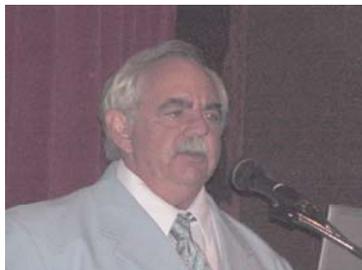


# 43rd Annual MACUB Conference MOLLOY COLLEGE Rockville Centre, New York October 23, 2010



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**IN VIVO** is published three times yearly during the Fall, Winter, and Spring. Original research articles in the field of biology in addition to original articles of general interest to faculty and students may be submitted to the editor to be considered for publication. Manuscripts can be in the form of a) full length manuscripts, b) mini-reviews or c) short communications of particularly significant and timely information. Manuscripts will be evaluated by two reviewers.

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### **Election Results MACUB 2010-2011 Executive Board**

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# MACUB 2010 Conference Poster Presentation Award Winners

## COMMUNITY COLLEGE

### First Place (tie)

Bo Zhi (Robert) Hong, Tae Y. Kang and Nidhi Gadura  
*Increased Levels of Unsaturated Fatty Acids Correlates with Increased Levels of E. coli cell Death on Copper Surfaces*  
Queensborough Community College, Bayside, NY

Shalini Singh<sup>1</sup>, Bruce Sun<sup>2</sup>, Kevin Jhun<sup>2</sup>, Mark J. Johnson<sup>1</sup> and John J. Dennehy<sup>2</sup>  
*Testing the Fitness of the Bacteriophage Phi6 Host Range Mutants*  
<sup>1</sup>Queensborough Community College and <sup>2</sup>Queens College, Flushing, NY

Zakiyya Nicholas<sup>1</sup>, Kun Huang<sup>2</sup>, Margaret A. Carroll<sup>1</sup> and Edward J. Catapane<sup>2</sup>  
*The Toxic Effects of Metals on Mitochondrial Cytochrome c Oxidase Activity in the Gill of the Bivalve Crassostrea virginica*  
<sup>1</sup>Kingsborough Community College and <sup>1</sup>Medgar Evers College, Brooklyn, NY

### Second Place

Jose Zhagnay<sup>1</sup> and Maria L. Cotrina<sup>2</sup>  
*Effect of Carnitine on Brain Cell Survival*  
<sup>1</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>Columbia University, NYC, NY

### Third Place (tie)

Anibal Davalos-Morinigo<sup>1</sup> and Sanjai Kumar<sup>2</sup>  
*Synthesis of Nek2 Activity-Based Biosensors*  
<sup>2</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>Queens College, Flushing, NY

Lainga Tong and Mohamed Lakrim  
*Extra-pair Paternity in Birds: Studying Variations Among Populations With the Genetic Diversity Hypothesis*  
Kingsborough Community College, Brooklyn, NY

## SENIOR COLLEGE

### First Place

Cesar Augusto Villamil, Estefania P. Cabezas, Jose Leovigildo Perez and Lee H. Lee  
*The Effect of Heavy Metals on Exopolysaccharides in Cyanobacteria Synechococcus sp. IU 625*  
Montclair State University, Montclair, NJ

### Second Place (tie)

Trevon Adams<sup>1</sup>, Danilo Beaubrun<sup>2</sup>, Michael Nelson<sup>1</sup>, Margaret A. Carroll<sup>1</sup> and Edward J. Catapane<sup>1</sup>  
*Are the Neurotoxic Effects of Manganese Due to Blockage of Post Synaptic Dopamine Receptors*  
<sup>1</sup>Medgar Evers College and <sup>2</sup>Kingsborough Community College

Kerri Pryce<sup>1</sup>, Jordan Knight<sup>2</sup>, Margaret A. Carroll<sup>1</sup> and Edward J. Catapane<sup>1</sup>  
*Pharmacological Study of the Effects of Octopamine on Heart Rate of Crassostrea virginica*  
<sup>1</sup>Medgar Evers College and <sup>2</sup>Kingsborough Community College

### Third Place

Parth Vyas and Sandra D. Adams  
*Curcumin Inhibits Sindbis Virus Infection in Vero Cells*  
Montclair State University, Montclair, NJ

# MACUB 2010 Conference Poster Presentation Award Winners

## MASTERS

### First Place

Zain Alvi, Juan Franco and Angela V. Klaus  
*Analysis of the Relationship Among Protamine Sequence, Chromatin Condensation Patterns,  
and Nuclear Shaping in Drosophila Sperm Nuclei*  
Seton Hall University, South Orange, NJ

### Second Place

Bobak Haghjoo<sup>1</sup>, Tin-Chun Chu<sup>2</sup> and Lee H. Lee<sup>1</sup>  
*The Effects of Heavy Metal Toxicity on the Morphology and DNA of  
Cyanobacteria Synechococcus sp. IU 625*  
<sup>1</sup>Montclair State University, Montclair, NJ and <sup>2</sup>Seton Hall University, South Orange, NJ

### Third Place

Michael C. Gutkin<sup>1</sup>, Christopher P. Corbo<sup>1,2</sup>, Alejandra del C. Alonso<sup>2</sup> and Zoltan L. Fulop<sup>1</sup>  
*Immunofluorescent Characterization of the Cellular Composition  
in Normal Adult Zebrafish (*Danio rerio*) Optic Tectum*  
<sup>1</sup>Wagner College, Staten Island, NY and <sup>2</sup>CUNY College of Staten Island, Staten Island NY

## DOCTORAL

### First Place

Peter J. Park and Michael A. Bell  
*Spatial Learning and Forebrain Differences in Field-Caught and Lab-Reared Threespine Stickleback Fish  
(*Gasterosteus aculeatus*): Implications for Hatchery-Reared Fish Survival in the Wild*  
Stony Brook University, Stony Brook, NY

### Second Place

James P. Browne<sup>1,2</sup> and Dianna Padilla<sup>1</sup>  
*Analysis of Salt Marsh Edge Change in the Western Bays of Long Island South Shore, Hempstead, NY*  
<sup>1</sup>Stony Brook University, Stony Brook, NY and <sup>2</sup>Conservation and Waterways, Town of Hempstead, NY

## MACUB 2010 Conference Poster Abstracts

**High Glucose Enhances the Proliferation Effects of Stress Hormones in Mesenchymal Stem Cell Cultures.** Nancy Abrego<sup>1,2</sup>, Jodi F. Evans<sup>1,2</sup> and Louis Ragolia<sup>2</sup>, <sup>1</sup>Molloy College, Rockville Centre, NY and <sup>2</sup>Winthrop University Hospital, Mineola, NY.

Mesenchymal stem cells (MSC) are the progenitor cells to connective tissue cells, epithelial cells, and smooth muscle cells. These cells are currently being investigated as a cellular source for tissue regeneration and repair. The systemic and local tissue environment may have significant influence on the success of such efforts. We hypothesized that elevated glucose and exposure to stress hormones would influence the proliferation of MSC. MSC from the bone marrow of Wistar-Kyoto (WKY) rats were grown under both low glucose (5 mM) and high glucose (20 mM) conditions in the presence and absence of the synthetic glucocorticoid, dexamethasone, and adrenocorticotropic hormone (ACTH). Relative cell density was used to determine the rate of proliferation and was measured using methylene blue staining. Changes in cell density from initial plating were recorded at various stages of culture. Under low-glucose conditions, stress hormones reduced MSC proliferation and these changes were enhanced when cells were exposed to high glucose conditions. These data indicate that stress and elevated glucose can have a significant effect on the ability of MSC to proliferate and may prove to reduce their efficacy during tissue repair.

**Are the Neurotoxic Effects of Manganese Due to Blockage of Post Synaptic Dopamine Receptors.** Trevon Adams<sup>1</sup>, Danilo Beaubrun<sup>2</sup>, Michael Nelson<sup>1</sup>, Margaret A. Carroll<sup>1</sup> and Edward J. Catapane<sup>1</sup>, <sup>1</sup>Medgar Evers College and <sup>2</sup>Kingsborough Community College.

Manganese, a neurotoxin causing Manganism, a Parkinsons-like disease, disrupts dopaminergic neurotransmission. Lack of effective treatment for Manganism is major obstacle in its management. Recently, p-aminosalicylic acid (PAS) was reported an effective treatment. Lateral cilia of gill of *Crassostrea virginica* are controlled by serotonergic-dopaminergic innervations from their ganglia. We showed manganese blocks cilio-inhibitory effects of dopamine and this is prevented by PAS. We sought to determine if manganese exerts its effects by blocking dopamine post-synaptic receptor binding and if PAS prevents manganese from doing this. We observed membrane potentials of lateral ciliated cells with fluorescent dye while measuring cilia beating. Applying dopamine or 20 Hz electrical stimulation after exciting cilia repolarized the cell membrane and decreased beating. Manganese prevented this. PAS prevented the actions of manganese. Adding ATP to gill increased cilia beating without changing membrane potential. Applying MDL-12,330A, an adenylylase inhibitor, after manganese decreased cilia beating without affecting membrane potentials. The study shows the correlation between membrane potential of lateral ciliated cells and cilia beating rates. It helps elucidate the neurotoxic mechanism of action of manganese, showing the site of action is after the post-synaptic dopamine receptors. This information is helpful to understand causes and potential therapeutic treatments of Manganism.

**The Synergistic Effect of Green Tea Polyphenols with Antiseptics and Antibiotics against the Growth of Potentially Pathogenic Bacteria.** Sylvia Chinons Akuwudike, Bobby Haghjoo and Lee H. Lee, Montclair State University, Montclair, New Jersey, USA

Green tea leaves contain many polyphenolic compounds such as (-)-epicatechin, (-)-epicatechin-3-gallate, (-)-epigallocatechin, and (-)-epigallocatechin-3-gallate(EGCG). Green tea polyphenols (GTPs) have been implicated to have distinct properties that combat the harmful effects of cell proliferation. These compounds contain certain anti-viral and anti-microbial mechanisms that inhibit growth and perhaps reverse the process in which replication occurs. In this study, 2% GTP was used alone or with antiseptics and antibiotics to study its effect on different gram + and gram - bacteria. For the antiseptic study, disk diffusion test was carried out and for the antibiotics; Kirby-Bauer method was used. The zones of inhibition were measured in millimeter and bacterial resistant, intermediate, or susceptible was determined. The results suggested that GTP works best on the gram positive bacteria and had very little effect on the gram negative bacteria. The most powerful GTP effect can have zone of inhibitions reaching to more than 8mm.

**Effect of Gap Junction Inhibitors on Breast Cancer Cell Migration.** Vanessa Almonte<sup>1</sup> Maria L. Cotrina<sup>2</sup> and Regina Sullivan<sup>1</sup>, <sup>1</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>Columbia University, NY.

Connexins, a family of transmembrane proteins, form intercellular gap junctions in vertebrate cells. Gap junctions allow for cell-cell communication and the passage of small molecules between cells. Defective gap junctions have been identified in cancer cells however their role in cancer progression and the maintenance of a metastatic phenotype remains elusive. This study focused on the role of gap junction hemichannels in the migration of MDA 231, a highly metastatic breast cancer cell line. Experiments were done to assess the levels of functional gap junctions in MD231 cells and compared to mouse astrocytes, a cell line that shows abundant gap junctions and to a human embryonic kidney cells which show low levels of gap junctions. The cells were grown to a confluent monolayer and treated with carboxy-dichlorofluorescein. The monolayers were injured with a razor and the cells were imaged using an inverse phase fluorescent microscope fitted with a green filter. The wound healing assay was used to determine the effect of two gap junction inhibitors, carbenoxolone and meclofenamic acid, on the migration of 231 cells. The results of the dye transfer assay revealed that 231 cells have a low level of gap junctions. Interestingly, however, carbenoxolone significantly inhibited cell migration while meclofenamic acid caused cellular morphological changes. Further studies will investigate the specificity of these effects.

**Post-Transcriptional Regulation of NF1 and F2 Gene Expression by Conserved G-quadruplexes. Rami Alrabaa, Lawrence D'Antonio and, Paramjeet Bagga, Ramapo College of New Jersey, Mahwah, NJ.**

Mutations in NF1, a tumor suppressor gene, causes Neurofibromatosis Type 1 which is characterized by soft noncancerous tumors known as neurofibromas and by patches of skin pigmentation called café-au-lait spots. Corruption of a related tumor suppressor gene, NF2, is characterized by vestibular schwannomas or acoustic neuromas which are noncancerous tumors that grow and develop along the auditory nerve. Several mutations in NF1 and NF2 are known to cause changes in gene expression. Therefore, understanding how the expression of these genes is regulated can help provide better insights into the molecular mechanism of their roles in human disease. Previous studies in our lab have suggested that G-quadruplexes may regulate mammalian gene expression. Using a bioinformatics approach, we have discovered G-quadruplex motifs conserved in the 5'- and 3'-untranslated regions of six mammalian NF1 and NF2 orthologs, suggesting their roles in the regulation of gene translation and/or turnover. G-quadruplexes with high predicted stability were also found in many of the alternate polyadenylation sites suggesting their involvement in the regulation of polyadenylation. Our findings strongly suggest that G-quadruplexes play a role in the regulation of NF1 and NF2 gene expression.

**Analysis of the Relationship Among Protamine Sequence, Chromatin Condensation Patterns, and Nuclear Shaping in *Drosophila* Sperm Nuclei. Zain Alvi, Juan Franco and Angela V. Klaus, Seton Hall University, South Orange, NJ.**

Current evolutionary theory states that protamines evolved from histone linker-like proteins. The current study is aimed at analyzing putative nucleotide and protein sequences in the protamines of 12 *Drosophila* species based upon the reference sequences of two protamines (MST35Ba and MST35Bb) and reference sequence of one histone linker-like protein (MST77F) found in *Drosophila melanogaster*'s sperm nuclei. The analysis was initially conducted using the basic local alignment search tool (BLAST) which utilizes a conservative algorithm to compare primary biological sequence information. The best matches from each *Drosophila* species were aligned using CLUSTALW, a multiple sequence alignment tool that uses an algorithm to create a phylogenetic tree. The algorithm in CLUSTALW is specifically designed to align species based upon the global alignment method. Additionally, we have designed primers to isolate and sequence MST35Ba, MST35Bb, and MST77F regions in the genomes of *D. simulans* (*D. melanogaster*'s closest relative) and *D. pseudoobscura* (a species for which our lab has developed an *in vitro* system for studying spermatogenesis). We are also analyzing chromatin condensation patterns during nuclear transformation in *Drosophila* sperm nuclei. Our hypothesis is that the type of protamines present in the sperm nucleus will affect the pattern of chromatin condensation, which in turn will affect the species-specific shape of the sperm nucleus.

