidal zones along the northeast coast of North America. They are indigenous to North America, thus their management is very important since foreign species often upset the ecosystem. Overgrazing by large number of periwinkles has led to a reduction of sea lettuce (*Enteromorpha*) populations in some northeastern estuaries, and this has threatened the survival of other native marine organisms for which *Enteromorpha* is a food source. Since their management is important, our long term goal is to understand the dispersion of periwinkle populations. In this study, comparison was made between periwinkles collected from Plum Beach in Jamaica Bay to those collected from Fort Wadsworth in the Lower Bay of New York to determine if they are part of the same population. We hypothesized that the periwinkles from Plum Beach are a separate population from the periwinkles collected from Fort Wadsworth. To test this hypothesis, we first PCR-amplified a 700 base pair region of the cytochrome c oxidase I gene using DNA extracted from snail tissues. Verification of correct sizes using agarose gel electrophoresis was done to the PCR- amplified DNA fragment before it was sent for sequencing. The seventeen periwinkle sequences can be placed into seven haplotypes. The average evolutionary distance (d) over sequence pairs within groups was calculated using the Kimura 2 parameter model, and results were as follow: d=0.0044917 (S.E. = 0.0016442) for Plum Beach and d=0.0022587 (S.E. = 0.0010774)for Fort Wadsworth. Using a two-tailed t-test with alpha = 0.05, we were unable to reject our null hypothesis since p= 0.26. Our overall data suggest that the periwinkles belong to one population and we therefore reject our hypothesis which states that periwinkles from Plum beach and Fort Wadsworth are two separate populations.

Understanding the Mechanisms of Copper Induced, Lipid Peroxidation Mediated Cell Death in *Saccharomyces cerevisiae*. Jasodra Ramlall and Nidhi Gadura, Queensborough Community College, Bayside, NY.

The long-term goal of this proposal is to understand the mechanisms of copper induced cell death by using *Saccharomyces cerevisiae*, a powerful eukaryotic model system. Our working hypothesis, based on our preliminary results is that upon exposure to copper, toxicity is triggered by the increased lipid peroxidation of unsaturated fatty acids in the plasma membrane. In order to determine the relationship between exposure to copper alloy surfaces, lipid peroxidation, and cell death in *Saccharomyces cerevisiae* quantitative dilutions series were performed to test for *S. cerevisiae* cell death levels. Our results indicate a biphasic killing curve when *S. cerevisiae* is exposed to copper chips however this was not seen on steel chips. TBARS assay was used to measure the lipid peroxidation levels. In addition to looking at how copper effects the membrane we characterized the impact of exposure to copper alloy surface by using FM4-64, an amphiphilic styryl dye followed by fluorescent microscopy to study the structural integrity of the plasma membrane. Genomic DNA was analyzed in order to establish whether the cell death is triggered by the apoptotic or necrotic pathway.

An Investigation of Flower Development in *Petunia hybrida*: Comparisons of Reproductive Organ Growth. Naderia Ramprashad and Farshad Tamari, Kingsborough Community College, Brooklyn, NY.

Petunia hybrida (SOLANACEAE) is a hybrid of *P. axillaris* and *P. integrifolia*. The primary focus of this research was to investigate the developmental morphology of reproductive organs in *P. hybrida*. Flower reproductive organs in *P. hybrida* are very interesting because the five stamens can be found at three relative heights compared to the pistil. We set out to test three hypotheses. In this study, we hypothesized that 1) Flower buds grow relatively continuously; 2) Reproductive organ development closely follows that of flower bud development; and 3) Stamen development differs for the three types of stamens found. To determine the age of the flower buds, we followed the development of buds from about 1cm in length until they matured at anthesis. Measurements of bud sizes were taken using a pair of Vernier calipers. Buds at four days prior to

anthesis measured 1.23 cm (\pm 0.01) and matured relatively linearly reaching 4.02 cm (\pm 0.16) in length one day before anthesis. Flower bud development reached a plateau after one day before anthesis. Reproductive organ growth followed bud length growth relatively closely, as expected. Surprisingly, flower buds, pistils, and all three types of stamens actually shortened slightly from one day before anthesis until the flowers opened. Future studies focusing on pollinations using the three types of stamens are discussed. This work was supported by grants 2R25GM06003 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537121091 of the CSTEP Program of the NYS Department of Education.

The Adverse Effects of High Fat Induced Obesity on Female Reproductive Cycle and Hormones. Laxminarasimha Reddy Donthireddy, Tandra R Chakraborty and Satya Priya Babu, Adelphi University, Garden City, NY.

The prevalence of obesity, an established risk and progression factor for different tumors like postmenopausal breast cancer and cervical cancer, remains high in US women. In addition, it leads to earlier puberty, menarche in girls and infertility. There are extensive range of consequences of obesity which includes type-2 diabetes, cardiovascular disease and insulin resistance. Obesity is the interaction between dietary intake, genes, life style and environment. The interplay of three hormones estrogen, insulin, and leptin is well known on energy homeostasis and reproduction. The aim of this study is to determine the effect of high fat induced obesity on reproductive cycles on mice model. Two week, 3 month and 8 month long normal and very high fat diet (VHFD) diet course is followed. When mice are fed with very high fat diet, there is a drastic increase in weight within the first week. There was a significant ($p < 0.001$) increase in leptin and insulin levels in VHFD treated animals. The Papanicolaou test (Pap smear) results showed that the number of cells and length of estrous cycle changes with VHFD mice compared to normal diet mice. These results also indicate that the changes in the reproductive cycles in VHFD treated female mice could be due to the changes in hormones. Histopathological analyses showed remarkable changes in some tissue on exposure to high fat. A comparative study on the effect of high fat induced obesity using female and male mice models is therefore planned to give a better insight of this study.

The Importance of Studying Seal Demographics in the NYC Area. Brian Restrepo¹, Kristy Biolsi¹ and Kevin Woo², ¹St. Francis College, Brooklyn, NY and ²Empire State University, New York, NY.

At select locations of Long Island and New York City, Harbor seals (*Phoca vitulina*), grey seals (*Halichoerus grypus*), and hooded seals (*Cystophora cristata*) are local wildlife attractions during the winter months. Due to the public interest in these species, and the growing human population with its consequent development of shared habitats, it is critical that we understand the relationship between humans and these pinnipeds. A first step is to investigate the population distribution of these species in the area. While there have been collections of general population data over the years, no one has evaluated either a historically accurate or continuously updated count of seal populations. We have recently begun to use behavioral observations to collect data on seal demographics which will allow us to collate our research with historical population records, and to update the current population data, especially in the NYC area – as these numbers are the least understood and documentation has been very limited. A historically sound and progressively mindful data collection process affords us a greater understanding of local wildlife and allows us to better understand the impact that humans have on these animals.

Evaluation of Metal Contamination in Raw Dandelion (*Taraxacum officinale*) and Dandelion Supplements. Christian Rivoira and Patricia Schneider, Queensborough Community College of CUNY, Bayside, NY.

The common dandelion (*Taraxacum officinale*) is consumed mainly in salads but it is also used in traditional and modern herbal medicine. The root is considered a gastrointestinal remedy, while the leaf is used as a diuretic and weight-loss supplement. Toxic elements have been reported in domestic and imported botanical dietary supplements. It was hypothesized that because dandelions accumulate metal contaminants, dandelion specimens and supplements will contain high levels of toxic metals. The concentration of two essential trace elements (copper and zinc) and four toxic metals (arsenic, cadmium, chromium and lead) was measured. Samples were dried and milled to a homogeneous powder before screening with Innov-X portable X-Ray Fluorescent spectrometer and subsequent analysis by inductively coupled plasma mass spectrometry. Dandelion greens purchased in the market were analyzed along with specimens

collected along urban roadways. All samples exceed World Health Organization (WHO) vegetable limits for arsenic and zinc. All the roadside samples exceeded WHO limits for chromium and most exceeded limits for cadmium and for lead. Sixteen dried specimens imported from six different countries were analyzed; four exceeded the raw herb limit for Cd and eight exceeded the chromium limit. The concentration levels in eight dietary supplements were within tolerable levels except for cadmium and chromium. Chromium exposure associated with five dietary supplements is above the safe limit for men. In addition, the lead in one product poses a health risk to children. These results indicate that metal contamination of dandelion is a global problem unrelated to cultivation status. Further research is needed to determine the pattern of contamination along roadways and to analyze dried dandelion and supplements for uniformity between batches. Christian is a participant in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (R25 GM65096-05).

Effects of Antioxidants and Anti-inflammatory Agents on the Neurotoxic Effects of Manganese on the Dopaminergic Innervation of the Gill of the Bivalve Mollusc, *Crassostrea virginica*. Mojisola Rotibi¹, Kisha LaFleur², Edward J. Catapane² and Margaret A. Carroll², ¹Kingsborough Community College, Brooklyn, NY and ²Medgar Evers College, Brooklyn, NY.

Lateral cilia of the gill of *Crassostrea virginica* are controlled by a serotonergic-dopaminergic innervation. Dopamine acts as an excitatory neurotransmitter within the ganglia, but an inhibitory neurotransmitter at gill, causing cilio-inhibition. The mechanism of action of manganese toxicity is not fully understood, but may be due to oxidative damage. We found several chelators, including p-aminosalicylic acid (PAS) prevented neurotoxic effects of manganese in *C. virginica*. The therapeutic actions of PAS are thought to be due to chelation, but PAS is also anti-inflammatory. We sought to determine if anti-inflammatory agents and/or antioxidants are effective in preventing neurotoxic actions of manganese in gill of *C. virginica*. Indomethacin, an anti-inflammatory agent with antioxidant abilities, and ascorbic acid, an antioxidant with possible anti-inflammation abilities were tested. We examined acute and short term (3 - 5 days) treatment of indomethacin and ascorbic acid on manganese toxicity on dopaminergic innervation.

Beating rates of lateral cilia in gill epithelial cells were measured by stroboscopic microscopy. Acute or short-term treatments of indomethacin or ascorbic acid (25 - 100 μ M) and had no effect on the cilio-inhibitory effects of dopamine (10^{-6} - 10^{-3} M). When acute or short-term manganese treated animals (25 - 100 μ M) were pretreated with indomethacin or ascorbic acid (25 - 100 μ M), both drugs effectively prevented the neurotoxic effects of manganese, with ascorbic acid being more effective than indomethacin. The study demonstrates antioxidants and anti-inflammatory agents can block the neurotoxic actions of manganese and may be possible therapeutic agents in the treatment of Manganism.

Analyzing the Effect of BPA on Viability and Development of *Drosophila melanogaster*. Felicia Rubertone and Heather Cook, Wagner College, Staten Island, NY.

Endocrine disrupting chemicals (EDCs) have become a source of major concern over the past few decades. These chemicals are found in many environmental and household products and are linked to adverse affects not only on human health, but also on wildlife. One particularly consistent effect is negative impacts on the reproductive systems of animals. EDCs alter the normal function of chemical messengers produced by multicellular organisms known as hormones. Hormones are produced by glands of the endocrine system and are used to control various metabolic and developmental processes. Because EDCs are either natural or synthetic, they are found in a wide variety of man-made consumer products as well as the environment. EDCs have been detected in food, the lining of food storage cans, the makeup, detergents and plastics. Thus, human beings and wildlife are can be exposed to EDCs through multiple routes including ingestion and inhalation. The major focus of this study was to test whether Bisphenol-A (BPA), an endocrine disruptor in aquatic invertebrates, affects either the viability or the development of the fruit fly *Drosophila melanogaster*. 0-24 hr adult flies were exposed to different concentrations of BPA in their food. After 10 days of exposure, the number of surviving flies was counted. The effect of BPA on the number of pupae formed was also determined as well as the number of new flies that eclosed. Our data indicate that BPA at the concentrations of 0, 1, 10 and 100 ppm do not significantly affect viability or development in *Drosophila*. Future experiments will analyze the effects of higher concentrations of BPA.

Genetically Altered spo- Strain Reveals that Endospores Delay Copper-alloy Surface Mediated Toxicity in *Bacillus subtilis*. Kaung Myat San and Nidhi Gadura, Queensborough Community College, Bayside, NY.

This project is part of the bigger project in the lab where we are trying to understand the mechanism of copper induced, lipid peroxidation mediated cell death in different types of bacteria. Copper has long been known for its antimicrobial properties, however the mechanism of cell death is still not clear. In this study, we used two different strains of *Bacillus subtilis*, a WT spo+ (BR 151) and its mutant spo- (SL10950IIA deletion), obtained from Temple University in order to understand if endospore formation plays a role in prolonged survival on the copper. Stainless steel surface was used as a control. A quantitative dilutions series was used to determine bacterial cell death. The TBARS Assay was used to measure the amount of lipid peroxidation that occurs during exposure to copper ions. Also, genomic DNA was extracted to study the mode of death, whether it's apoptotic or necrotic. Fluorescent microscopy was done using a Live Dead Assay kit; furthermore, Acridine Orange was also used to quantitate spore formation. Our results indicate that most of the cells die within five to ten minutes of copper exposure while the endospores lasts for hours. Cell death for spo- strain was seen within seconds of copper exposure. The increase in lipid peroxidation correlates with majority cell death as well as genomic DNA degradation.