**Construction of an Ovarian-Specific INHa-Flag-Dr-Icer Iy Gene Construct for the Generation of a Transgenic Zebrafish. Caitlin Marie Ament and Carlos A. Molina. Montclair State University, Montclair, NJ.**

Inducible cAMP Early Repressor (ICER) regulates the nuclear response to gonadotropins in ovarian tissue and is thus an important regulator in folliculogenesis. It has been hypothesized that increasing the amount of ICER in granulosa cells should lead to increased production of mature follicles in the ovary thus increasing the number of ova produced. The purpose of this study was to demonstrate that expression of an ICER transgene could be induced using the 3.0 kb promoter region of the ovarian-specific alpha inhibin (INHa) gene in zebrafish, *Danio rerio*. The sequences for ICER and the INHa promoter in *D. rerio* were identified via a BLAST search using the known sequences from mouse and chicken. The putative sequences were subsequently isolated and amplified using PCR and confirmed with DNA sequencing. ICER was tagged with a FLAG sequence in order to differentiate endogenous ICER from exogenous ICER. FLAG-ICER was cloned into pFLAG-CMV-2 plasmid to create the FLAG-Dr-ICER Iy transgene construct. The expression of FLAG-ICER protein was confirmed by Western blot after transfection into HEK 293T human kidney cells. INHa was sub-cloned into a three different vectors (pHRGFP, pGL3-Basic and pLuc-MCS) to test the functionality of the Danio 3000bp INHa promoter region. These constructs will be transfected into an embryonic zebrafish cell line termed PAC-2 to test promoter activity. The long term goal of this project is to use the same vectors to determine if transgenic *D. rerio* hyperovulate in response to excess ICER.

**A Screen for Self-organized Protein Localization. Samuel Anador<sup>1</sup>, Zemer Gitai<sup>2</sup> and Anastasiya Yakhnina<sup>2</sup>, <sup>1</sup>Medgar Evers College and <sup>2</sup>Princeton University.**

A key challenge for cells is to make the right amount of protein at appropriate times and localize them to precise locations. The exact localization of protein is required for processes such as cell shape, motility, division and polarity. Proteins can be directed to specific locations by internal properties (specific sequences or structures) or external properties present (cell geometry, binding to other proteins). One way to identify localization of proteins is to clone and express each gene as a fusion to a fluorescent protein and examine fluorescent patterns of each clone. I address the question of whether localized proteins in *Caulobacter crescentus* can self assemble or organize and localize in other systems that do not have other proteins from *Caulobacter*. My main goal was to clone fluorescent fusion for approximately 300 localized *Caulobacter* proteins into *E. coli* creating expression vectors by *in vivo* Gateway cloning and determine their localization in *E. coli*. I was looking to better understand these properties by expressing a library of *Caulobacter* proteins with known localizations in *E. coli*. This screen has been successful in that we identified several proteins with interesting localization patterns. Of the 182 *Caulobacter* proteins assayed, 56 showed precise localization in *E. coli*.

**Pharmacological Study of Serotonin Post-Synaptic Receptors of the Lateral Ciliated Cells of the Gill and Visceral Ganglia of *Crassostrea virginica*.** Zeekanapi Bandaogo, Amanda Hernandez, Margaret A. Carroll and Edward J. Catapane, Medgar Evers College, Brooklyn, NY.

Lateral cilia of gill of *Crassostrea virginica* are controlled by serotonergic-dopaminergic innervation from their ganglia. Serotonin and dopamine are neurotransmitters that increase and decrease ciliary beating, respectively. We studied serotonin agonists and antagonist to determine serotonin receptor types present in *C. virginica* gill and visceral ganglia (VG). Beating of cilia of isolated gill preparations and VG-gill preparations in which the innervation of the gill by the VG was kept intact was measured. Serotonin receptors are classified as HT1 - 7, with subtypes. Agonists and antagonists of different receptor types were tested by application to the gill or the VG to determine efficacies in altering beating of the lateral cilia. All but the HT3 are G protein metabotropic; HT3 are ionotropic. The agonists 5-Carboxamidotryptamine, alpha-Methyl-Serotonin and BIMU8, effectively mimicked serotonin. 1-(3-Chlorophenyl)biguanide did not. The antagonists, Methysergide, NAN-190, GR127935 and Clozapine-N-oxide blocked serotonin. NAN-190, GR127935 and Clozapine N-oxide were slightly excitatory when applied to the gill or ganglia; methysergide was not. Analysis indicates HT4 or HT7 receptors are present in the gill and visceral ganglia. Both are excitatory receptors which increase cAMP levels. The study shows serotonin receptors of the gill and visceral ganglia are of the same family and are metabotropic.

**Increasing Sampling of Taxa and Characters to Produce a More Robust Phylogeny for the *Drosophila melanogaster* Species Group.** Stefan Barone<sup>1</sup>, Valerie Schawaroch<sup>1,2</sup>, <sup>1</sup>Baruch College, New York, NY and <sup>2</sup>American Museum of Natural History, New York, NY.

Comparative biological investigations require an established, well-understood description of the relationships among species. Therefore, it is important to establish a phylogeny for the model organism, *Drosophila melanogaster*, with its close relatives in the *melanogaster* species group. This study will compile newly sequenced data with data from past works into one large dataset to provide a solid foundation for generating the *melanogaster* species group phylogeny. The dataset will include DNA sequence from four gene regions (*Adh*, *hb*, *Coll*, *Amyrel*) for 104 representative taxa. This is a work in progress. We are rearing 13 species from cultures and the remaining species are frozen at -80°C. Since the frozen samples' DNA is degraded to small fragments, we are designing primers for *Amyrel*. To construct this molecular based phylogeny, the DNA will first need to be extracted from the flies, then copied using PCR. The PCR product will be cleaned and cycle sequenced. The DNA sequences will be aligned and assembled into a single data matrix. This matrix will be analyzed under the maximum parsimony criterion in order to establish a phylogeny for the *melanogaster* species group. This work was supported by a Benjamin Cummings/MACUB Student Research Grant and the WSAS of Baruch College.

**Study of Serotonin and Dopamine Post-Synaptic Receptor Mechanisms in the Bivalve Mollusc *Crassostrea virginica*.** Danilo Beaubrun<sup>1</sup>, Trevon Adams<sup>2</sup>, Michael Nelson<sup>2</sup>, Edward J. Catapane<sup>2</sup> and Margaret A. Carroll<sup>2</sup>, <sup>1</sup>Kingsborough Community College and <sup>2</sup>Medgar Evers College.

Lateral cilia of gill of *Crassostrea virginica* are controlled by serotonergic-dopaminergic innervations from their ganglia. Serotonin is the neurotransmitter causing cilio-excitation, dopamine cilio-inhibition. Post-synaptic serotonin and dopamine responses are G-protein linked metabotropic mechanisms involving activation or inhibition of adenylyclase and changes in ion channel conductance. We studied ions involved in generating the post-synaptic responses by observing membrane potentials of lateral cells with DIBAC, a voltage sensitive fluorescent dye, using artificial sea water with ion replacements based on formulas from Formulae and Methods VI, Marine Biological Labs, Woods Hole, MA. Stimulating the branchial nerve at 5 Hz increased cilia rates and caused prolonged increased fluorescence, indicative of membrane depolarization. Stimulating at 20 Hz after exciting cilia decreased beating rates and reduced fluorescence, indicative of membrane repolarization. With potassium free salt water the response to stimulations was reduced. The same was seen with sodium free salt water. No differences were seen with calcium free salt water. The study shows a correlation between changes in membrane potential and beating rates of the cilia, with the activity of effector channels which change ionic fluxes. It provides insights into the serotonin and dopamine post-synaptic receptor mechanisms in the gill of *C. virginica*.

**The Stem Cell Niche in the Testes of the Obscure Species Group in the Genus *Drosophila*.** Michael Beaury, Matthew Emery, Jennifer Goonetilleke and Angela V. Klaus, Seton Hall University, South Orange, NJ.

Fly species in the genus *Drosophila* offer an attractive model for studying spermatogenesis as many of the sperm cell developmental stages that occur in mammals are mimicked in flies. Additionally, both flies and mammals maintain a spermatogenic stem cell niche in the testes that is responsible for providing a continuous supply of sperm precursor cells over the life of the adult male animal. The stem cell niche is characterized by the presence of a cluster of somatic cells called "the hub" which maintains the undifferentiated state of the stem cells. Recent work in our lab has suggested that testes from *Drosophila pseudoobscura* may contain multiple hubs, as opposed to *D. melanogaster* which has one apically located hub. In the current work, we are testing three species from the obscure species group for the presence of multiple clusters of hub cells using immunofluorescent staining. In addition, we are testing the hypothesis that the number of hubs will diminish as a function of fly age using pupae, virgin 1-3 day old flies, and one week old flies.

**Effect of Co-Enzyme on Cancer Cell Proliferation and Survival.** Shawna Benjamin<sup>1</sup>, Maria L. Cotrina<sup>2</sup> and Regina Sullivan<sup>1</sup>, <sup>1</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>Columbia University, NY.

Cancer cells are characterized by a high-energy demand required by increased proliferative rate of the tumor. Paradoxically, cancer cells utilize aerobic glycolysis instead of oxidative phosphorylation as the main glucose metabolic pathway (the so-called Warburg effect). We hypothesized that favoring oxidative phosphorylation in cancer cells may promote a metabolic switch back to the more efficient glucose utilization pathway and this, in turn, may reverse cancer cells towards their normal phenotype, by decreasing proliferation and increasing cell death. In this study we tested the effect of co-enzyme Q10 (CoQ10) on proliferation and cell survival of the breast adenocarcinoma cell line MDA-MB-231. CoQ10 is a naturally occurring substance directly involved in the electron transport chain and is commonly prescribed for the treatment of mitochondrial disorders and heart failure. We first incubated cultured 231 cells with 1-100 M CoQ10 for 2-24 hours and then analyzed cell proliferation by indirect immunofluorescence using the antibody Ki67, and indicator of mitosis. Cell death was concomitantly monitored with propidium iodide, a cell death marker that only labels nuclei of dying cells. Changes in mitochondrial morphology (indicator of respiration activity) were also studied with the use of the fluorescent indicator MitoTracker, which labels mitochondria in active, living cells. These experiments will establish a standard protocol to evaluate the potential of energy enhancing compounds as anti-cancer therapy. Our preliminary results show that CoQ10 may influence MDA231 cell proliferation and the experimental system is applicable to the study.

**Exploration of the Regulatory Effects of *jadW*<sub>1</sub>, *jadW*<sub>2</sub>, and *jadW*<sub>3</sub> in the Biosynthesis of Jadomycin B in *Streptomyces venezuelae* ISP5230.** Jeffrey Bertone and Roy Mosher, Wagner College, Staten Island, NY.

The soil-dwelling, gram-positive, filamentous bacterium *Streptomyces venezuelae* ISP5230 produces the antibiotic jadomycin B (JdB) under stress conditions such as heat shock, ethanol shock and microbial competition. Jadomycin B is known to have antibiotic properties against MRSA, other *S. aureus* strains, *Enterococcus faecalis* and *Bacillus subtilis*. Located on the *S. venezuelae* chromosome, the *jad* gene cluster not only encodes enzymes necessary for the biosynthesis of JdB, but also regulatory genes such as *jadW*<sub>1</sub>, *jadW*<sub>2</sub> and *jadW*<sub>3</sub>. Previous studies have shown that *jadW*<sub>1</sub> may encode an AfsA homologue involved in  $\gamma$ -butyrolactone signaling under environmental stress. As a result, *S. venezuelae* DNA encoding the *jadW*<sub>2</sub> and *jadW*<sub>3</sub> genes (along with flanking regions) was subcloned in pJV429. In the present study the *jadW* genes were deleted from pJV429 and replaced with a DNA fragment encoding both apramycin resistance (AprR) and an origin of conjugal transfer (OriT). The resulting plasmid, pJR001 will be digested to release the disruption cassette, ligated to the shuttle vector pHJL400, and introduced into *S. venezuelae* by conjugal transfer. Replacement of the *jadW* genes via homologous recombination should reveal their role in regulation of JdB biosynthesis.

**Effects of Lithium Chloride on the Behavior of Adult Zebrafish.** Orlando Bogran, Kristin Polizzotto, Kingsborough Community College, Brooklyn, NY.

Adult zebra fish (*Danio rerio*) were exposed to different concentrations of lithium chloride (LiCl) varying from low to high concentrations in 200 ml of solution for about 30 minutes. For each trial, five individuals were exposed to each concentration and then placed in observation tanks. We used 6 concentrations of LiCl: 1 millimole, 10 millimoles, 50 millimoles, 100 millimoles, 150 millimoles, 200 millimoles, and a control with 0 millimoles. To our knowledge this is the first time this experiment has been performed on adult *D. rerio*. We expected to see a loss of sense of direction, sluggish movement, or even death at the highest concentration. Individuals exposed to higher concentrations were less active in their respective observation tank than the control and other fish exposed to lower concentrations. We have also noticed that after the exposure, the fishes are more aggressive in the 50 mM concentration compared to the others. Interestingly, the aggression does not seem to increase with LiCl concentration above 50 mM. These results may help to clarify potential effects on humans taking lithium for bipolar disorder. This work was supported by grants 2R25GM06003 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537101091 of the CSTEP Program of the NYS Department of Education.

**Pharmacological Study of Dopamine Post-Synaptic Receptors of the Lateral Ciliated Cells of the Gill and Visceral Ganglia of *Crassostrea virginica*.** Cherryle Brown, Damilola Adebesein, Edward J. Catapane, and Margaret A. Carroll, Medgar Evers College.

Lateral cilia of the gill of *Crassostrea virginica* are controlled by a reciprocal dopaminergic- serotonergic innervation which originates from the cerebral and visceral ganglia. Dopamine is the neurotransmitter slowing down beating and serotonin accelerates beating. Dopamine receptors are classified as D1-like and D2-like, with respective subtypes. D1-like receptors are coupled to G protein Gas and activates adenylate cyclase. D2-like receptors are coupled to the G protein Gai, and directly inhibits the formation of cAMP by inhibiting the enzyme adenylate cyclase. Previous work of our lab showed the dopamine receptors in the lateral cells D2 type. To learn more we continued the study by investigating the receptors in the visceral ganglia. The agonists, A68930, propylpiperidine, piribedil, BHT920, 2-bromo-ergocryptine, SKF89626; and the antagonists, supiride, droperidol, metoclopramide, ergonovine and chlorprothixene were tested to determine their efficacy in altering the beating rates of the lateral cilia. Analysis of the data for the agonists and antagonists indicates that the dopamine receptors present in the gill and visceral ganglia are of the D2 type. The study also shows that this preparation is a good model for pharmacological studies of dopamine function as well as the pharmacology of drugs affecting biogenic amines in nervous systems.

**Analysis of Salt Marsh Edge Change in the Western Bays of Long Island South Shore, Hempstead, NY.** James P. Browne<sup>1,2</sup> and Dianna Padilla<sup>1</sup>, <sup>1</sup>Stony Brook University, Stony Brook, NY and <sup>2</sup>Conservation and Waterways, Town of Hempstead, NY.

Salt marshes on Long Island list about 50% of their area during the 20th century. Most of this loss was due to dredging and construction on filled marsh. Before marsh protection programs were instituted in the 1970s, dredging and filling caused a loss of about 45 Ha/y within the Town of Hempstead. Despite the protections, marshes are continuing to loose area at a rate of 6.5 to 10 Ha/y. This study uses GIS to measure the change at numerous points on the edges of marshlands that are located in the western bays of Long Island's South Shore Estuary Reserve and within the Town of Hempstead. The rates of marsh change at the chosen points vary between even nearby locations within the marsh, and statistical comparisons with local variations and trends in several parameters can provide insight into the drivers of both gain and continued loss. This work is funded by New York State, Department of State EPF funds.

**Development of a Genetically Encoded Malonyl-CoA Sensor.** Violeta Capric<sup>1</sup>, Michael Wolfgang<sup>2</sup> and Horst Onken<sup>1</sup>, <sup>1</sup>Wagner College and <sup>2</sup>Johns Hopkins University.