Composition of Fossilized Pseudosutures from Cretaceous Baculites: Implications for Growth Patterns of Ammonite Cephalopods. Fombens Séjour and Kristin Polizzotto. American Museum of Natural History New York, NY, USA and Kingsborough Community College Brooklyn, NY.

It can be difficult to determine the growth patterns of fossilized organisms, since evidence of the juvenile stages is often unavailable. In organisms such as ammonites, however, ontogeny is preserved in the shell. The inner surface of the shell often contains imprints and other types of markings left by the soft body of the ammonite, and these have been analyzed to help determine growth patterns. One type of marking, the pseudosutures, may provide information about the pace and consistency of growth. However, it is unclear how these structures were produced by the animal, and their origin is important to

understanding what they tell us about growth. Previous work on scaphitid ammonites provided some evidence that pseudosutures were originally an organic secretion produced by the animal, rather than an inorganic secretion such as the shell itself. We hypothesized that the same pseudosuture composition would exist in a related ammonite group called baculites. We researched the chemical composition of pseudosutures in two species of Cretaceous baculites. We examined pseudosutures from baculites collected from Mississippi and Montana. For the Mississippi specimens, original shell material was available. For the Montana specimens, we examined the surface of well-preserved internal molds as well as exfoliated shell. We performed energy-dispersive X-ray spectroscopy (EDX) in order to determine the elemental composition of the pseudosutures. Preliminary results show that pseudosutures are enriched in calcium, aluminum, silicon, chromium, and smaller amounts of iron, magnesium, potassium, and sodium. Phosphorus, manganese, chlorine and sulfur were lacking. Similar composition was found in shell material in the same specimens. These results indicate that the baculite pseudosutures are more likely to have been produced as mineralized deposits similar to the shell itself, rather than as an organic secretion.

Potential Usage of Tea Polyphenols in Controlling Endospore Germination in *Bacillus megaterium*. Nadia Shaikh, MeyLyn Vasquez, Umme Habiba and Lee H. Lee, Montclair State University, NJ.

An evaluation of four *Bacillus megaterium* endospore preparation methods was performed to obtain maximum yield of endospores. The four media compared include Tryptic Soy Agar, Liver Fraction "B" agar, modified nutrient agar, and sporulating agar. Average percent yields ranged from 28-96%, of which modified nutrient agar and sporulating agar yielded the highest endospore proportion to vegetative cells. Two spore purification methods, ASTM deionized water washes and ethanol treatment, were compared by determining ratio of spores to vegetative cells in each Schaeffer-Fulton method-stained suspension. ASTM method yielded a ~100% pure suspension from a 10 day-incubated culture, in comparison to ~99% pure suspension with ethanol treatment. Germination, specifically outgrowth, of the aforementioned purified endospores was studied by treating with four different green tea polyphenols: GTP (mixed green tea polyphenols),

LTP (lipophilic green tea polyphenols), EGCG (epigallocatechin gallate), and EGCG-Sterate. Purified 10-day grown spore crops were boiled at 100° C for 20 minutes to kill any remaining vegetative cells. The heated samples were treated with 10% of GTP, LTP, EGCG, or EGCG-Sterate for 2 hours, diluted and plated onto nutrient agar plates, and incubated at 37° C for 24 hours. The non-starved cells and starved cells without treatment were used as controls. The viability of *Bacillus megaterium* endospores in 10% LTP treated samples showed 95% inhibition compared to the control, while 10% GTP treatment showed 75% inhibition. 10% EGCG showed 100% inhibition compared to 10% EGCG-Sterate, which showed 37% inhibition. These results suggest that green tea polyphenol products play a role in inhibiting the endospore germination. This experiment suggests that these natural antimicrobial products could potentially be useful in the food industry as a means of preventing food spoilage caused by spore-forming bacteria, and also in the medical industry to prevent contamination of devices.

PCR-Based Detection of Sea Nettle (*Chrysaora quinquecirrha*) DNA in Environmental Samples. George Shchegolev¹, Dena Restaino¹, Victoria Lussier¹, Archana Tare², Paul A.X. Bologna¹ and John J. Gaynor¹,
¹Montclair State University, Montclair, NJ
²Massachusetts General Hospital, Boston, MA.

The sea nettle, *Chrysaora quinquecirrha*, has become abundant in estuaries of Mid-Atlantic States and frequently blooms in warm summer months. Various factors have been attributed to the rise in numbers of sea nettles and other jellyfish including eutrophication, overfishing, global warming, construction and species introduction. Despite its abundance and frequent disruption of ecosystems, virtually nothing is known about the genome of this important species. In an effort to aid in the molecular identification of this organism, especially at early developmental stages, we have developed a PCR-based assay using the mitochondrial 16S rDNA locus. Using primers developed by Bahya & Graham (Hydrobiologia 616:217–228, 2009), we have amplified and sequenced a 209 bp fragment (Genbank #GU300724) unique to *C. quinquecirrha*. This technique is sensitive enough to detect as little as 80 copies of *C. quinquecirrha* 16S rDNA and may permit us to not only

determine and quantify the abundance of early medusa stages (ephyra), but also identify gametes and planula larval stage to assess sexual reproduction in environmental samples. We plan to utilize this method to quantify *C. quinquecirrha* DNA in Barnegat Bay both temporally and spatially and correlate these data with counts of adult medusa found in the bay in warm weather. We anticipate that this method may permit us to predict blooms of adult medusa in estuaries.

Antibiotic Properties of Natural Substances. Hannah Singer, Victoris Pierre-Louis, Aleexa Wachs, Marlon Joseph and Kathleen Nolan, St. Francis College, Brooklyn, NY.

Cinnamon oil, tea tree oil, garlic, Manuka honey, and apple cider vinegar were compared to tetracycline and erythromycin in their efficacy in producing halos around *Streptococcus aureus* and *Escherichia coli*. The natural substances produced halos that were larger than the traditional antibiotics in some cases. In the light of antibiotic resistance further studies such as this should be explored.

Engineering Smart Proteins for Drug Delivery. Navjot Singh¹, Min Dai¹ and Jin K. Montclare^{1,2},
¹Polytechnic Institute of NYU, Brooklyn, NY
and ²SUNY Downstate Medical Center, Brooklyn, NY.

Inspired by nature, we have developed biomaterials comprised of two self-assembling domains (SADs) derived from Elastin (E) and the coiled-coil domain of the Cartilage Oligomeric Matrix Protein (C). With the objective of employing these biomaterials for drug delivery and tissue engineering, we have generated protein diblock polymers E_nC and CE_n libraries in which the E domain length is tuned from 4 to 1 repeat. We observe a trend in the thermoresponsive behavior of the diblock polymer libraries: as the E domain is shortened, the polymers exhibit an increase in inverse transition temperature (T_i). However the ranges of temperature change differ dramatically between the E_nC and CE_n library even though they are compositionally nearly identical. While all polymers assemble into nanoparticles, the bulk mechanical properties of the E_nC are very different than CE_n. The CE_n members are predominantly viscous at all temperatures while the E_nC members demonstrate more elastic character at

room temperature and temperature above their T_m 's. All library members demonstrate binding to the anticancer agent Curcumin. Selecting the E₁C and CE₁ proteins, we have initiated experiments to template gold nanoparticles with the goal of triggering delivery via temperature. Here, we present the characterization and key properties of the protein materials.

Priming and Sequencing the Plasmid in *Synechococcus* sp. IU 625. Anna Slusarczyk, Kiara Benitez and Lee H. Lee, Montclair State University, Montclair, NJ.

Among numerous species of phytoplankton capable of forming algal blooms, the blue-green algae, or cyanobacteria, are the most notorious. Algal blooms deteriorate water quality including discoloration, odor production, deoxygenation, fish kill, food web alternation, and toxin production. *Synechococcus* sp. IU 625 (S. IU 625) is one of the cyanobacteria that is responsible for the production of algal blooms. Due to its simplicity, size, ease of growth and heavy metal response, and non-pathogenicity, it has been used as a potential environmental pollution indicator. S. IU 625, *S. elongatus* strains PCC 7942 and 6301 are closely related and were commonly referred to as *Anacystis nidulans*. *S. elongatus* strains PCC 7952 and 6301 differ only by 189 base pair inversion ; however, it is unknown to what degree S. IU 625 is related. *S. elongatus* strains PCC 7942 harbors plasmids and the complete sequences of plasmid have been reported. S. IU 625 was also found to contain plasmids. In this project, plasmid DNA from S. IU 625 was isolated and purified using the QIAprep® Spin Miniprep Kit. Nanodrop analysis was used to determine the purity and quantity of the plasmid DNA. Many primers were designed based on the sequence of *S. elongatus* PCC 7942 using Pride 1.2 software or OligoPerfect Designer. The designed primers were then used to prime S. IU 625 plasmid DNA by PCR-based assay. The size of PCR products was estimated by gel electrophoresis. The successful PCR products were further purified and sequenced. Many sequences have been generated and assembled. BlastN and BlastX searches of these sequences have been carried out to compare the plasmids of S. IU 625 and other cyanobacteria.

Highway vs Horseshoe Crab: Spawning Site Selection and Egg Survivorship of the Atlantic Horseshoe Crab (*Limulus polyphemus*) on an Urban Beach in Brooklyn. Francine Smart and Christina Colon, Kingsborough Community College, Brooklyn, NY.

A survey of Atlantic horseshoe crab (*Limulus polyphemus*) eggs was conducted in 2012 to determine differences in density and distribution on opposite sides of Plumb Beach. The Eastern sector is sandy with abundant shorelines compared to the Western sector. It was hypothesized that egg counts and viability would be lower here. A total of 13,661 live eggs, 3,054 dead eggs, 651 live embryos, 73 dead embryos, 343 live trilobites, and 28 dead trilobites were counted. The vast majority (99.9%) of these were found on the Eastern sector. On the Eastern sector in the 5cm cores 2,735 eggs were discovered. Of these, 16 contained live embryos, but no trilobites. The 20cm cores contained 13,643 eggs, of which 638 contained live embryos. Twenty-eight dead trilobites and 309 live trilobites were counted in these deeper cores (2% survivorship). Most samples on the Western sector contained no eggs, but had higher trilobite survivorship in the shallow cores. On May 8th, 342 live eggs were collected in a single 5cm core, and on May 22nd 1,583 eggs were collected in a single 20cm core. On June 4th, 24 trilobites were discovered in a single 5 cm core, indicating a 7% survivorship compared to 0% survivorship in the 20cm cores. Low egg numbers on the Western sector corresponds to lower numbers of spawning crabs observed in this area by New York City Audubon researchers. Observed higher survivorship of hatchlings in the shallow cores, may be due to severe beach erosion and unavailability of sandy shorelines for spawning. Low survivorship on the Eastern sector was unexpected, but may relate to unusually high tides observed. This study provides baseline data for comparison of eggs and trilobites in 2013. This project was supported through grant 0537101091-a CSTEP Program of the NYSED, a Kingsborough President's Faculty Innovation grant and NY Sea-grant.

Angiotensin-Converting-Enzyme Inhibitor Induced Angioedema in Patients of Hispanic Origin. Tennyson A. Smith¹, Getaw Worku Hassen² and Ana Costea¹, ¹Medgar Evers College, Brooklyn, NY, ²Lutheran Medical Center, Brooklyn, NY and ³Metropolitan Hospital Center, New York, NY.

This study determined the rate of angiotensin-converting-enzyme inhibitor (ACEI)-induced angioedema (AE) in patients of Hispanic origin and compared it to those of other ethnic groups. Charts of patients who presented with AE to the Emergency Departments of Lutheran Medical Center (LMC) and Metropolitan Hospital Center (MHC) from January 2003 through October 2011 were retrospectively reviewed. Demographic and clinical data including ACEI use were analyzed. Out of 189 patients diagnosed with AE, 83 of them were seen at MHC and 106 of them were seen at LMC. Hypertension (HTN) was documented in 131 patients (69.3%). ACEI use was documented in 88 patients (46.6%). Of these patients, there were 16 African American Males (AAM) (18.1%), 25 African American Females (AAF) (28.4%), 12 Hispanic Males (HM) (13.6%), 21 Hispanic Females (HF) (23.9%), 3 Caucasian Males (CCM) (3.4%), 11 Caucasian Females (CCF) (12.5%), 1 Asian Males (1.1%). AE recurrence from presumed ACEI use was documented in 129 patients (33%). AE recurrence from presumed ACEI use was present in 5 AAM (17.2%), 7 AAF (24.1%), 4 HM (13.8%), 6 HF (20.7%), 2 CCM (7%) and 5 CCF (17.2%). Despite reports that ACEI-induced AE is more common in African Americans and patients of African descent, it was found an equivalent number of patients of Hispanic origin presented with ACEI-induced AE. Initiating early and appropriate intervention, including discontinuation of the medication, influences patient outcome.