Malonyl-CoA, an intermediate in the fatty acid synthesis pathway, is known to regulate energy homeostasis and food intake within the hypothalamus of the mammalian brain. Malonyl-CoA responds to levels of blood glucose and leptin, both regulatory molecules in energy homeostasis (Wolfgang, *et al.*, 2007). During periods of energy surplus, malonyl-CoA is synthesized via Acetyl-CoA Carboxylase (ACC), which converts acetyl-CoA to malonyl-CoA. Inhibition of ACC by AMPK-directed phosphorylation or the expression of Malonyl-CoA Decarboxylase (MCD) results in the decrease of malonyl-CoA concentrations and in increase in food intake. Inhibition of Fatty Acid Synthase (FASN) results in an increase of malonyl-CoA concentrations and food intake suppression (Wolfgang and Lane, 2006). Recent advances suggest that Carnitine Palmitoyltransferase-1c (CPT1c), a brain specific CPT1 enzyme, binds malonyl-CoA in the hypothalamus to facilitate the behavioral response to food deprivation (Wolfgang, *et al.*, 2006). These findings provide evidence for a neuronal target of malonyl-CoA in energy homeostasis. A limitation to understanding the role(s) of metabolites is a dearth of analytical tools. Specifically, it is not possible to define a cell-specific concentration of malonyl-CoA to delineate which cells in the brain respond to changes in nutrient availability. Due to our interest in the role Malonyl-CoA plays in energy homeostasis, we have developed a genetically encoded malonyl-CoA sensor.

**Characterization of Sit-1, a Novel Gene Potentially Involved in the Regulation of Bone Mass.** Sarah Carrante<sup>1</sup>, Fayez Safadi<sup>2</sup>, Steve Popoff<sup>2</sup> and Tom Owen<sup>1,2</sup>, <sup>1</sup>Theoretical and Applied Science, Ramapo College of NJ, Mahwah, NJ and <sup>2</sup>Department of Anatomy and Cell Biology, Temple University School of Medicine, Philadelphia, PA.

Osteoporosis is characterized by the loss of bone mass with resulting loss of mechanical strength and increased fracture risk. During an ongoing study to characterize novel genes involved in regulating bone mass in rats, we identified Sit-1, a member of a family of transmembrane adapter proteins which recruit other signaling proteins to the cell membrane. Sit-1 has been reported in the literature only in the context of T-cell receptor activation and has not been reported to have a function in bone. In the reports concerning the T-cell receptor, Sit-1 is phosphorylated by the non-receptor tyrosine kinase c-src. Interestingly, it has long been known that by either knocking out the c-src gene in mice or downregulating its expression in cultured osteoblasts, bone formation increases and so, Sit-1 may be a crucial part of the c-src signaling pathway related to bone mass. Here we demonstrate that Sit-1 gene expression is temporally related to osteoblastic differentiation in both primary rat osteoblasts and human SaOS-2 osteosarcoma cells. We have cloned full length rat Sit-1 in an expression vector and are designing miRNAs to silence its expression so that we will be able to carry out functional studies in osteoblast cell culture.

**Sequencing of the 18S rRNA Gene from the Barnegat Bay Sea Nettle (*Chrysaora quinquecirrha*).** Jennifer E. Catuzzi and John J. Gaynor. Department of Biology and Molecular Biology, Montclair State University, Montclair, NJ.

The Stinging Sea Nettle (*Chrysaora quinquecirrha*) is native to the Atlantic Ocean, commonly inhabiting coastal waters and estuaries of the Eastern United States. Sea Nettle populations bloom during the summer months, placing this organism in constant contact with humans. The organism possesses stinging nematocysts causing a potential danger for humans swimming in populated waters. In recent years, Barnegat Bay has experienced a rapid and unexplained growth in the Sea Nettle population which has had a significant economic impact on tourism and fisheries of the region. Despite the potential dangers posed by the Sea Nettle, virtually nothing is known about the genome of this important species. DNA samples of this organism have been isolated in 2009 and 2010 from individuals collected from Barnegat Bay, New Jersey. In this study, genomic DNA of the 18S rRNA gene has been amplified using Cnidarian specific PCR primers specific for this locus. A 1,700 bp fragment was generated and the DNA sequence of this gene has been determined (Genbank HM015266). A BLAST search has demonstrated closest homology to other Scyphozoan 18S rRNA sequences as expected. This study is ongoing and we are continuing our efforts to complete the sequence of this gene as well as the entire 45S pre-rRNA cassette. We anticipate that this locus may prove useful as a tool for the molecular detection of larval forms of this important species in environmental samples from Barnegat Bay and other east coast estuaries.

**Parallel Synthesis of Potential Histone Deacetylase Inhibitors to Be Used For PET Imaging of the Brain.** Shannon Caesar<sup>1</sup>, John Dobbs, Jr.<sup>1</sup>, Tiffany St. Bernard<sup>2</sup>, Sunny Kim<sup>3</sup> and Alicia Reid<sup>1</sup>, <sup>1</sup>Medgar Evers College, Brooklyn, NY, <sup>2</sup>University of Connecticut, Storrs, CT and <sup>3</sup>Brookhaven National Laboratory, Upton, NY.

The behavior of a person's genes doesn't depend just on the genes' DNA sequence, but includes the epigenetic factors affected also. Changes in these epigenetic factors can play a critical role in disease. Histones are proteins that aid in the organization of DNA in to chromosomes. Histone deacetylase (HDAC) removes acetyl groups from histone tails, causing the histones to wrap more tightly around the DNA with an accompanying reduction in gene expression. Several classes of histone deacetylase inhibitors (HDIs), including benzamides, have been pursued as treatments for cancer as well as psychiatric and neurological disorders. Since little is known about the concentration and distribution of HDAC in the human brain, we set out to synthesize HDIs that could be radiolabelled for imaging HDAC in the brain using Positron Emission Tomography. To date no agent is available for imaging HDAC in the brain. A parallel synthesis procedure was developed that gives access to more than 100 potential benzamide ligands was developed. Using this synthetic approach nine benzamide ligands have been synthesized thus far. Two <sup>11</sup>C radiolabeled benzamide derivatives have been prepared, both of which have shown moderate brain uptake and HDAC affinity.

**Historic and Current Analysis of the Effects of Cranberry Agriculture on Plant Diversity in the New Jersey Pine Barrens.** Christopher Cerami and Heather Smith-Reinhart, Kean University, Union, NJ.

By analyzing the current ecosystem types within the New Jersey Pine Barrens, one can obtain a better understanding of how cranberry agriculture influenced the natural landscape and hydrology of the area and subsequently altered its plant diversity. The sites being compared are a red maple swamp, a naturalized bog, a modernized restored bog, and a white cedar swamp. To create a cranberry bog all ground covering within the desired lowland forest area is destroyed, the ground is then leveled, and then ditched with irrigation channels. Bogs are created near stream headwaters to create reservoirs for constant water supply during the growing season. Flooding of the bogs creates a unique environment for only cranberry plants to thrive. Peat depth is highest in the red maple swamp, where water levels influence vegetation year round. Areas with increasing overstory % cover also have decreasing species richness. The red maple swamp has the lowest species richness. Based on cranberry % cover, the highest percentage is within the naturalized bog, followed by the modernized bog, then the red maple and white cedar swamps. Changes to the landscape singularly benefitted the cranberry crop, with little thought of any detrimental affects to the native plant species.

**Antimicrobial activity of in-house synthesized Silver Nano Particles on *Escherichia coli*.** Khush Preet Cheema, Eunchul Kim, Moni Chauhan and Mangala Tawde, Quennsborough Community College of CUNY, Bayside, NY.

Silver (Ag) nano particles were synthesized in one-step process by the reaction of silver nitrate, Tris [trimethoxysilylpropyl] isocyanourate and trioctyl amine. The reaction was monitored via UV-Vis spectra and the particles were analyzed by SEM. The nano Ag particles were then tested for toxicity using *Escherichia coli* ATCC # 2374. *E. coli* was selected as a bacterial indicator since it is a Gram negative bacterium with high lipid content in its cell wall. Various solvents as well as silver salts were tested for their toxicity on *E. coli* and suitable solvent with minimal toxicity was selected to suspend the Ag nano materials. A range of concentrations of Ag nano are tested on bacterial lawn for growth inhibition. The Minimal Inhibitory Concentration (MIC) for the Ag nano particles are being determined by standard microbiology methods which will be compared with other silver salts. The anti-microbial activity against bacteria can serve as an important indicator for various applications of the Ag nano particles.

**Biodiversity Revealed through Seining of the Hudson and East Rivers.** Lauren Clark<sup>1</sup>, Gaetano Musarella-Conti<sup>1</sup>, Victoria Garufi<sup>2</sup>, Kara Gilmour<sup>3</sup>, Allen Burdowski<sup>1</sup> and Kathleen Nolan<sup>1</sup>. <sup>1</sup>St. Francis College, Brooklyn, NY, <sup>2</sup>Beczak Environmental Education Center, Yonkers, NY, <sup>3</sup>Brooklyn Bridge Park Conservancy, Brooklyn, NY.

The St. Francis College Biology Health Promotion Department is actively involved with two environmental education programs sponsored by the Brooklyn Bridge Park Conservancy and the Beczak Environmental Education Center. Environmental variables of catches from seining programs of the East River and the Hudson River were analyzed. This analysis included: species lists, richness, evenness, and diversity as determined by the Shannon Weiner Diversity Index. We mined the data of the "catch of the day" programs to obtain this data. Many of the species were found in both locations, but each area contained species unique to that location. This information could be an indication of the health of the rivers, and provides a window on temporal and spatial changes in species diversity and abundance in these two important locations of the NY/NJ Harbor Estuary.

**Utilization of Gemcitabine and Genistein to Induce Apoptosis in Pancreatic Cell Lines. David Conway and Valerie Giordano, St. Joseph's College, Patchogue, NY.**

Gemcitabine is a highly effective chemotherapy that is successful against multiple cancer lines, including pancreatic cancer. However, its effect on non-cancerous tissue is highly toxic. Phytochemicals have been shown to reduce chemotherapy induced toxicity on normal tissue. Genistein is a promising anticancer phytochemical that is beneficial to non-cancerous cells, but is lethal to cancer cells. The purpose of these studies was to use the phytochemical genistein to attenuate the toxic effects of gemcitabine on the pancreatic cancer cell line, Panc-1. The goal was to determine whether in the presence of genistein the anticancer effects of gemcitabine would be achieved with lower doses. Morphological changes due to exposure were examined and compared to untreated controls using an inverted compound microscope. Apoptosis and cell survival was investigated using a Colony Formation Assay and Western blot to determine if the activation of CDK2 was achieved. The results indicate that the combination of a decreased amount of gemcitabine, 15 – 20  $\mu$ M, with a constant concentration of genistein, 40  $\mu$ M, had the same effect as therapeutic treatment with 30 to 40  $\mu$ M gemcitabine alone.

**Control of Invasive Species on Long Island. Jamie Cooper, Natasha Cambria and Mohammad Rana, St. Joseph's College, Patchogue, NY.**

There are a large number of invasive species on Long Island including Common reed (*Phragmites australis*) and Japanese knotweed (*Fallopia japonica*). These two invasive species cause a great deal of harm; they have an extensive ability to spread quickly by their rhizomes forming dense strands and crowding out native fauna. They increase fire potential, and create monoculture strands that threatens the native plant communities. Both are very difficult to manage and control due to their unique properties. The methods of control used in this study include mechanical, chemical and biological. For both the Common reed and Japanese knotweed, the only mechanical method that had effective results was cutting the rhizome to a size less than 5 inches; a rhizome smaller than 5 inches showed no re-growth. Household vinegar and ethanol in cut-stem application, proved effective for both plants. *P. australis* can also be controlled by the allelopathic effects of *Juniperus squamata*.

**State of Seafloor and Sewage Outfall Pipes Offshore Jones Beach, NY. Beth A. Christensen<sup>1</sup>, Robert Weltner<sup>2</sup>, Robert Aluck<sup>1</sup> and Danielle Bissett<sup>1</sup>, <sup>1</sup>Adelphi University, Garden City, NY and <sup>2</sup>Operation Splash, Freeport, NY.**

Sewage outfall pipes are used to disperse nutrients and reduce impact on the estuarine system. Two pipes were placed off Jones Beach in the 1970's. As part of a special effort, the EPA research vessel (OSV Bold) was used to map the seafloor around the pipe, assess the condition of pipe, image sediments and measure water column conditions in the vicinity of the pipe. Imaging suggests the pipes have not been significantly comprised in the area we investigated. However, there are boils that imply some of the pipe may be compromised. The area is heavily altered from fisheries operations (dredging). Sediment imaging indicates little flocculant is being deposited in the area. The current state of the pipes suggests that a similar pipe planned for Long Beach has potential, since the benthic impacts at the two locations studied do not appear significant, using the tools employed. However, an evaluation for contamination by heavy metals and other toxins in this region should be conducted before a final conclusion is drawn.

**Urinary Steroids Profile In Endometriosis Patients. Fiona Dailey<sup>1</sup>, Ozgul Muneyyirci-Delale<sup>2</sup> and Vijaya Nacharaju<sup>2</sup>, <sup>1</sup>Medgar Evers College and <sup>2</sup>SUNY Downstate Medical Center, Brooklyn, NY.**

Endometriosis is a debilitating gynecological medical condition in women. This occurs when endometrial cells appear and flourish in areas outside the uterine cavity, often times on the ovaries. These endometrial cells outside of the uterus are also influenced by hormonal changes and respond similarly as do those cells found inside the uterus. Along with Endometriosis, women experience severe pelvic pains, dysmenorrhea (painful menses), dyspareunia (painful intercourse) and even infertility. This disease does not have a cure; however, patients can be treated in order to alleviate the pain. While the exact cause of Endometriosis remains unknown, research shows that it is a hormone dependent condition. Specifically in this study, we focused on urinary androgens and glucocorticoids. We concentrated on cortisol a stress hormone before and after treatment. Steroid extraction and hydrolysis was used as a technique before injecting the derivatives in the gas chromatography/mass spectrometry. These peaks were identified and analyzed. The THE (tetrahydrocortisone) levels were higher after 24 week treatment, indicating increased conversion of the stress hormone cortisol to the inactive cortisone.

**Synthesis of Nek2 Activity-Based Biosensors. Anibal Davalos-Morinigo<sup>1</sup> and Sanjai Kumar<sup>2</sup>,<sup>1</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>Queens College, Flushing, NY.**

A defining characteristic of cancer progression is chromosomal instability due to malfunctioning cell cycle proteins. Nek2 is a dimeric Ser/Thr protein kinase that is located in the centrosome and tightly regulates centrosome organization. Nek2 kinase is over-expressed in many forms of cancer such as breast, prostate and intestinal. However, the role of Nek2 in cancer development is not fully understood. This is primarily due to the lack of suitable tools for rapid assessment of Nek2 functions in an intracellular setting. This research focused on generating fluorescent-based, Nek2-specific biosensors using solid phase peptide synthesis (SPPS). The goal is to synthesize a small library of peptide-based substrates containing the Nek2 target serine residue. Eight of these compounds were synthesized using SPPS, purified through HPLC and identified using mass spectroscopy. The next step will be to conduct kinetic studies in order to identify the synthetic peptides that can best serve as Nek2 reporter substrates. It is anticipated that availability of an activity-based Nek2 biosensor will enhance our current understanding of Nek2 biology in both normal and aberrant cells. Anibal Davalos-Morinigo is a participant in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (grant 1 R25 GM65096-05).