Identification of Toxic Substances in Urban Playground Soils. Melissa Stapleton, Shannel Galloway, Emmanuel Cenord, Karl Ruddock and Dereck Skeete, Medgar Evers College, Brooklyn, NY.

Open spaces in poor neighborhoods are usually created by demolition of old structures and attract children who use them as playgrounds. Parents and community leaders anxious for a place for children to play embrace these places and eventually convert them to playgrounds and recreational areas. The Thornton Labs of Discovery Playground in Tarpon Springs Florida found arsenic levels of 5.4 ppm in soils of such

sites. State threshold safe level is 0.8 ppm. State officials closed the playground. Mielke *et al.* (1999) found urban soils are highly contaminated with lead and other pollutants. Lack of this knowledge is a reason why area residents rarely attempt to procure Environmental Impact Statements of the sites. In playgrounds children tend to be in contact with soils. Reports show inner city children are often exposed to lead-tainted soils in urban playgrounds that can cause behavioral problems, including brain damage and hearing loss. Our research investigated these areas using grab-sampling techniques and sub-surface analysis of soils from selected urban playgrounds in Crown Heights, Fort Greene and Park Slope sections of Brooklyn to identify organic and inorganic contaminants. Samples were collected, weighed, dried, extracted using a 50/50 ratio of methylene chloride and acetone, then sonicated to separate organic materials from soil. Samples were placed in a Rota-vapor at 65°C before a final extraction using a silica column. Cleaned samples were injected into a Gas Chromatographer Mass Spectrometer to determine semi-volatile compounds. We found 7-oxabicyclo heptane; benzophenone; N- (4-bromophenyl)- acetamide; naphthalene; trichloroacetic acid; 1,1,2,2-tetrachloroethane; 1-octen-3-yne and 1-methoxy-2,4- dinitrobenzene. These results show more extensive research is needed. 1,1,2,2 tetrachloroethane; 1-methoxy 2,4 dinitrobenzene, benzophenone and naphthalene are toxic to humans in high concentrations. Naphthalene and 1-methoxy 2,4 dinitrobenzene are found in insecticides. 7-oxabicycloheptane, a skin and eye irritant, is a herbicide. 1,1,2,2, tetrachloroethane is used in dry cleaning.

Blue Mussels (*Mytilus edulis*) from Fort Wadsworth and Plum Beach in New York are Not Separate Populations. Dominique Stewart, Gary Sarinsky and Craig Hinkley, Kingsborough Community College, Brooklyn, NY.

Blue mussels (*Mytilus edulis*) are filter feeders capable of filtering ten gallons of water daily. As they feed, they can accumulate heavy metals, toxins and bacteria, and are therefore often used to assess the health of coastal ecosystems. Blue mussels are abundant in both the Lower Bay (LB) and Jamaica Bay (JB) of New York. Although blue mussel larvae are motile, there are strong currents in the LB which might prevent gene flow between LB and JB. We therefore wanted to determine whether the blue mussels in the LB were a

separate population from those in JB. Our hypothesis was that the blue mussels in the Lower Bay and Jamaica Bay are separate populations. To test this hypothesis, DNA was isolated from gill and mantle tissues of blue mussels collected at Fort Wadsworth in the LB and Plum Beach in JB. The mussel DNA was used to PCR-amplify a 700 base-pair region of the cytochrome c oxidase I gene. A portion of the PCR-amplified DNA was sequenced and the DNA sequences were aligned and compared. The mean number of base substitutions per site (d) was $d = 0.005057$ (S.E. = 0.0028376) for mussels from Fort Wadsworth and $d = 0.0042044$ (S.E. = 0.0014388) for mussels from Plum Beach. An unpaired two-tailed t-test failed to reject the null hypothesis that the means from each population were the same. A phylogenetic tree was constructed using the UPGMA method from distance measurements calculated by the Jukes-Cantor method. Although the tree separated the sequences into two groups, they were not separated by geographical locations. In conclusion, the results do not support our hypothesis that Fort Wadsworth and Plum Beach mussels are from different populations. However, since the samples sizes were small we would like to examine more mussels from each location for future studies. This work was supported by grant 2R25GM06003 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537121091 of the CSTEP Program of the NYSED.

Metal Templated Protein Fibers for Electronic Applications. Jennifer Sun, Jasmin Hume, and Jin Kim Montclare, Polytechnic Institute of NYU, Brooklyn, NY.

Research towards protein-derived materials has become increasingly popular for scientists engineering energy efficient resources frequently used in medical technology and biological applications. Given the ability to biosynthesize scaffold materials for electronic components, biological engineers are provided a unique level of design specificity that is easier and less expensive to achieve than through synthetic means. Using proteins, we are able to exploit nature's resources to achieve the same level of function and effectiveness seen in synthetic metallic nanomaterials. In this project, our mission is to design and construct self-assembling protein fibers capable of metal nanoparticle templation to be used as components of electronic devices. The protein of interest is a derivative of the coiled-coil region of the cartilage oligomeric matrix protein

(COMPcc), most commonly expressed in cartilage, ligament, and tendon tissue. This protein is unique due to its formation of a homopentamer in the coiled-coil region., whose structure contributes to its ability to bind small molecules. As an initial step, two novel proteins derived from COMPcc, CC and Q54 have been constructed. These variants of COMPcc have been engineered to self-assemble and generate fibers that extend longitudinally. To express these proteins, we used the XL1 Blue strain of *Escherichia coli* as the host organism for protein expression. Cells were lysed and proteins expressed under denaturing conditions using an Ni-NTA affinity resin, where the proteins of interest were eluted using a pH gradient. Characterization studies were then conducted using circular dichroism (CD), transmission electron microscopy (TEM), and Fourier transform infrared spectroscopy (FTIR).

Gradient Phenomena, Hominoid Body Plans, and Locomotor Function. Deborah Swartz, Adelphi University, Garden City, NY.

The literature on primate development and locomotion (e.g., Grand, 1977; Zihlman and Brunner, 1979; Rollinson and Martin, 1981; Berge, 1998) has stated that changes in segment proportions and centers of mass during ontogeny are crucial to attaining mature locomotor function. The actions of developmental gradients along the body's main axes and in the limbs are largely responsible for these changes (Lumer and Schultz, 1941; Tanner, 1960; Fleagle and Samonds, 1975; Sinclair, 1978). In ontogeny, segment proportions are also modified by biomechanical forces, which perfect balance and energetic efficiency (Amtmann, 1979; Norkin and Levangie, 1983; Berge, 1998). The evolution of new body plans, with altered proportions and centers of mass is apparently accomplished by altered gradient actions. The reality of gradient interactions, with relative trunk broadening significantly correlating with antero-posterior steepening (increased skull length/tail length and increased intermembral index) was demonstrated within samples of 692 primate and tupaiid skeletons, regardless of weight or function (Swartz, 1993). Apes express this "trunk broadening-tail shortening-intermembral increase", also known as "carcinization" (Gould, 1995) most extremely. Steepened disto-proximal within-limb gradients (long distal and short proximal segments) parallel antero-posterior steepening in the main axis. Thus, an ape's body plan has a

high center of mass (promoting efficient climbing) and long cheiridia for powerful grasping during suspension. *Homo* has a narrower trunk and lower intermembral index (antero-posterior flattening) and disto-proximal within-limb gradient flattening. With a lower center of mass, stable stance, with an extended adducted lower limb, is facilitated. Resultant forces produce lumbar lordosis, iliac curvature, and a valgus knee.

Changes in DNA Methylation in the Nucleus of Cultured Neurons After Treatment with the PARP Blocker 3. Darlene Sylvain¹, Kim Allen^{1,2}, Eduardo Mascareno², William Oxberry², Juan Marcos Alarcon² and A. Ivan Hernandez², ¹Medgar Evers College, Brooklyn, NY 11225 and ²SUNY Downstate Medical Center, Brooklyn, NY.

The Hernandez Laboratory is interested in studying the role of the chromatin remodeling enzyme Poly(ADP)Ribosyl Polymerase (PARP) in synaptic plasticity, learning and memory. PARP regulates gene expression by ribosylating chromatin and adding negative charges to positively charged histones. As PARP activity increases, chromatin becomes more negatively charged and decondenses to allow for transcription. Recently, it has been shown that PARP might also regulate gene expression by inhibiting the activity of the enzyme DNA methyltransferase. DNA methyltransferase has been shown to transfer methyl groups to DNA which shuts down gene expression. A recent study suggests a link between aberrant methylation patterns and Alzheimer's Disease (AD). We hypothesize that these aberrant changes might be due to PARP activity misregulation resulting in the memory deficit seen in AD. To understand the role of PARP in the indirect regulation of DNA methylation we began with the question: Does inhibition of PARP/PAR activity lead to an increase in DNA methylation? In order to inhibit PARP expression, we used 3-aminobenzamide (3-AB, Sigma) which has been shown in previous studies to prevent PARP-mediated Poly(ADP) Ribosylation (PAR). We chose three different time points to test the effect of 3-AB on methylation. Our results of our immunocytochemistry data show that cells treated with 3-AB showed increased DNA methylation over the different time points compared to untreated cells, supporting the hypothesis that of PARP role in memory deficit.

Alexander Disease Mutant Glial Fibrillary Acidic Protein Compromises Glutamate Transport in Astrocytes. Rujin Tian¹ and James Goldman, ¹Bronx Community College, NY and ²Columbia University Medical Center, NY.

The genetic deficiency of intermediate filament protein, GFAP, in astrocytes of Alexander Disease (AxD) may contribute to the loss of myelin and neurons in the CNS. Uptake of glutamate (Glu) via the major glutamate transporter (GLT-1) of astrocytes is important for limiting Glu-mediated toxicity to other cell types. This study is aimed to understand how an astrocytic encephalopathy caused by a mutation in GFAP compromises neuronal survival in AxD. GLT-1 is a major glutamate transporter in the brain expressed primarily in astrocytes. Immuno-histochemical staining of GLT-1 suggests that there may be decreased levels of GLT-1 in the hippocampi of infantile AxD patients and examination of a knock-in mouse model of AxD also showed a significant reduction of GLT-1 in the hippocampus. To explore further the possible alterations in expression and activity of GLT-1 in AxD, we overexpressed wild type and R239C GFAP in astrocytes in culture. Western blotting and whole-cell recordings demonstrated that the R239C astrocytes exhibited markedly reduced GLT-1 protein levels, which resulted in attenuated or abolished glutamate-induced inward current. Neurons co-cultured with the R239C astrocytes exhibited increased death following glutamate challenge. The abnormal accumulation of GFAP in AxD resulted in a loss of phosphorylated Akt. Constitutive activation of Akt in the R239C astrocytes partially reestablished GLT-1 levels and glutamate currents and relieved the neuronal death. Our studies indicate a novel intercellular mechanism for the pathogenesis of AxD, where mutation in an astrocyte gene leads to neuronal demise.

Changes in Response to Odors During the Reproductive Period in Male and Female Prairie Voles (*Microtus ochrogaster*). Okworogwo Ugochukwu and Damaris-Lois Yamoah Lang, Hostos Community College, Long Island City, NY.

Prairie voles are unusual mammals because they are socially monogamous and bi-parental. Female voles become abruptly parental immediately before or at parturition, whereas males become increasingly more parental after mating. The onset of parental caring differs by sex and reproductive condition. Given that both males

and females show all components of active (i.e., licking) and inactive (i.e., huddling) parental behaviors, these sex differences are most likely not a result of differences in neural mechanisms that regulate behavioral output, but rather differing responses to the sensory inputs from infants. The factors that contribute to the sex differences in the parental behavior of prairie voles are unknown. Little research has been conducted on understanding the behavioral and physiological changes that facilitate infant attachment and caring in males. Males and females may focus their attention on different aspects of infant cues or may develop a preference for infant stimuli at different times. Such sex differences could underlie the disparity in the onset of enhanced parental attachment in prairie voles.

The Acorn Barnacle (*Semibalanus balanoides*) Does Not Appear to Serve as a Vector for Dermo (*Perkinsus marinus*) in Jamaica Bay, NY. Durojaiye Victoria, Craig Hinkley and Gary Sarinsky, Kingsborough Community College, Brooklyn, NY.