**The Role of MT1-MMP in Ovarian Cancer: the “Pearl Necklace”. Jenniffer De Leon, Long Island University, Brooklyn, NY.**

Epithelial ovarian cancer is the leading cause of death for gynecological cancers in the Western world. Poor prognosis in the clinic has been linked to cancer metastasis within the peritoneal cavity and is characterized by a complex series of interrelated cellular events. Matrix metalloproteinases (MMPs) have been demonstrated to play an important role in ovarian carcinogenesis. Several MMPs have been demonstrated to impact biological processes by increasing cell migration, invasion, and metastasis. This study examines the role of MT1-MMP in a stably transfected ovarian cancer cell line, SKOV-3. Endogenous expression of MT1-MMP in transfected cells caused a unique phenotype in which a ring-like arrangement of cells was observed in 2D culture. MT1-MMP transfected SKOV-3 cells increased migration when employed in a Transwell Migration assay, as well as increased invasion in a 3D Type I collagen matrix. An increase in cell proliferation was also observed in MT1-MMP/GFP stable cells as compared to GFP transfected and wild type. Using a mutational analysis approach, SKOV-3 cells were transiently transfected with different chimeras of MT1-MMP domains; a Transwell migration assay was employed which demonstrated critical

domains involved in the enhancement of cell migration. MT1-MMP catalytic domain and the IS4 and IVS4 blades of the hemopexin domain were required for MMP-2 activation and increased cell migration. MT1-MMP PEX domain mutant chimeras were stably transfected in SKOV-3 cells; the IVS4 blade mutants displayed a loss in the ability to form the ring-like growth pattern suggesting it may play a role in this unique phenotype. MT1-MMP has also been shown to induce Epithelial to Mesenchymal Transition (EMT). Changes in E-cadherin expression, a cell-cell adhesion protein, are indicative of the phenotypic plasticity that occurs in ovarian cancer progression. The Snail transcription family is thought to be involved in the repression of E-cadherin expression, leading to EMT. EMT markers were analyzed by RT-PCR and it was demonstrated that the transcriptional factor Snail was upregulated in the MT1-MMP/GFP stable SK-OV-3 cells. Decreased expression in E-cadherin was demonstrated by RT-PCR, Western Blot, and Immunohistochemistry.

**The Inhibitory Effect of Green Tea Lypophilic Polyphenols (LTP) on Herpes Simplex Viral Infections. Aline de Oliveira, Sandra Adams and Lee Lee. Montclair State University, Montclair, NJ.**

Herpes viruses (family *Herpesviridae*) are a diverse group of large DNA viruses, each of which is able to establish latent infections. There is no cure for the diseases caused by HSV infections. Green tea polyphenols are antioxidants known to possess antiviral properties against several viruses, including HSV (Herpes Simplex Virus). More importantly, HSV infection could be significantly reduced if effective agents for prevention are developed. HSV-1 DNA with the green fluorescent protein (GFP) introduced into the UL46 gene was used to investigate the effects of green tea polyphenols on the virus. Two different green tea extracts have been isolated and modified, EGCG is water-soluble and LTP is fat-soluble. These extracts with concentration of 12.5, 25, 50, 75 and 100  $\mu$ M were used on Vero cells to determine the cytotoxicity, and wound healing effect. Cell viability was determined by the trypan blue reagent, which stains only non-viable cells. The preliminary results of this study suggested that EGCG and GTP with concentration of 25  $\mu$ M, and LTP with concentration of 12.5  $\mu$ M provided the best results on Vero cells. There are no significant morphological and proliferation changes seen in the treated cells. The maximum non-toxic concentration of each extract was further used to study its effect on HSV by plaque forming unit (PFU) assay and GFP expression. Virus treated with the different green tea polyphenols infected cells much less when compared to control.

**Effects of Lower VHL Levels on PC12 Pheochromocytoma cells. Panchajanya Deshpande and Alan Schoenfeld, Adelphi University, Garden City, NY.**

von Hippel-Lindau (VHL) disease is a genetic condition resulting from the inactivation of the VHL gene. Patients with VHL disease carry one wild type allele and inherit one mutant allele. VHL disease is characterized as autosomal dominant. Patients afflicted with this condition are at risk of developing the following tumor types: Renal Cell Carcinoma, Hemangioblastoma and Pheochromocytoma. Pheochromocytoma tumors are neuroendocrine in nature and arise from chromaffin cells in the adrenal medulla. These tumors secrete large quantities of catecholamines (e.g., epinephrine). The mechanisms by which VHL mutations cause these tumors are currently not completely understood. To this end, this project focuses on understanding these mechanisms and their correlation to phenotypic manifestation and characterization of pheochromocytoma. To characterize pheochromocytoma, PC12 cell lines with lowered VHL levels were created using RNA interference and western blots were performed to establish VHL down-regulation. Additional western blots were conducted to confirm secondary characteristics of these cells such as HIF- $\alpha$ , Cyclin D1, Tyrosine Hydroxylase (TH), Glut-1,  $\alpha$ -5 Integrin,  $\beta$ -1 Integrin, and p27 expression. Finally, neurite outgrowth assays were performed to analyze neuronal growth in these cell lines. We hypothesize that VHL down-regulation leads to a more cancerous and less differentiated phenotype in these cells.

**Manganese Impairs the Activity of Mitochondrial Aconitase in the Gill of the Bivalve *Crassostrea virginica*. Rachelle Desroches, Alfred Hutchinson, Hai Huang, Margaret A. Carroll Edward J. Catapane, Medgar Evers College.**

Manganese is an essential trace metal but excessive exposure leads to manganese accumulations and toxicity. Excess manganese is neurotoxic and causes Manganism, a Parkinsons-like disorder. The mechanism of manganese neurotoxicity is unknown. It is hypothesized excess manganese causes mitochondrial dysfunction. Manganese accumulates in mitochondria and can raise levels of reactive oxygen species or participate in catalyzing unwanted redox reactions. We showed manganese accumulates in tissues of *Crassostrea virginica* and disrupt the dopaminergic system controlling lateral cilia in gill. We also showed it impairs gill mitochondrial respiration. We examined effects of manganese on the Krebs Cycle enzyme aconitase in gill. Mitochondrial suspensions were exposed to manganese minutes on ice, repelleted, resuspended, then sonicated to free aconitase from the mitochondrial matrix. Aconitase activity was determined spectrophotometrically. The reactions were monitored by measuring the increase in absorbance at 340 nm associated with the formation of NADPH. Results show short-term exposure to manganese (1 -50 mM) caused up to a 90% loss in aconitase activity. The results corroborate our previous findings that manganese disrupts mitochondrial respiration in oyster gill and further demonstrates a mechanism by which manganese can disrupt energy homeostasis by impairing aconitase, an oxidative stress-sensitive enzyme of the Krebs Cycle.

**Evaluation of New Enhancements to BRCAPRO for Predicting BRCA1 and BRCA2 Mutations. Kadidiatou Diallo and Swati Biswas, Medgar Evers College.**

Deleterious mutations of the BRCA1 and BRCA2 genes confer susceptibility to breast and ovarian cancer. BRCAPRO is a widely used statistical model in genetic counseling for these cancers. If estimated probability of carrying a mutation is high, the counselee is referred for genetic testing. It is of interest to know the effect of recent enhancements in the new version of BRCAPRO compared to the older version. 25 families were analyzed using old and new versions of BRCAPRO. The two versions were compared using the Area Under receiver operating characteristic Curve (AUC), sensitivity, and specificity. Of the 25 counselees, 11 carried mutation and 21 had extended family information. The new version performed better. Examination of specific families revealed differences in the two versions. A limitation of this study is small sample size.

**DNA Binding Activity of the Transcription Factor HIF-1 in Normoxic and Ischemic Testis. Christine Dugan, Marie Karpodinis and Michael A. Palladino, Monmouth University, West Long Branch, NJ.**

Testicular torsion occurs due to twisting of the spermatic cord, which can result in ischemia (reduced blood flow) and hypoxia (reduced oxygen) that can cause germ cell damage and reduced fertility or infertility. Activation and inhibition of oxygen-dependent genes and proteins determine the degree of tissue damage in the ischemic testis, or conversely, provide protection to cells from damage. One protein that may protect cells from ischemic damage is HIF-1 (Hypoxia Inducible Factor-1). HIF-1 is a key regulator of responses to hypoxia by stimulating expression of genes in response to hypoxia. Previously we determined that testicular HIF-1 is abundant in Leydig cells, and the levels of HIF-1 mRNA and proteins were unregulated by hypoxia and ischemia. Unlike most tissues, HIF-1 protein levels remained unchanged in normoxic and ischemic testes. The goal of this project was to determine if HIF-1 in the normoxic or ischemic testis is an active transcription factor by using an Electrophoretic Mobility Shift Assay (EMSA) to evaluate HIF-1 DNA-binding activity. EMSA experiments were carried out by incubating nuclear and cytoplasmic protein extracts from normoxic rat testis with a biotin-labeled HIF-1 $\alpha$  oligonucleotide containing a consensus Hypoxia Response Element. Oligo-protein complexes were separated by non-denaturing polyacrylamide gel electrophoresis and shifts detected by enhanced chemiluminescence. Studies to date have revealed DNA binding activity of testicular HIF-1.

**Chromatin Condensation Status of Parasperm and Eusperm in *Drosophila pseudoobscura*, *D. subobscura* and *D. persimilis*.** Matthew Emery Jennifer Goonetilleke and Angela V. Klaus, Seton Hall University, South Orange, NJ.

*Drosophila pseudoobscura*, *D. subobscura* and *D. persimilis* belong to the obscura species group of flies in the genus *Drosophila*. The obscura group is characterized by males with ellipsoid testes and by the presence of two sperm types produced within the testes: parasperm and eusperm. In the female reproductive tract, the parasperm are usually targeted for destruction and are never found to fertilize an egg. We hypothesize that this is due to differences in chromatin condensation between the eusperm and parasperm. In the current work, we will report on the effects of SDS treatment on the sperm nuclei of eusperm and parasperm. SDS is a strong cationic detergent that has capacity to denature proteins. If the chromatin of the parasperm is improperly compacted, then we expect to see the sperm heads swell in response to SDS treatment. This assay has been successfully used to analyze chromatin compaction in mammalian sperm nuclei; we wish to modify it for use with our invertebrate sperm.

**Distyly in *Primula vulgaris*: DNA Extraction and PCR Amplification of Polygalacturonase.** Alyssia Ferrol and Farshad Tamari, Kingsborough Community College, Brooklyn, NY.

Distyly is a breeding system for plants with two morphologies. Long-styled plants have long pistils and short stamens and short-styled plants have short pistils and long stamens. *Primula vulgaris* is a distylous species that is self-incompatible: preventing self-fertilization and encouraging outcrossing. The gene polygalacturonase has been implicated in distyly and self-incompatibility. We hypothesize that polygalacturonase is present in *P. vulgaris*' genome. To test our hypotheses, we used five short- and long-styled plants of *P. vulgaris* for DNA extraction using a modified mini extraction protocol following Doyle and Doyle. Agarose gel electrophoresis was used to ensure that DNA was present. Our results indicate that DNA extraction was successful. We used PCR to amplify polygalacturonase. Our attempts were unsuccessful; however, we are trying to optimize the conditions for PCR amplification. In the future, the extracted DNA will be used for PCR amplifications and comparisons of sequences of genes implicated in distyly, including polygalacturonase. The lack of PCR amplification of polygalacturonase from *P. vulgaris*' genome might suggest that this gene does not occur in its genome. However, before making this conclusion we will exhaust all possibilities that this lack of amplification is due to experimental error in our PCR preparation. This work was supported by grant 0537101091 of the CSTEP Program of the NYS Department of Education.

**The Involvement of SIP1 in Neural Crest Formation.** Renee Fleming<sup>1</sup>, Marianne Bronner<sup>2</sup> and Crystal Rogers<sup>1</sup>, <sup>1</sup>Medgar Evers College and <sup>1</sup>California Institute of Technology.

The zinc finger homeodomain containing transcriptional repressor Sip1 has been identified in chick. Sip1 is required for development of the cranial nervous system but its role in neural crest development has yet to be elucidated. In the present study, we used whole mount *in situ* hybridization and protein immunohistochemistry. We found that Sip1 is expressed in the neural tube and migratory cranial neural crest. Its expression pattern is very dynamic and changes between stages. Additionally immunohistochemistry reveals that the Sip1 protein expression overlaps with fluorescent antibody expression in both the neural tube and migratory neural crest. Additionally, morpholino oligoneucleotides to do a protein knock-down as a tool to inactivate Sip1 and we found a partial phenotypic response. The study shows that the zinc finger homeodomain containing transcriptional repressor Sip1 is involved in neural crest development.

**Eastern Oysters (*Crassostrea virginica*) From Jamaica Bay, NY Contain Multiple Polymorphisms in the Cytochrome Oxidase I Gene and the Ribosomal RNA Internal Transcribed Spacer.** Cynthia Flovel, Craig Hinkley and Gary Sarinsky, Kingsborough Community College, Brooklyn, NY.

Eastern oysters were once plentiful in the bays of New York including Jamaica Bay (JB), but pollution, over-fishing and disease led to their disappearance. As a first step towards possibly reintroducing oysters into JB, we want to determine whether eastern oysters along the east coast of North America are the same genetically or whether there might be sub-speciation occurring. We first examined the cytochrome oxidase I (COI) gene and the ribosomal RNA internal transcribed spacer (ITS) from oysters grown in JB under controlled conditions. Our hypothesis was that there would be no variation in these DNA regions in oysters from JB. To test our hypothesis, we isolated DNA from gill and mantle tissue of oysters and amplified the COI gene or the ITS using the polymerase chain reaction. Comparison of the DNA sequences for the COI gene and the ITS showed that there is a polymorphism within each of these DNA regions among oysters from JB. In addition, comparison of the ITS of oysters along the east coast suggest there may be polymorphisms specific to oysters from different regions of the east coast. In conclusion, we reject our hypothesis because there is variation in both the COI gene and ITS in oysters from JB. This work was supported by grants 2R25GM06003-05 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537101091 of the CSTEP Program of the NYS Department of Education.

**A Behavioral Study of Sharks in Captivity. Mario C Flunory<sup>1</sup>, Mary T Ortiz<sup>1</sup> and Anjelique M. Restrepo<sup>2</sup>, <sup>1</sup>Kingsborough Community College, CUNY, Brooklyn, NY and <sup>2</sup>Hunter College, CUNY, New York, NY.**

Measures weren't taken until recently to ensure shark safety or satisfaction in captivity. Four behaviors (biting, fast swimming, rest, curiosity) before, during and after feeding, of Nurse, Sandbar and Sand Tiger sharks were observed in aquaria (Baltimore, NY Aquarium, Adventure and Jenkinson's (NJ)), and compared to studies in the wild. Data included habitat size, tank shape, other features. The hypothesis was: Sharks in captivity are less aggressive than in the wild. For the species studied, (number of behaviors observed)/shark/visit were calculated. No aggressive biting was observed. The primary behavior was curiosity in all four aquaria. Sharks displayed minimal fast swimming. They were more motionless after feeding. More activity was observed in Nurse Sharks in Jenkinson's (58,000 gal) and NY (90,000 gal) compared to Baltimore (225,000 gal) and Adventure (550,000 gal) aquaria. Tank size may be influential. Sand Tigers were more active than Nurse Sharks before feeding regarding curiosity - average curious behaviors were  $12.17 \pm 11.83$  versus  $1.56 \pm 1.94$ /shark/visit, respectively. The hypothesis was accepted. Sharks in captivity were less aggressive than those in the wild, perhaps due to less food competition, less stimulation. Such studies may provide animal models for human behavior. Support: Grants 2R25GM06003 Bridges to the Baccalaureate (NIGMS), 0537101091 CSTEP (NYS Education Department); Jenkinson's Aquarium.

**Regulation of Glial Cell Proliferation: the ASIC-BK Channel Interaction. Jennifer C. Guercio, Jude Mele and Elena Petroff, Montclair State University, Montclair, NJ.**

Gliomas are the most common and aggressive brain cancer. Normal glia and glioma tissue express Acid Sensing Ion Channels (ASICs) and Big K<sup>+</sup> (BK) channels, and at normal brain pH (7.4), ASICs interact with and inhibit BK channels, and thus, may inhibit glioma cell growth. At an acidic pH, this interaction is disrupted, and the active BK channels may foster cell proliferation, such as at a site of trauma or injury. We tested this hypothesis by growing isolated mouse glial cells at normal pH (7.4) to simulate normal brain environment, at a low pH of 7.0 to mimic brain injury conditions, and at both pH 7.4 and 7.0 in the presence of 200nM of a BK channel blocker Charybdotoxin. Our data demonstrate that cell proliferation is significantly increased at pH 7.0 as compared to normal pH conditions (7.4). The presence of Charybdotoxin inhibited glial growth at both pH's. These results support our hypothesis and firmly establish the important role that the ASIC-BK channel interaction plays in glial cell proliferation. These results are a step towards our long-term goal of developing novel approaches to treating glioma brain cancers.

**Immunofluorescent Characterization of the Cellular Composition in Normal Adult Zebrafish (*Danio rerio*) Optic Tectum. Michael C. Gutkin<sup>1</sup>, Christopher P. Corbo<sup>1,2</sup>, Alejandra del C. Alonso<sup>2</sup> and Zoltan L. Fulop<sup>1</sup>, <sup>1</sup>Wagner College, Staten Island, NY and <sup>2</sup>CUNY College of Staten Island, Staten Island NY.**

In our previous studies aiming at the morphology of the normal adult zebrafish brain, we have analyzed the cellular organization of the optic tectum using light and electron microscopy. In this particular work, immunofluorescent technique along with laser scanning confocal microscopic imaging provided us the ability to view the different cell types within relatively thick (80  $\mu$ m) vibratome sections of the optic tectum. This technique provides us a more three-dimensional perspective as opposed to two-dimensional work that we have done prior. Zrf-1 and Zn-12 antibodies were used to label both glial cells and neurons, respectively (antibodies were obtained from the Zebrafish International Resource Center, ZIRC). This labeling technique allowed for the detection of neuronal cellular elements such as glial fibers and neuronal cell projections. Through this study, we can gain a better understanding of the cytoarchitecture and organization of the different cell types that reside in the adult zebrafish optic tectum. We conclude that both the three-dimensional immunofluorescence, as well as the high magnification confocal microscopy with its Z-stacking ability, provide us a very dynamic set of tools to analyze the cytoarchitecture of the zebrafish brain in general. These observations will be enhanced with further studies and the use of more specific antibodies in order to investigate more deeply the organization of the different cell types.

**The Effects of Heavy Metal Toxicity on the Morphology and DNA of Cyanobacteria *Synechococcus sp.* IU 625. Bobak Haghjoo<sup>1</sup>, Tin-Chun Chu<sup>2</sup> and Lee H. Lee<sup>1</sup>, <sup>1</sup>Montclair State University, Montclair, NJ and <sup>2</sup>Seton Hall University, South Orange, NJ.**

*Synechococcus sp.* IU 625 is a unicellular photosynthetic cyanobacterium. The effect of different heavy metals on the growth of *Synechococcus sp.* IU 625 has been previously studied. Cadmium (Cd<sup>2+</sup>), zinc (Zn<sup>2+</sup>), copper (Cu<sup>2+</sup>), and mercury (Hg<sup>2+</sup>) are well-studied heavy metals in its physiological interaction in many organisms. In this study, their effects on cyanobacteria *Synechococcus sp.* IU 625 were observed using Differential Interference Contrast (DIC) microscope and Scanning Electron Microscope (SEM) in order to determine morphological changes under heavy metal stressed conditions. DAPI stain was used to study the DNA changes. The results indicated that cells elongate under most heavy metal stress. Some cells were curved due to the metal effect on the cell cytoskeleton. Among all, mercury has the strongest effect on the DNA. DNA fragmentation has been observed in metal treated cells. Significant surface changes have been detected in the SEM images. The observed changes in characteristics allow further understanding of the interactions of these heavy metals on the cells, DNA and cytoskeleton.

**The Emperor's New Clothes: Genes Involved in Molting and Their Roles in Non-Ecdysozoan Phyla. Bekim Hajrizi and Julian Stark, Queensborough Community College, Bayside, NY.**

The superphylum Ecdysozoa are a group of organisms which form an entirely new cuticle beneath a pre-existing one, shed the old cuticle, and expand and then sclerotize (harden) the new one. Growth would be otherwise impossible. The group contains the familiar Arthropods (animals with jointed appendages and hard exoskeletons, such as insects and crustaceans) and Nematodes, as well as some much more obscure phyla: Onychophorans (velvet worms), Tardigrades (water bears), Nematomorphs (horsehair worms) Priapulids (penis worms), Kinorhynchs (spiny-headed worms), and Loriciferans (brush heads). The group was first proposed by Aguinaldo, *et al.* in 1997, based mainly on trees constructed using 18S ribosomal RNA genes. DNA sequencing of hundreds, if not thousands of genes and taxa has progressed infinitely far since that time, and almost all of that sequence information is freely available in Genbank, making possible datamining studies on selected gene families and taxa. While the role of various genes in the process of ecdysis (molting of the cuticle) has been characterized in the phyla within Ecdysozoa, many of these genes have homologs in other phyla. Our study has organized these genes into larger functional groups, in an attempt to hypothesize possible gene evolutionary patterns.

**Copper Surface Mediated Toxicity Correlates with Increased Lipid Peroxidation rates in both Gram Positive and Gram Negative Bacteria. Rachel Hammer, Tae Y. Kang and Nidhi Gadura, Queensborough Community College, Bayside, NY.**

The mechanism(s) by which copper alloy surfaces kill microorganisms is still largely unclear. The aim of our project is to determine the relationship between exposure to copper alloy surfaces or copper ions, lipid peroxidation, and killing of *Escherichia coli* and *Bacillus subtilis*. Quantitative dilutions series were performed to test for bacterial cell death. Our results indicate a biphasic killing curve when both Gram positive and Gram negative bacteria are exposed to copper chips. TBARS assay was used to measure the lipid peroxidation levels. The bacterial killing rate upon exposure to copper surface also correlates with increased lipid peroxidation levels.

This project was funded by PSC-CUNY and Copper Development Association grant to Dr. Gadura. Rachel Hammer is partially funded by QCC NSF-STEP.

**Increased Levels of Unsaturated Fatty Acids Correlates with Increased Levels of *E. coli* cell Death on Copper Surfaces. Bo Zhi (Robert) Hong, Tae Y. Kang 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. We also determined the relationship between membrane lipid peroxidation levels and cell death in *E. coli* on both copper and steel surfaces. Quantitative dilutions series were performed to test for bacterial cell death. Our results indicate a biphasic killing curve when *E. coli* is exposed to copper chips however this was not seen on steel chips. TBARS assay was used to measure the lipid peroxidation levels. Genetically altered bacterial strains show that when exposed to copper surfaces, increased levels of unsaturated fatty acids in the plasma membrane results in faster cell death rates in *E. coli*. This project was funded by PSC-CUNY and Copper Development Association grant to Dr. Gadura. Funding for Robert Hong is provided by QCC NSF-STEP grant.

**Induction of the Expression of the Tachykinin Precursor 1 (TAC-1) Gene by Tumor Necrosis Factor- $\alpha$  (TNF- $\alpha$ ) in Breast Cancer Cells. Taslima Ishmael<sup>1</sup>, Luanda Morris<sup>1</sup>, Pranela Rameshwar<sup>2</sup> and Tammy A. Castro<sup>1</sup>. <sup>1</sup>Bloomfield College, Bloomfield, NJ and <sup>2</sup>UMDNJ, Newark, NJ.**

Like many other endocrine responsive cancers, breast cancer (BC) has a predilection to migrate to the bone marrow (BM). A growing body of evidence suggests that the products of the tachykinin precursor 1 (TAC-1) gene play a role in the early events that allow for the integration of breast cancer cells (BCCs) into the BM as well as their survival. The aim of this study is to look into the role of TNF- $\alpha$  in the induction of the expression of the TAC-1 gene. We hypothesize that TNF- $\alpha$  is an inducer of the expression of one of an important TAC-1 gene product: Substance P (SP). We propose that SP is in turn able to stimulate the expression of TNF- $\alpha$  establishing an autocrine loop. TNF- $\alpha$  was used to treat MCF7, T47D and MDA-MB-231 breast cancer cell lines. The SP concentration in the culture supernatants was measured via a competitive ELISA and the levels of SP message were measured via rtPCR. In order to investigate the portions of the TAC-1 gene that might be crucial to induction by TNF- $\alpha$ , the non-tumorigenic cell line MCF12A was transfected with various constructs of the TAC-1 gene.

**Eastern Oysters (*Crassostrea virginica*) From Jamaica Bay Contain a Specific Polymorphism in the Cytochrome Oxidase I Gene.** Anton Johnson, Craig Hinkley and Gary Sarinsky. Kingsborough Community College, Brooklyn, NY.

Eastern oysters, once abundant in Jamaica Bay (JB), began to disappear in the early 1900's and are now absent. In order to repopulate JB with eastern oysters, we wanted to determine how much genetic variation there is in the eastern oyster population. As a first step, we compared the cytochrome oxidase I (COI) and 28S ribosomal RNA (28S) genes of eastern oysters grown in JB under controlled conditions. We hypothesized that there would be no polymorphisms in either the COI or 28S gene in oysters grown in JB. To test this hypothesis, we extracted DNA from gill and mantle tissue of six oysters and amplified regions of the COI and 28S genes using the polymerase chain reaction. The sequence of the 28S gene had no differences between oysters from JB. However, the sequence of the COI gene of oysters from JB showed a single nucleotide difference in oyster number four (A) when compared to the other oysters (G). Interestingly, when oyster number four from JB was compared to eastern oysters collected from other regions of the east coast, it was more similar to them than to oysters from JB. In conclusion, our hypothesis is rejected because there are polymorphisms within the COI gene of eastern oysters from Jamaica Bay. This work was supported by grants 2R25GM06003-05 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537101091 of the CSTEP Program of the NYS Department of Education.

**p-Aminosalicylic Acid and Acetylsalicylic Acid Reduce the Toxic Effects of Manganese on Mitochondrial Oxygen Consumption and Mitochondrial Membrane Potential.** Jevaun Joseph<sup>1</sup>, Sherine Crawford<sup>2</sup>, Margaret A. Carroll<sup>2</sup> and Edward J. Catapane<sup>2</sup>, <sup>1</sup>Kingsborough Community College and <sup>2</sup>Medgar Evers College.

Manganese is an essential metal that at excessive levels in brain produces Manganism, which is similar to Parkinsons disease. The mechanism of action of manganese toxicity is not completely understood. Previously we showed manganese reduces oxygen consumption of mitochondria of *Crassostrea virginica*. We also showed the deleterious effects were reduced by EDTA and p-aminosalicylic acid (PAS). We tested acetylsalicylic acid (ASA), a compound similar in structure to PAS, on mitochondrial oxygen consumption. We also used the voltage sensitive dye Tetramethylrhodamine to study mitochondrial membrane potential. Manganese (0.2 mM - 20 mM) caused a dose dependent decrease in O<sub>2</sub> consumption of up to 55%. Pretreating mitochondria with 1 mM ASA blocked this (up to 20 mM), however manganese treated mitochondria did not recover when ASA was added after manganese. Tetramethylrhodamine staining revealed that gill filaments and mitochondrial smears exhibited a red-orange fluorescence when excited. Time lapse photography revealed the fluorescence of specimens treated with manganese dimmed over a 10 minute period indicating loss of mitochondrial membrane potential. Specimens pretreated with PAS or ASA did not dim. This study showed manganese reduced oxygen consumption and disrupted the mitochondrial membrane potential and PAS and ASA were effective in protecting against these toxic effects.

**Effects of Culture Density on the Response of Fibroblasts to Oxidative Stress.** Saleen Khan, Vincent Marchese, Diti Emporelli and Dorothy H. Lobo, Monmouth University, West Long Branch, NJ.

Mitogen-activated protein kinases (MAPKs) are part of a signaling cascade present in every cell, and regulate such processes as gene expression, cellular proliferation and apoptosis. MAPKs are activated by phosphorylation, and are inactivated by dephosphorylation by MKP (MAP kinase phosphatases). Previous results have indicated that normal fibroblasts have higher levels of certain MAP kinase phosphatases (MKP) upon contact inhibition and that fibrosarcoma cells, which do not undergo contact inhibition, show no change in the levels of phosphorylated MAPKs or MKPs when confluent. This differential regulation of MAPKs may influence the ability of contact inhibited cells to survive oxidative stress. Contact-inhibited normal human fibroblast cells (BJ) were found to have increased protection against H<sub>2</sub>O<sub>2</sub>-stimulated apoptosis. Increasing the antioxidant capacity may also further increase MAP kinase activity by limiting the levels of MKPS or enhancing the activation of kinases. N-acetylcysteine (NAC) was used to increase the antioxidant capacity of both normal fibroblast (BJ) and fibrosarcoma cell (HT-1080) cultures. In both cell types, NAC treatment resulted in increased levels of phosphorylated ERK, while levels of MKP -1 and MKP-3 were not significantly altered. These results suggest the antioxidant status may influence the activation of MAP kinase pathways involved in cell survival.

**A Comparison of Surface Microbial Counts on *Ulva* from Kingsborough Beach, NY, and on *Ulva* and *Zostera marina* from Shinnecock Bay, NY.** Stephanie Magloire, Mary T. Ortiz and Navneet K. Parmar, Kingsborough Community College, CUNY, Brooklyn, NY.