Jamaica Bay, NY was once abundant with the eastern oyster (*Crassostrea virginica*). In the early 1900's, the oyster population began to decline and none have been observed for the past 100 years. Dermo is caused by a single celled protozoan parasite called *Perkinsus marinus* which is known to be transmitted from oyster to oyster. In 2001, our lab initiated a project to study the growth and survival of *C. virginica* grown from spats. Some of these oysters had become infected with dermo. If there are no known oysters in the Bay, how did they become infected? Some literature suggests that possible vectors could be dormant infections in other shellfish. This experiment is designed to determine if barnacles serve as a vector for dermo. DNA was isolated from the tissues of the barnacles collected in Jamaica Bay. The DNA was subjected to Polymerase Chain Reaction (PCR) using a Dermo specific primer set. No dermo was amplified from the barnacle samples tested. To verify that we could amplify dermo, a positive control for dermo was used under the same conditions the barnacles were subjected to. To prove that DNA had been extracted from all the barnacles tested, the mitochondrial Cytochrome Oxidase 1 gene was amplified by PCR using the Folmer primer set and the correct size was confirmed through gel electrophoresis. The CO1 gene was found to be present in all samples and was sent to to be sequenced. The sequences

were subjected to a NCBI Blast search which further verified that the CO1 gene was indeed from *S. balanoides* and the positive control was from *P. marinus*. The experimental results showed that the barnacles tested are not vectors for dermo and our hypothesis at this time is therefore rejected. A future experiment will involve a significantly larger sample of barnacles.

HIV-1 CCR5 Macrophage Tropism is Determined by Changes in GP120 that Increase Affinity with CD4. Jennel Vincent¹, Paul Peters² and Paul Clapham². ¹Medgar Evers College, Brooklyn, NY and ²University of Massachusetts Medical School, Worcester, MA.

HIV-1's entry into cells is facilitated by trimeric envelope glycoproteins (gp120s) binding to the major cell surface receptor, CD4. HIV-1 infects CD4+ T cells which express high amounts of CD4, and macrophages which express low amounts of CD4. We hypothesize that HIV-1 CCR5 macrophage tropism is determined by changes in gp120 that increase affinity with CD4. To determine this HIV-1 gp120s were isolated from patients and characterized. Previous research identified that one determinant of macrophage tropism is N283 which is in the CD4 binding site. N283 is associated with highly macrophage tropic envs derived from the brain, while T283 is associated with non-macrophage tropic envs derived from lymph nodes. In order to investigate whether HIV-1 CCR5 macrophage tropism is determined by changes in gp120 that increase affinity with CD4, patient HIV gp120s were studied for their interactions with CD4. Enzyme linked immunosorbent assays were used to check the concentration and affinity of gp120 for soluble CD4 (sCD4). Results found that CD4 affinity for monomeric gp120 contributes to overall trimer affinity for CD4 and that N283 also plays a role in macrophage tropism. However, there are other determinants outside the CD4 binding site that affect trimer affinity for CD4, and macrophage tropism is likely to be partially determined by features of the overall trimer structure. These results will help guide efforts to develop a vaccine that targets the CD4 binding site on gp120.

The Presence of Octopamine and Octopamine Receptors in Ganglia and Tissues of *Crassostrea virginica*. Christopher Welsh, Fiana Bess, Edward J. Catapane and Margaret A. Carroll, Medgar Evers College, Brooklyn, NY.

Octopamine, a biogenic amine first identified in octopus has been well studied in arthropods and gastropods being a neurotransmitter and hormone. Octopamine has rarely been reported in bivalves. Using HPLC and ELISA we showed it present in ganglia and tissues of the oyster *Crassostrea virginica*, the mussel *Mytilus edulis*, and the clam *Mercenaria mercenaria*. We found it cardio-excitatory in oyster and mussel, but cardio-inhibitory in clam. To localize octopamine and octopamine receptors in tissues we used immunohistofluorescence. We used pan TAAR primary antibodies, which are reactive to octopamine, beta-phenylethylamine, p-tyramine and tryptamine receptors, but not to classical biogenic amines and histamine receptors, and visualized with FITC conjugated secondary antibodies. Tissues were fixed with paraformaldehyde, treated with primary and secondary antibodies, paraffin embedded, sectioned and viewed with a Zeiss epilume fluorescence microscope. To detect octopamine we used anti-octopamine primary antibody (octopamine conjugated to KLH), and visualized with FITC conjugated secondary antibodies. Tissues were fixed with EDAC (1-ethyl-3-(3-dimethylaminopropyl) carbodiimide), treated with primary and secondary antibodies, and either paraffin embedded and sectioned, or frozen, cryostat sectioned and viewed. The TAAR antibodies revealed octopamine receptors in cerebral and visceral ganglia, heart, gill, adductor muscle and digestive tract. Octopamine antibodies revealed octopamine in cerebral and visceral ganglia, heart and blood cells in the gill blood channels. The study demonstrates the presence of octopamine receptors and octopamine in ganglia and organs of the oyster. The distribution of the octopamine fluorescence as well as previous HPLC data suggests it may be a hormone in the animal as it appears to be very wide-spread.

Chemokine Receptor Dysregulation Contributes to the Impaired Inflammatory Cell Recruitment to the Lung in Sepsis. Michael Nathaniel Wilkinson and Mohammad Javdan, Queensborough Community College, Bayside, NY.

Sepsis is a potentially lethal illness triggered by systemic bacterial infection. Macrophages are known to play an essential role in killing

pathogens and releasing inflammatory mediators which are critical for orchestrating host responses to the bacterial invasion. The cellular and molecular mechanisms of macrophage migration under the sepsis-induced lung injury are poorly understood. In order to migrate toward the infected area macrophages need the attachment of surface receptors such as CX3CR1 and CCR2 to their chemokine ligands. Therefore, we hypothesized that LPS by inducing downregulation of these receptors can impair macrophages migration in sepsis induced lung injury. In this study we examined whether LPS has any effect on the expression of CCR2 and CX3CR1 on the macrophages of septic animals. C57BL/6 mice became septic by receiving sub-lethal dose of LPS during i.p injection and the control mice received saline instead of LPS. Then after 24, 48 and 72 hours these septic and control mice received either LPS or saline intranasally. After 18 hours, infiltrated macrophages, total leukocyte, and neutrophils in the bronchoalveolar fluid (BALF) were measured. The expression of two receptors on the surface of macrophages, CCR2 and CX3CR1 that were harvested by heart puncture were also examined by immunofluorescent technique. Infiltration of macrophages, total leukocyte and neutrophils in the BALF of septic animals were significantly less than control group ($P < 0.05$) that correlated with downregulation of both receptors (CCR2 and CX3CR1) on macrophages. These results highlight evidences that the failure of macrophages and neutrophils migration to the site of septic-induced infection is associated with downregulation of the CCR2 and CX3CR1 expression on the macrophages surface. Michael is a participant in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (R25 GM65096-05).

Further Studies on the Sensory Motor Integration of Gill Lateral Cilia in the Bivalve Mollusc, *Crassostrea virginica*. Patricia Williams, Patrick Akande, Edward J. Catapane and Margaret A. Carroll, Medgar Evers College, Brooklyn, NY.

Lateral cilia of gill of *Crassostrea virginica* are controlled by serotonergic-dopaminergic innervation. The motor aspects have been well studied, but the sensory side has not. Here we studied effects of sensory stimulations to mantle on beating of gill cilia of *C. virginica*. Cilia beating was measured by stroboscopic microscopy. Applying *Isochrysis*, a food source, to mantle rim increased beating rates, whereas crab extract reduced beating rates. The response to crab extract was abolished by disrupting nervous innervation to gill by cutting the branchial nerve or

detaching the mantle rim. Cutting the cerebrovisceral connective lowered basal cilia rates but crab extract still slowed beating. Stimulating mantle nerves with suction electrodes increased beating, which was not observed when the circumpallial nerve from mantle was cut. Histamine, which does not alter beating when applied to gill, decreased beating when applied to mantle. This was not seen when nervous innervation to gill or mantle rim was transected suggesting histamine maybe a neurotransmitter of mantle receptor cells that synapse with afferents going to the visceral ganglia. The neurotransmitters/neuroactive substances: serotonin, dopamine, acetylcholine, GABA and FMRFamide had no effect on rates when applied to mantle rim. The study demonstrates sensory-motor integration of beating of lateral cilia that involves the sensory mantle rim and visceral ganglia and cerebral ganglia. It appears animals can sense harmful cues and food, and adjust gill cilia beating appropriately. The results also suggest the sensory apparatus involved are sensory nerves that send axons to the visceral ganglia, and sensory receptor cells that synapse in the mantle rim with afferent neurons.

Does ICER Impart its Antioncogenic Function by Eliciting Cell Death? Fanaye Bezunesh Woldeamanuel, Marni Crow and Carlos A. Molina, Montclair State University, Montclair, NJ.

There is compelling evidence supporting Inducible cAMP Early Repressor (ICER) as a potent anti-proliferative and potential tumor suppressor protein. ICER is a dominant negative transcription factor that is inducible upon increase of cAMP level and represses genes important for cell-cycle regulation, proliferation, differentiation and apoptosis. Our research discusses the evidence in support of ICER as a tumor suppressor gene product and elucidates mechanisms by which cancer cells that express ICER can nullify its anti-proliferative properties. Our laboratory has shown that ICER is either degraded by the proteasome upon polyubiquitination or mislocalized in the cytosol upon monoubiquitination. With these results in hand, we are currently studying the effect of ICER ubiquitination on cell death. To that effect we have constructed a form of ICER where all 10 lysine residues have been mutated to arginine. Our data shows that the "unubiquitinatable" form of ICER elicit a stronger response to caspase activity.

Behavioral Analysis of *Drosophila melanogaster* Olfactory Perception. Alina Zhyvotovska, Michelle Batchu, Mamuna Faizi, Kathleen Nolan and Alexander Braun, St. Francis College, Brooklyn, NY.

Drosophila melanogaster is a widely utilized model organism for many areas of research. Experiments were performed characterizing olfactory response of wild-type and two mutant (white-eyed and vestigial) fruit fly larvae to various scents. Larvae were placed in petri dishes with the scents (cinnamon, grape and orange) placed in the center and the time required for them to reach the food was recorded. The wild-type flies were the fastest, followed by the white-eyed, and then the vestigial. Vestigial flies preferred the orange scent versus the others, while white-eyed mutants preferred grape. There was a difference in speed among the larvae, however, the standard deviations were quite high.

MACUB 2012 Conference Member Presentations



Ecological Observations at Four Coastal Dune Communities from Cape Cod, Massachusetts to Isle of Palms, South Carolina
R. Stalter, Y. Bashir, V. Henriques, T. Keitt, N. Lamarre, C. Nwujei, S. Rabb, N. Rencher, S. Shehzadi, R. Yousef, A. Wahadi, J. Reed, A. Przemielewska and A. Ramariz
St. Johns University, Queens, NY



A Pre-Anatomy and Physiology Workshop Improves College Students' Perceptions and Performance
M. Gannon and A. Abdullahi
Bronx Community College of the City University of New York, NY



Web-based Tutorial Support For Academic Success In the Anatomy and Physiology
M. Tawde and A. Nguyen
Queensborough Community College, Bayside, NY



Conference Highlights



2013 Benjamin Cummings/MACUB Student Research Grants

Purpose

To provide investigative research support for undergraduate students working under the supervision of faculty who are current members of MACUB. Awards Applications will be evaluated and awards granted based on the scientific merit and overall quality of the proposed research experience.

4 grants of \$500 each will be awarded annually (provided by BC).

Complimentary registration for the annual fall conference of MACUB and membership in MACUB for student research grant awardees (provided by MACUB).

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A student is only eligible to receive one award.

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Student research grants may be used to support scientific investigation in any field of biology.

Funding may be used to purchase equipment or supplies required for the proposed project, and/or travel to and from a research location.

Grant winners are required to present the results of research supported by this award at the MACUB annual fall conference following the year of the award.

Institutional support is required. This may include research supplies, travel expenses, in-kind matches, and other forms of support.

All application materials must be submitted on-line at <http://www.macub.org> by February 28, 2013 and all applicants will receive notification of award status by March 15, 2013.

Application

On-line proposal requires:

Student contact information

Faculty advisor contact information

Faculty reference letter from the research advisor

This letter must include a statement of institutional support for the project

Proposal title

Proposal (maximum of 500 words)

The proposal should provide a brief background on the project with reference, a statement of the proposed question or hypothesis to be tested, and a description of the experimental approach.

References

Basic budget justification.

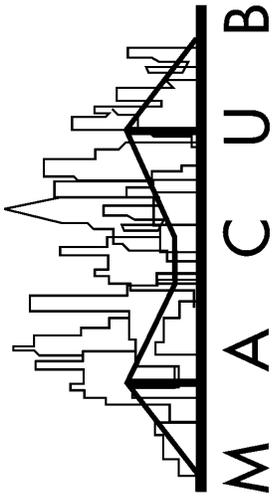
Include discipline. For example, molecular biology, cell biology, genetics, etc.

Register on-line at: www.macub.org

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Dr. Edward J. Catapane
Department of Biology
Medgar Evers College
1150 Carroll Street
Brooklyn, New York 11225