In the 1930's, fungi decimated *Zostera marina* on U.S. coasts. It reappeared in Shinnecock Bay (SB), NY, but not Jamaica Bay (JB), NY. We studied microbial counts on *Ulva* from Kingsborough Beach (KB), JB and on *Ulva* and *Zostera* from SB. The hypothesis: there would be comparable microbial counts on *Ulva* and *Zostera* from SB compared to *Ulva* from KB. *Zostera* and *Ulva* from SB, *Ulva* from KB, were swabbed, plated onto TSA plates (10<sup>0</sup> to -3 dilutions), incubated, and colonies counted. For all microbes, all *Ulva* SB plates and all 10<sup>0</sup>-10<sup>-2</sup> SB *Zostera* plates were "Too Numerous To Count" (TNTC). For SB 10<sup>-3</sup> *Zostera* plates, 2 were TNTC, 3 contained countable bacterial colonies. SB 10<sup>-3</sup> *Zostera* plates had countable fungal colonies, as did all 10<sup>-1</sup>-10<sup>-3</sup> KB *Ulva* plates. KB 100 *Ulva* plates bacterial counts were TNTC in 4/5 plates; fungal counts were TNTC in 3/5 plates. The hypothesis is rejected. More microbes are on *Ulva* and *Zostera* from SB than on *Ulva* from KB. *Zostera* remediation, healthy coastal restoration in JB may be questionable due to surface microbes. Future studies will expand counts; identify microbes. Support: Grants 1R25GM62003 Bridges to the Baccalaureate (NIGMS), 0516051091 CSTEP (NYS Education Department); NYCEPA.

**Effect of L-Carnitine on Breast Cancer Cell Migration.** Adam McConnell, Maria Cotrina Regina Sullivan. Queensborough Community College, Bayside, NY.

Metastasis, a deadly event in cancer progression, occurs when a subgroup of primary tumor cells infiltrates surrounding normal tissues and forms secondary tumors. Recent studies suggest that metastatic potential may be supported by mitochondrial dysfunction. This dysfunction leads to an excessive generation of reactive oxygen species, which may increase the cancer cell's ability to proliferate, migrate and, eventually, metastasize. To evaluate the importance of mitochondrial alterations in the migratory behavior of cancer cells we have tested the effect of L-carnitine on the ability of cancer cells to migrate. Cell migration is an early and significant event in the metastatic process. 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. In this study, we pre-incubated the highly metastatic breast carcinoma cell line MDA-MB-231, with 150 M of L-carnitine for various time periods. Cell migration was assayed using the wound healing assay. Concomitant experiments evaluated changes in mitochondrial morphology with the fluorescent indicator MitoTracker, which labels mitochondria in active, living cells and it is an indicator of cellular respiration. Obvious changes are not observed in mitochondria morphology after carnitine morphology. Preliminary results are inconclusive but may show L-carnitine inhibits the MDA 231 cell migration in a wound healing assay. These experiments will help determine the potential of L-carnitine and energy enhancing compounds as anti-metastatic therapy.

**Effects of Ellagic Acid and Quercetin on TGF- $\beta$ R Signaling.** Jessica Minder and Valerie Giordano, St. Joseph's College, Patchogue, NY.

The TGF- $\beta$ R is involved in proliferation, differentiation, development, angiogenesis, and wound healing. In early stage cancer, TGF- $\beta$ R is involved in tumor suppression, immune response, growth and metastatic inhibition. In late stage cancers, this receptor suppresses immune response, remodels tissues, promotes angiogenesis, proliferation and metastasis. Therefore, this receptor is a target of study in cancer cell signaling. TGF- $\beta$ Rs signal via the SMAD family of transcription factors. SMAD7 is an inhibitory transcription factor which may have a negative feedback effect on the expression of other SMADS, as well as itself by the TGF- $\beta$ R. NF- $\kappa$ B has been shown to have anti-apoptotic effects in cancer cells. NF- $\kappa$ B has also been shown to inhibit SMAD7, possibly allowing for uninhibited TGF- $\beta$ R expression. Ellagic acid and quercetin are polyphenols that inhibit NF- $\kappa$ B, which is expected to increase SMAD7 expression; therefore increasing inhibition of TGF- $\beta$ R, causing the receptor's inability to potentiate pro-cancer effects seen in late-stage cancers. This study shows that ellagic acid and quercetin individually, and in combination inhibit NF- $\kappa$ B, but that the anti-cancer effects are not propagated by inhibition of SMAD7. Levels of SMAD7 were unaffected by presence or absence of NF- $\kappa$ B. Further research will determine the full mechanism by which the NF- $\kappa$ B inhibition exhibits anti-cancer effects.

**Diffusion of Substances through Aquatic Egg Membranes.** Shagun Mohan<sup>1</sup>, Astha Anand<sup>1</sup>, Amulya Mohan<sup>1</sup>, Jessica Rios<sup>1</sup>, Noemi Rivera<sup>1</sup>, Jonathan Rothstein<sup>1</sup>, Ekaterina Selivanovitch<sup>1</sup>, Charles Barrios<sup>1</sup>, Salvador Torres<sup>1</sup>, Neeti Bathala<sup>2</sup>, Lynda Valanzano<sup>1</sup>, Allen Burdowski<sup>1</sup> and Kathleen Nolan<sup>1</sup>, <sup>1</sup>St. Francis College, Brooklyn, NY and <sup>2</sup>the University of the Arts, Philadelphia, Pennsylvania.

Eggs from horseshoe crabs, whitefish, and salmon were used to study cellular process such as osmosis and diffusion in order to understand the integrity of the egg in relationship to the organism's ecology. For this study, horseshoe crab eggs were obtained from Pickering Beach on Delaware Bay in June, 2009 during the spawning season and then frozen. Additional fresh horseshoe crab eggs were collected from Long Island Sound in June 2010 and examined. Salmon and whitefish eggs were obtained from a specialty deli. The eggs were weighed before placing them in water, vinegar, salt and sugar solutions, and weighed again after. The eggs gained or lost weight depending on the solution in which they were placed. Visible differences in appearance were noted. The eggs were photographed under a dissection scope using a Motic camera. The horseshoe crab eggs displayed the most resistance to environmental change, which perhaps reflected the fact that they receive the most abrasion through sand and wave action. There appears to be a relationship between degree of change in egg weight and appearance when placed in various solutions and the ecology of the organisms that produced the egg.

**The Lichen *Physcia stellaris* Contains Polyketide Synthase Gene for Secondary Metabolite Production.** Omari Moses and Ivan Shun Ho. Kingsborough Community College, Brooklyn, NY.

A Lichen is a symbiotic relationship between a fungal, and an algal partner. The lichen formed can survive in places that are seemingly uninhabitable for individual partners. It is hypothesized that their survival in harsh environments is due to the lichens' ability to produce secondary metabolites, chemical species that are beneficials for survival in other organisms. Polyketide synthase (PKS) is a family of enzymes that produce secondary metabolites. These enzymes have several catalytic domains, one of which is the ketosynthase (KS) domain essential for secondary metabolites synthesis. We hypothesize that *Physcia stellaris*, a lichen species found in the Sheepshead Bay region, will have the KS domain present in the polyketide synthase. The KS domain of the polyketide synthase was amplified by polymerase chain reaction (PCR) from collected lichen samples. The PCR products were separated by agarose gel electrophoresis. Our PCR results indicate that DNA products of correct sizes were present, suggesting the presence of a KS domain of polyketide synthase within the genome of *P. stellaris*. This work was supported 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.

**Production of Zebrafish (*Danio rerio*) Embryos Using In Vitro Fertilization Techniques. Caroline Mroz and Ammini Moorthy, Wagner College, Staten Island, NY.**

The zebrafish (*Danio rerio*) is considered an ideal model organism for genetic and developmental research. The optical clarity of the developing embryos makes it possible to observe development and morphological changes. Since embryos are fertilized and develop externally, it is possible to collect viable sperm and eggs from mature zebrafish and fertilize the eggs in vitro. Mature fish were anesthetized and gently squeezed until sperm and eggs were collected. Eggs and sperm were then mixed and incubated at 28.5° C to allow fertilization. On average, 20% of eggs fertilized in vitro were viable embryos (M=31). This technique is significant because it will facilitate the production of haploid zebrafish. Since many mutations are recessive and can go unnoticed in a genetically diploid system, producing fish with only one set of genetic information makes it possible to observe these mutations. In order to generate haploid fish, the gametes from one sex are irradiated with ultraviolet (UV) light. This will successfully destroy the genetic material but keep the gamete intact. In vitro fertilization following this process will produce haploid embryos. By observing phenotypic changes present in haploid offspring it will be possible to trace mutations back to the paternal genome. This research was supported by the Benjamin Cummings Student Research Grant of the Metropolitan Association of College and University Biologists (MACUB).

**Eutrophication of the Lower Part of Great Patchogue Lake. Melissa Hoerning, Michael Namorato, Christine Nastasi and Mohammad Rana, Saint Joseph's College, Patchogue, NY.**

The lake of concern is located in the Town of Patchogue, Suffolk County, New York (40° 46'00"N 073° 01'15"W). It is connected to the Upper Patchogue Lake, and Cannon Lake to its north. This series of lakes is also attached to the Great South Bay through Patchogue River. The lake appears to be in the last stage of eutrophication, or lake death. The visible signs of lake eutrophication are lake islands (covering fifty percent of the lake and dominated by an invasive species burr reeds *Sparganium* spp.), thick algal bloom, and an unusually high concentration of sediments. The lake also appears to have abnormal concentrations of nutrients and heavy metals. This is pertinent to the Patchogue community, as well as to Long Island as a whole, because of the importance lakes play in recharging the aquifers. In attempt to save the lower part of Great Patchogue Lake, the aquatic plants must be removed, and lake islands must be dredged. As a result, the excess nutrients and heavy metals may flush out. It is also recommended that the lake should be monitored regularly for invasive species, and excess amounts of heavy metals and nutrients.

**Use of *Synechococcus* sp. IU 625 for Understanding the Role of Metallothionein in Heavy Metal Caused Freshwater Harmful Algal Blooms. Robert Newby Jr.<sup>1</sup>, Lee H. Lee<sup>2</sup> and Tin-Chun Chu<sup>1</sup>, <sup>1</sup>Seton Hall University, South Orange, NJ and <sup>1</sup>Montclair State University, Montclair, NJ.**

Freshwater harmful algal blooms (FHAB) remain a modern day problem due to freshwater eutrophication. We are using cyanobacterial species *Synechococcus* sp. IU 625 as a model organism in a variety of EPA target heavy metal studies. One of the known ways cyanobacteria deal with heavy metal stress is by over expression of a heavy metal binding protein metallothionein (MT). MT is a conserved, cross species protein whose primary purpose in cyanobacteria is to bind to excess intracellular zinc. This laboratory has shown that MT has an increased response not only to zinc, but several other heavy metals, indicating universal heavy metal response use. To verify the necessity of MT, we are in the process of creating both a knock-out, using a suicide vector, and an inducible smt gene using a vanillate inducible expression vector. Vanillate has been shown to encourage heterotrophic growth of SIU 625; the proposed promoter region has been sequenced and cloned into this expression vector. Using this two front approach, we hope to understand the role MT plays in *Synechococcus* sp. IU 625 heavy metal response, and how these metal responses may lead to FHAB in industrialized water ways.

**The Toxic Effects of Metals on Mitochondrial Cytochrome c Oxidase Activity in the Gill of the Bivalve *Crassostrea virginica*. Zakiyya Nicholas<sup>1</sup>, Kun Huang<sup>2</sup>, Margaret A. Carroll<sup>1</sup> and Edward J. Catapano<sup>2</sup>, <sup>1</sup>Kingsborough Community College and <sup>1</sup>Medgar Evers College, Brooklyn, NY.**

Many metals are believed to exert their toxic effects by raising cellular levels of reactive oxygen species (ROS). We showed metals accumulate in gill and other tissues of *Crassostrea virginica*, and some, particularly copper and manganese, impair mitochondrial respiration. In this study we treated gill mitochondria with copper, manganese, lead or cadmium to determine effects on cytochrome c oxidase (COX). COX is the principle terminal oxidase of high affinity O<sub>2</sub> in aerobic respiration. Agents that inhibit the function of respiratory complexes not only disrupt energy homeostasis but also increase production of ROS. Gill mitochondria were prepared from *C. virginica* and exposed to Cu, Mn, Pb or Cd, re-pelleted then resuspended in fresh media. COX activity was determined spectrophotometrically. Compared to controls results indicate mitochondrial COX activity decreased in response to Cu, Pb and Cd, but remained unaffected by Mn. Mitochondrial COX was most affected by Cu. We also showed the loss of COX activity due to copper treatments could be prevented if mitochondria were pre-incubated with glutathione suggesting the toxic effects of Cu on COX is due to increased oxidative stress. Studying the effects of metals on cellular processes will provide insight into the mechanisms that underlie metal toxicities.

**Is Chelation the Mechanism of Action of p-Aminosalicylic Acid (PAS) in the Treatment of Manganism?** Deshawn Nicholson, Jean-Rony Hilaire, Josephine Mayne, Jose Rios, Karl Ruddock and Dereck Skeete, Medgar Evers College.

Manganese is a naturally occurring element, essential for living organisms, but potentially toxic in high concentrations. Certain occupations including mining, welding and steel manufacturing can expose workers to high manganese levels, leading to Manganism, a Parkinsons-like disorder. The mechanism of toxicity is not fully understood and effective treatments are still being developed. A number of studies indicate the metal chelator EDTA is effective in alleviating symptoms of Manganism. Recently p-aminosalicylic acid is being used in treatment of Manganism. However, the mechanism of action is unclear and it is debated whether the effects of PAS are due to anti-inflammatory or metal chelation properties. In this study we used a spectrophotometric assay to determine the manganese chelating properties of PAS. A 1.78 mM of manganese ion ( $Mn^{+2}$ ) solution was exposed to varying concentrations of PAS. Free  $Mn^{+2}$  was then converted to permanganate ion ( $MnO^{+4}$ ). Levels of  $MnO^{+4}$  were then measured spectrophotometrically and compared to controls. Our results indicate that PAS is an effective chelator of  $Mn^{+2}$  ions. Increasing concentrations of PAS reduced levels of free  $Mn^{+2}$  in solution. These results help to clarify the mechanism of action of PAS in alleviating the symptoms of Manganism.

**Behavior of Adult Zebra Fish Exposed to Different Concentrations of Alcohol.** Christiana Ojo and Kristin Polizzotto, Kingsborough Community College, Brooklyn, NY.

Adult zebra fish (*Danio rerio*) were exposed to two different concentrations of alcohol (ETOH): 0.25%, 1.0%, and 0% for control. For each trial, five fishes were immersed in each different concentration beaker for 40 minutes. Interestingly, the fish exposed to 0.25% and 1% concentrations of alcohol (ETOH) experienced a color change from silver to orange. Similar to the results of previous research, alcohol (ETOH) also caused the fish to become more aggressive (faster swimming and more jumping compared to the control group). The shoaling response (staying together as a social group) was reduced as well. We also noted that these behaviors were more pronounced during the exposure period than during the observation period that followed exposure, which is contrary to previous results. From these results, we conclude that alcohol exposure can have widespread, strong effects on zebra fish behavior, although at these concentrations the effects are not long-lasting. This research may help us to better understand the varied effects of alcohol on human behavior, including how it can affect human social interaction.

**Identification and Determination of Expression Levels of Mercuric Resistance Genes in *Synechococcus sp.* IU 625.** Dozie Okafor<sup>1</sup>, Jose Leovigildo Perez<sup>1</sup>, Tin-Chun Chu<sup>2</sup> and Lee H. Lee<sup>1</sup>, <sup>1</sup>Montclair State University, Montclair, NJ and <sup>2</sup>Seton Hall University, South Orange, NJ.

Due to high levels of heavy metal pollution in the environment, there has always been a high interest in organisms that have developed resistance to certain heavy metals. Extensive work has been done with respect to mechanisms of resistance to heavy metals in an array of microorganisms. However, mechanisms of resistance are yet to be fully explored in some other microorganisms. One such example is the Cyanobacteria *Synechococcus sp.* IU 625 (SIU 625), formerly known as *Anastycis nidulans* (AN). This microorganism has shown resistance to  $Cu^{2+}$ ,  $Hg^{2+}$  and  $Zn^{2+}$  in previous studies. In this study, the growth of SIU 625 in different concentrations of mercuric chloride was studied using direct count and turbidity study. Genomic and proteomics analysis of all currently identified mercuric resistance genes in prokaryotes were carried out to determine their relationship to putative mercuric resistant genes in SIU 625. Primers for various genes encoding putative mercuric resistance were designed for both chromosomal and plasmid DNA and amplified for SIU 625. Expression levels of identified genes were then analyzed in relation to mercuric chloride concentration and exposure time. Gene arrangement of newly identified mercuric resistance genes were compared to the known *mer* operons in other species

**Comestible Juices and Their Secondary Plant Metabolites (e.g., Proanthocyanidins) Reduce Rotavirus-associated Dysfunction of Monolayer Tight Junctions and Compromise Rotavirus Capsid Integrity in Cell-free Suspension.** F. S. Ozen<sup>1</sup>, J. Nuamah<sup>2</sup>, S. Mahaud<sup>2</sup>, R. Gordon<sup>3</sup> and S. M. Lipson<sup>2</sup>, <sup>1</sup>University of Konya, Konya, Turkey, <sup>2</sup>St. Francis College, Brooklyn Heights, NY and <sup>3</sup>Mt. Sinai Med. Ctr., New York, NY.

Cranberry juice (CJ), grape juice (GJ), and these species' proanthocyanidins (PACs) have an ameliorative effect on tight junction (TJ) function and structural integrity of epithelial cells in monolayer culture following rotavirus infection. TJ function and structural integrity were measured by changes in transepithelial electrical resistance (TEER) and immunostaining of the alpha-claudin 1 molecule. After four days, virus infected monolayers pretreated with GJs exhibited TEER readings similar to uninfected controls. CJ imparted a significant [TJ] protective effect ( $p < 0.05$ ), but to a lesser extent than GJs. Disorganization of TJ integrity commenced at ca. 24-h post-inoculation; this effect was reduced upon CJ and GJ pretreatment of monolayer cultures. Transmission electron microscopy showed a juice-associated sequestering of viral particles within PAC particulates. Rotavirus capsid antigen 6 (i.e., VP6) was reduced >90% following incubation for 30 min in 50% CJ or GJ. Cranberry and grape PACs at 500  $\mu g/ml$  reduced VP6 detection by >1  $\log_{10}$  after 60 min at 23°C. Anthocyanidins, used as a polyphenolic control molecule, had no effect on VP6 integrity. Increased pH (pH 7) significantly reduced CJ and CJ-PAC anti-rotavirus activity. An identical increase of pH among GJ and GJ-PACs displayed no significantly reduced efficacy on these analytes antiviral activity. At native pH values, both CJ and GJs inhibit rotavirus infectivity titers, have a protective effect on TJ function and structure, and compromise viral capsid integrity in cell-free suspension.

**The Lichen *Physcia stellaris* Contains the Group I Intron-Related Sequence Previously Found in Bacteria.** Michelle P. Pamas and Ivan Shun Ho. Kingsborough Community College, Brooklyn, NY.

Previous report has shown that the genomes of several species of the lichen-forming algae genus, *Trebouxia*, contain group I intron-related DNA sequence from *E. coli* via horizontal transfer. Group I intron is a type of transposable element that can move within the same organism's genome or integrate itself into another's genome. The lichen species *Physcia stellaris*, found around the Manhattan Beach, NY, area, has been shown to contain the algae genus *Trebouxia*. We hypothesize that this lichen may contain the group I intron sequence. The lichen's DNA was isolated by using the Edward's Buffer protocol. We then performed PCR using the isolated DNA with specific primers that allow us to detect whether group I intron-related sequence is present in *P. stellaris*. Gel Electrophoresis was then performed to visualize and to identify DNA band of the correct size. Results show the correct size DNA band is present in the PCR product. Therefore our hypothesis is accepted. There may be horizontal transfer between *E. coli* and *P. stellaris*. 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 New York State Department of Education.

**Spatial Learning and Forebrain Differences in Field-Caught and Lab-Reared Threespine Stickleback Fish (*Gasterosteus aculeatus*): Implications for Hatchery-Reared Fish Survival in the Wild.** Peter J. Park and Michael A. Bell, Stony Brook University, Stony Brook, NY.

Many animals can navigate using a cognitive map that they create by memorizing environmental landmarks. In vertebrates, cognitive map use has a neuroanatomical correlate within the forebrain, and its expression is associated with ecology. Fishes reared under laboratory or hatchery conditions usually have smaller forebrains than their wild counterparts. Smaller relative forebrain size has been implicated in poorer cognitive map use, which may contribute to poor survival of hatchery-reared fish stocks returned to the wild. I investigated whether cognitive map use differs between field-caught and lab-reared threespine stickleback fish (*Gasterosteus aculeatus*) from a lake population in Cook Inlet, Alaska (Corcoran Lake). As expected, field-caught stickleback outperformed their laboratory-reared counterparts, and this difference could not be explained by confounding behavioral qualities. Gross forebrain morphology was studied in the field-caught subjects to determine whether forebrain size was associated with superior cognitive map use. Additional studies indicate that field-caught stickleback have larger relative forebrain sizes than lab-reared stickleback. These results are consistent with the contention that forebrain size and cognitive map use are positively associated. The evidence of strong phenotypic plasticity for both traits suggests that fish reared in hatcheries are extremely sensitive to housing conditions which may affect their survival in the wild.

**The Development of Scoliosis on *Menidia beryllina* Effected by Temperature Increase.** Athanasia Pavlou and Pokay Ma, Queens College.

Certain proportion of *Menidia beryllina* in the Flushing Meadow-Corona Park in the Borough of Queens from years 2006-2010 has been observed to have curvature of the vertebral column. Environmental factors such as increasing or decreasing temperature as well as the ecological events such as the spring plankton can have harmful effects on physiological and morphological processes, for instance, affecting the larvae stage resulting in the curvature of the spine. The effect of temperature on the curvature of the fish will be determined by measuring the ambient temperature throughout the years, measuring the curvature and the length of the fish.

**Zinc and Cadmium Resistance and Their Effects on *Synechococcus* sp. IU 625.** Jose Leovigildo Perez<sup>1</sup>, Dozie Okafor<sup>1</sup>, Tin-Chun Chu<sup>2</sup> and Lee H. Lee<sup>1</sup>, <sup>1</sup>Montclair State University, Montclair, NJ and <sup>2</sup>Seton Hall University, South Orange, NJ.

Cyanobacteria *Synechococcus* sp. IU 625 is a good environmental indicator especially for heavy metal contamination. Cadmium inhibits spontaneous protein folding and outcompetes essential metals for important binding sites. 30 mg/L of Cadmium chloride (CdCl<sub>2</sub>) has shown inhibition on the growth of *Synechococcus* sp. IU 625. Zinc is one of the essential metals involved in catalysing many enzymes, DNA binding proteins, and zinc-finger motif proteins. However, zinc is toxic at high concentrations. *Syn. sp. IU 625* cell growth was inhibited at 50 mg/L zinc chloride (ZnCl<sub>2</sub>) concentration. It is important to study the resistance mechanism to high zinc concentrations by the actions of a CPx-ATPase efflux pump (ZiaA-like protein) and its regulator repressor (ZiaR-like protein) in cyanobacterium *Synechococcus* sp. IU 625. ZiaA-like gene and ZiaR-like gene were shown to be present in *Synechococcus* sp. IU 625 genome and they share high homology with closely related species *S. elongatus* sp. PCC 7942 and *S. elongatus* sp. PCC 6301. The ZiaA-like gene expression level was increased in response to the zinc concentration and exposure time.

**Use of Dialysis Tubing to Study Passive Manganese-Chelator Diffusion Across the Blood-Brain Barrier.** Vanessa Petion, Margaret A. Carroll and Edward J. Catapane, Medgar Evers College.

Manganese, a neurotoxin causing Manganism, a Parkinsons-like disease, accumulates in the basal ganglia damaging dopamine neurons. We showed p-aminosalicylic acid (PAS) prevents manganese from disrupting dopamine neurons and it reduces manganese accumulations in oyster tissues. PAS cross the blood-brain barrier of humans. EDTA and DACH (1,2-Diaminocyclohexanetetraacetic acid) are good chelators of manganese, but EDTA does not cross the blood-brain barrier, while DACH is toxic to cells. We used dialysis tubing with manganese plus PAS, EDTA, DACH or glucose to mimic passive elements of manganese movements across the blood-brain barrier. Manganese was measured over time using Atomic Absorption Spectrometry. Less manganese passed across bags containing EDTA. The amounts of manganese outside bags containing PAS or DACH was higher than controls. The paradoxical results with PAS and DACH are explained by the fact that the manganese-PAS and the manganese-DACH chelation complex is able to pass through the pore size, while the manganese-EDTA complex can not. Therefore, manganese is diffusing out of the bags by two driving forces, that driven by the free manganese concentration gradient and that driven by the manganese-PAS or manganese-DACH chelation complex gradients. This information could be of importance with respect to passive transport mechanisms of the blood-brain barrier.

**Characterization of Spermatogenic Cyst Stages and Morphology in *Drosophila pseudoobscura*. Crystal Pristell and Angela V. Klaus, Seton Hall University, South Orange, NJ.**

Previous work in our laboratory was aimed at the development of an in vitro system for culturing *Drosophila* sperm cells. The current work is aimed at analyzing spermatogenic cyst morphology so that we can accurately characterize cyst maturation in our in vitro culture system. Sperm precursor cells develop within cysts and eventually mature to produce motile, elongate sperm cells. Germline stem cells are maintained in the stem cell niche in the apical end of the testis. Germline stem cells differentiate and become encapsulated in a cyst. After encapsulation, the germline cell (called a "gonialblast" at this stage) undergoes series of divisions which increase the number of sperm precursors within the cyst. In *D. pseudoobscura*, there are five mitotic divisions, followed by the two meiotic divisions, resulting in 124 haploid cells ultimately being produced. The purpose of our study is to characterize cyst morphology using phase contrast microscopy, and the number of precursor cells within each cyst type using nuclear fluorescence staining with DAPI (diamidino-2-phenylindole). Our goal is to develop a reliable system for identifying each cyst type by phase contrast imaging in culture.

**Pharmacological Study of the Effects of Octopamine on Heart Rate of *Crassostrea virginica*. Kerri Pryce<sup>1</sup>, Jordan Knight<sup>2</sup>, Margaret A. Carroll<sup>1</sup> and Edward J. Catapano<sup>1</sup>, <sup>1</sup>Medgar Evers College and <sup>2</sup>Kingsborough Community College.**

Octopamine, a biogenic amine first identified in the octopus, has been well studied in arthropods and a few gastropods, serving as a neurotransmitter and hormone. Its presence and possible functions have rarely been reported in bivalves. We identified octopamine in cerebral ganglia, visceral ganglia, gill, palps and hemolymph of *Crassostrea virginica*. We also found octopamine was a cardio-acceleratory agent and postulated that it may have a neuroendocrine role in *C. virginica*. The present pharmacological study examined octopamine agonist and antagonists to determine if octopamine is activating octopamine receptors in the oyster heart *C. virginica* heart preparations were prepared in situ. Mechanical and EKG rates were monitored. Basal heart rates averaged 4.2 beats/min. Superfusion of octopamine ( $10^{-6}$  -  $10^{-2}$  M) more than doubled heart rates in a dose dependent manner. The octopamine agonists, synephrine and phenylephrine were slightly more potent than octopamine in increasing heart rates. The antagonists, phentolamine, metaclopramide and yohimbine blocked the cardio-acceleratory effects of octopamine; however, they did not block the cardio-acceleratory effects of dopamine. The study provides further evidence that octopamine, which is present in the nervous system, innervated organs and hemolymph of *C. virginica*, may have a neuroendocrine role as a cardio-regulatory hormone.

**Cyanobacteria Detection: A Case Study in Lake Wapalanne. Michelle Reed<sup>1</sup>, \*Matthew Rienzo<sup>1</sup>, \*Lauren Pohlen<sup>1</sup>, Lee H. Lee<sup>2</sup>, Tin-Chun Chu<sup>1</sup>. <sup>1</sup>Seton Hall University, South Orange, NJ and <sup>2</sup>Montclair State University, Montclair, NJ.**

Eutrophication of freshwater lakes presents many problems in urbanized areas. Freshwater lakes receive excess amounts of nitrogen and phosphorus due to runoff of fertilizers and pesticides, which results in excessive cyanobacterial growth. Dense algal blooms of cyanobacteria disrupt aquatic life and vegetation. In this study, water samples from six different sites along Lake Wapalanne in Branchville, NJ were collected. The six samples were filtered through a coarse filter with a pore size of 3.0  $\mu\text{m}$  to collect large organisms and debris and then through a fine filter with a pore size of 0.45  $\mu\text{m}$  to collect small cyanobacteria. The samples underwent DNA extraction with 5% chelex-100 and genes of interest were selected for analysis by the polymerase chain reaction (PCR) using degenerate primers. Seven primer sets (Syn7942\_16sRTF-Syn7942\_16sRTR, rpsL\_RTF-rpsL\_RTR, PSf-Ur, Uf-PSr, CYA106\_16sF-CYA781\_16sR, CYA359\_16sF-CYA781\_16sR, and Syn7942\_cpcF-Syn7942\_cpcR) were designed and used for this study. Gel electrophoresis was used to evaluate PCR products and to determine the presence of cyanobacteria in our water samples. Both coarse and fine filters were dried and preserved through freezing for microscopic observation and identification of cyanobacteria.

**Examination of mtDNA Gene Sequence (Cytochrome b) to Show the Evolutionary Relationships Between Regional Populations of the Brown Howler Monkey (*Alouatta guariba*) in the Atlantic Coastal Forest of Brazil. Valerie Renard and Eugene Harris, Queensborough Community College, Bayside, NY.**

We analyzed mtDNA sequences of the cytochrome-b gene from brown howler monkeys living in the Atlantic Coastal forest in Brazil. Our samples derive from populations from three different localities: Rio de Janeiro state in the north, Santa Catarina state in the south and São Paulo state that lies in an intermediate geographic position. We used maximum parsimony and neighbor joining methods to analyze the cytochrome b genetic variation to make inferences about the intraspecific genealogical relationships of howler monkeys from these three populations. Our findings indicate that cytochrome b gene variation is structured into two main clades. Among the three populations, the cytochrome b sequences from Santa Catarina and Rio de Janeiro each form separate clades, with no shared diversity. However, the sequences from monkeys from São Paulo are represented in both of these clades. We hypothesize that the Santa Catarina and Rio de Janeiro populations underwent a forced separation related to fragmentation of the Atlantic Forest perhaps during the Pleistocene Epoch as has been hypothesized for other species. We also hypothesize that the São Paulo population formed at a subsequent time following environmental change and forest restoration, thereby accounting for its shared variation with both northern and southern populations.

**The Potential Impact of Industrial Activity on Antibiotic Resistance in Bacteria of the New Jersey Meadowlands.** Elizabeth Reuss, Robert Goldberg and Thomas Owen. Theoretical and Applied Science, Ramapo College of New Jersey, Mahwah, NJ.

The long-term effects of previous human activity on local microbial ecosystems have been investigated in many settings. Given the juxtaposition of a dense human population and several highly contaminated sites in the Meadowlands, studying the impact of past human activity on the development of antibiotic resistance in bacteria could serve to clearly demonstrate the unintended consequences of human actions. The goal of our studies is to investigate whether the high levels of heavy metals, especially mercury, found in Berry's Creek have resulted in increased bacterial resistance to antibiotics when compared to antibiotic resistance in the same bacterial species found in Miller's Creek, a remediated site. We obtained sediment samples from these two sites, plated bacteria from them and have to date identified eight species which are present at both sites. We plan on subjecting these isolates to antibiotic sensitivity testing using both disk-diffusion and minimal inhibitory concentration methods in order to compare and quantitate the level of antibiotics tolerated by the same species at the two sites. We also plan to determine if the isolates exhibit differences in their abilities to tolerate the presence of heavy metals and whether either antibiotic or metal resistance in these bacteria is plasmid mediated.

**Expression and Purification of *Arabidopsis thaliana* Proteins Involved in Synthesis and Assembly of Cell Wall Polymers.** Monica Rivera<sup>1</sup>, Na Li<sup>1</sup>, Mangala Tawde<sup>1</sup> and Paul Freimuth<sup>2</sup>, <sup>1</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>Brookhaven National Laboratory, Upton, NY.

Conversion of plant cell wall cellulose to ethanol is a major focus of the Department of Energy's current research efforts in production of biofuels. 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 was focused on the expression and purification of cell wall-active enzymes from the plant species *Arabidopsis thaliana*, leading to their structural and biochemical characterization. We attempted to express protein Alpha L-arabinofuranosidase ( $\alpha$ L-AF) with 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 cell lysis methods such as sonication and BugBuster® protein extraction reagent, followed by ammonium sulfate precipitation and Diethylaminoethyl cellulose anion exchange columns, we were able to purify the CBM protein in the soluble form and forward it for X-ray crystallography.

**The Blue Mussel (*Mytilus edulis*) Does Not Appear to Serve as a Vector for Dermo (*Perkinsis marinus*) in Jamaica Bay, NY.** Keisha Rogers, Gary Sarinsky and Craig Hinkley. Kingsborough Community College, Brooklyn, NY.

Dermo (*Perkinsis marinus*) is a single celled protozoan which is responsible for the massive mortality of the Eastern oyster (*Crassostrea virginica*). Dermo is transmitted from oyster to oyster. Oyster populations have not been observed in Jamaica Bay since the early 1900's. Previous research using juvenile oysters (spats) grown in Jamaica Bay under controlled conditions show that some oysters have become infected. How did they contract dermo? Literature suggests that the transmission may occur by vectors such as scavengers and bivalve mollusks. It is hypothesized that the blue mussel (*Mytilus edulis*) is a vector for dermo. DNA was isolated from gill and mantle tissue and subjected to PCR with a dermo specific primer set. No dermo DNA was amplified from the mussels tested. To verify that DNA had been extracted from the mussels, a portion of the extracted samples was amplified by PCR utilizing Folmer primers and the correct size was verified by gel electrophoresis. The CO1 gene was found to be present in all six samples. Amplified DNA was sequenced and subjected to a NCBI Blast Search which further verified that the CO1 DNA was from *M. edulis*. The experimental results show that the blue mussels tested are not vectors for dermo.

**Comparative Analysis of WTC Dust, CdSO<sub>4</sub>, and Pb (NO<sub>3</sub>)<sub>2</sub> on Avian Embryonic Bone Growth *In Vitro*.** Fahad Rouf<sup>1</sup>, Katherine Alberco<sup>2</sup>, Ann Marie DiLorenzo<sup>1</sup> and Constantino G. Lambrousis<sup>2</sup>, <sup>1</sup>Montclair State University Montclair, NJ.

Cadmium (Cd) is a metal with no physiological functions. Due to its long biological half life, it is causing increasing occupational and environmental concerns. Cd inhibits the function of calcium ion channels. Another toxic metal is Lead. It can be found in air, soil, leaded gasoline, lead based paints, an end products of manufacturing. It is quickly absorbed by growing bones thus young children are more susceptible and endangered. Exposure during pregnancy causes premature births, malformation of bones, and other abnormalities. Damage from lead is modified by simultaneous exposure to both lead and calcium. The ongoing experiment is testing to see the effect of lead and cadmium on the growth of avian embryonic bone cultures. The samples being tested are placed under control media with and media of various concentrations of World Trade Center dust, Pb(NO<sub>3</sub>)<sub>2</sub> and CdSO<sub>4</sub>. World Trade Center dust was found to have a greater effect on inhibiting bone growth than Pb(NO<sub>3</sub>)<sub>2</sub> or CdSO<sub>4</sub>. The data suggests that lower concentrations of only cadmium or lead inhibit the growth of bone than World Trade Center dust. In higher concentrations they have generally the same effect. This can be attributed to the heterogeneous ratios of materials in the dust.

**The Ability of PAS and Calcium EDTA to Protect Against the Toxic Effects of Manganese on Mitochondrial Respiration and Membrane Potential in the Gill of *Crassostrea virginica*.** Claudette Saddler, Latoya Duncanson, Margaret A. Carroll and Edward J. Catapane, Medgar Evers College.

Manganese is an essential metal that at excessive levels in brain causes Manganism, which is similar to Parkinsons disease. The mechanism of action of manganese toxicity is not completely understood but may be related to the role of manganese in causing mitochondrial damage and resulting dysfunction of the brain's dopaminergic system. Previously, we showed lateral cilia of gill of *Crassostrea virginica* are controlled by serotonergic-dopaminergic innervations from their ganglia and manganese disrupts the dopaminergic system. In this study we determined effects of manganese on mitochondrial respiration and membrane potential. We prepared mitochondria from the gill of *C. virginica*. Manganese caused a dose dependent decrease in O<sub>2</sub> consumption which was blocked by of calcium disodium EDTA (caEDTA) or p-aminosalicylic acid (PAS). The effects of manganese on mitochondrial membrane potential was also studied. Treatments with manganese decreased the membrane potential which was partially blocked by co-treatment with PAS, but not with caEDTA. The study demonstrates that not only does manganese reduces oxygen consumption but also disrupts the mitochondrial membrane potential. PAS protected against both toxic effects and may be a better therapeutic agent than caEDTA in the treatment of Manganism.

**Reproductive Ecology, Exosymbionts, and Mortality Among Atlantic Horseshoe Crabs (*Limulus polyphemus*) on Plum Beach, Brooklyn, New York.** Rebecca Saint-Dic, Noelia Cilli, Christina Colon, Kingsborough Community College, Brooklyn, NY.

The Atlantic horseshoe crabs (*Limulus polyphemus*) comes ashore to spawn from April through June. Field observations indicated high mortality among females and a high exosymbiont load including barnacles (*Balanus balanoides*) slipper shells (*Crepidula fornicata*) and blue mussels (*Mytilus edulis*). Since males use their compound eyes to locate females, and must amplex with a female to mate, we wondered if reproductive success is affected by exosymbionts, particularly ones that obscured the male's visual acuity. We questioned whether individuals with shorter telsons (tails) were more prone to mortality and/or heavy exosymbiont loads since they use their tail to right themselves when overturned in the surf, and to burrow into the mud when at rest. During mating peaks in May-July, we examined exosymbiont loads, and gender based mortality of *L. polyphemus* on Plum Beach, NY. No correlation was found between number, type or density of exosymbiont when compared to prosoma width and tail length. Unsuccessful (eg unattached) males showed no significant difference in their exosymbiont load when compared to successfully breeding males (those in amplexus), and no correlation was seen with regard to exosymbionts covering eyes and reproductive success. That female mortality did not differ from males may be an artifact of sampling.

**Comparison of Climatological Data and Relative Abundance of *Ixodes scapularis* Ticks in Northwestern New Jersey.** Nathaly M. Salazar-Vasquez and Mary G. Egan. Montclair State University, Montclair, NJ.

In the Northeast United States, *Ixodes scapularis* is the primary vector for disease agents such as the bacteria *Borrelia burgdorferi*, causative agent of Lyme disease. In this study we examine the relative tick abundance patterns and the impact of weather conditions such as temperature and rainfall on these abundances. Tick abundances have been monitored at the New Jersey School of Conservation located in northwest New Jersey (Sussex County) since July 2009. At the present time we can observe, for the months of July and August, relative tick abundances have decreased for all lifecycle stages as compared to the same months in 2009. The nymphal stage decreased almost three-fold, and no adult ticks were found during these months. Using climatological data from the NOAA-National Weather Service, Sussex Station, we were able to analyze the climatological data for daily temperature and rainfall accumulation. This year, for the July-August months, the data exhibits more than a 9% increase in the average maximum temperature and a 25% decrease for rainfall accumulation as compared to 2009. Weather conditions show to impact the relative abundance of ticks, but future tick surveillance will create a better understanding of these patterns of abundance in relation to weather conditions.

**Analysis of Long Term, Low Dosage Ciprofloxacin Treatment in *E. coli*.** Elana Santos, Omid Khalpari, Nidhi Gadura. Queensborough Community College, Bayside, NY.

This study is designed to look at microbial evolutionary changes in *E. coli* brought about using a controlled dosage of the antibiotic ciprofloxacin as the selective pressure. Wildtype (drug sensitive) *E. coli* was grown in a medium containing a low concentration of ciprofloxacin in order to keep the population stable over the course of several hundred generations. Ciprofloxacin is a type of quinolone antibiotic that binds to and interferes with the function of topoisomerases. Gyrase is a type of topoisomerase, an essential enzyme that unwinds DNA during replication. Mutations in *GyrA* or *GyrB* can prevent DNA replication. We used PCR to amplify both of these genes and analyze their sequences to reveal if long term exposure to ciprofloxacin has induced any mutations. Bioinformatics tools were used for sequence analysis and our results indicate minor changes in *GyrA* gene sequence. This project is funded by CUNY Community College Collaborative Grant. Funding for Elana Santos (QCC NIH-Bridges) and Omid Khalpari (QCC NSF-REU).

**Templating Metal Nanoparticles with Engineered Protein Polymers.** Dharanikanth Sathyanarayana<sup>1</sup>, Jennifer Haghpanah<sup>1</sup>, Susheel Gunasekar<sup>1</sup>, Carlo Yuvenco<sup>1</sup> and Jin Kim Montclare<sup>1,2</sup>, <sup>1</sup>Polytechnic Institute of NYU, Brooklyn, NY and <sup>2</sup>SUNY-Downstate Medical Center, Brooklyn, NY.

Biological systems are able to fabricate a wide range of materials comprised of inorganic and organic hybrids or biocomposites that can exhibit unique structural, optical and magnetic properties. A number of peptides have been studied based on their ability to stabilize various metal nanoclusters. Of these peptides histidine-rich epitope (HRE) from the histidine-rich protein II (HRP II) from *Plasmodium falciparum* was reported to stabilize a variety of nanoclusters such as Au and Ag. Recently, our lab has shown that block-polymers comprised of elastin-like peptide (E) and coil-coiled region of cartilage oligomeric matrix protein (C) can assemble into supramolecular particles that are dependent on the fusion orientation and number of domains. These supramolecular assemblies provide a unique scaffold and can be exploited for further templation of nanoparticles to generate new biocomposites, extending beyond natural systems. Here we describe the synthesis and characterization of HRE fusions to two protein block polymers CE and EC.

**Probing the Structural Stability of Benzoic Acid as Affected by the Presence of a Metal and the Nature of the Solvent.** Jean-Robert Savaille<sup>1</sup> and Ruel Z.B. Desamero<sup>2</sup>, <sup>1</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>York College, Jamaica, NY.

Benzoic acid a colorless crystalline solid used in the preservation of foods and beverages. A high intake of benzoic acid can affect liver and kidney functions and it can react with vitamin C forming benzene a known carcinogen. There is evidence that benzoic acid's preservative ability is created by reactions with sodium, potassium and calcium. We used infrared spectroscopy to investigate how the nature of benzoic acid is affected by the presence of metals and various solvents. We hypothesize that the nature of the benzoic acid is related to the environment around its carboxylic moiety and its ring. Any perturbation to these groups is exemplified as a peak shift in the IR spectra. In particular, we monitored two peaks one at ca.  $1700\text{ cm}^{-1}$ , the carboxyl mode, and another at ca.  $1250\text{ cm}^{-1}$ , a ring mode. Already we see a correlation between metal concentration and the extent of the shift of the ca.  $1700\text{ cm}^{-1}$ . The data obtained is articulated in terms of the stability of the benzoic acid structure in solutions of varying polarity and metal concentrations. Jean-Robert Savaille is a participant in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (grant 1 R25 GM65096-05).

**Age Differences in Testing Strategies and HIV Risk Behavior among Previously Jailed African American Women.** Carolyn R. Sealy, Juarlyn L. Gaiter and Kimberly R. Taylor. Medgar Evers College.

Women Incarcerated in the US are at risk for HIV/AIDS partly because of illicit drug use and commercial sex work. We studied age differences in access to public health testing and HIV related risk behavior in African American women. The overall sero-positivity rate was 3.1%. 80% testing HIV-positive were 35 and older. Among all age groups 61% used alcohol; 49% cocaine; 52% marijuana and 22% heroin. 96% aged 18-44, 25-34 and 35-44 have unprotected vaginal sex compared to 89% aged 45 and older. 64% of 18-24 year olds reported being high or intoxicated during sex which rose to 75% for women over 45, 78% for 24-34 year olds and 82% for women 35-44 years old. Almost half of 18-24 year olds and more than half of 35-45 years and older engaged in sex work. HIV testing programs are needed in jails for women as young as 18 and over the age of 45. Social networks testing is likely to identify HIV-positive women 35 and older. Drug treatment services are recommended for women with jail histories. Public health funding to expand availability of HIV testing and treatment programs for disadvantaged African American women who are unaware of their HIV status is warranted.

**Growth of White Perch, 2010 in Deal Lake of Deal, NJ.** K.A. Seiverd and D. Dorfman. Monmouth University, West Long Branch, NJ.

The purpose of this study was to examine the growth of zero year class white perch, *Monroea americana*, from Deal Lake, New Jersey. This lake is connected to the Atlantic Ocean by a flume. The perch enter the lake to spawn between March and June. After spawning the young-of-the-year fish were collected by seining several times each month. Months were divided into two halves, the first to the 15th and the 16th to the end of the month. Total length (T.L.) of the fish, in mm, was determined. Regression analysis was performed. A compilation of data for 14 years using linear regression for 103 observations from 5,032 fish yields  $Y = -39.968x + 6.6575$ , and linear regression for the mean of the means (14 observations) is  $Y = -35.178x + 6.034$ . For this year's data a comparison of the monthly means and the final regression slope was made to determine what differences, if any, have occurred. Small variations over time may occur and be related to food factors acting alone or in concert with other factors. The methodologies of comparing year to year growth may be added to methodologies used to study changes occurring on a larger scale, such as global warming. This project was funded by Monmouth University.

**A Three-year Study on the Biodiversity and Ecology of the Water Birds at Oakland Lake, Bayside, Queens, New York. Scott C. Sherman and Gheorghe Proteasa, Queensborough Community College, CUNY.**

Humans have had a devastating impact on the biosphere and on birds worldwide. Humans have caused the extinction of many avian species. Bird populations have greatly declined throughout the world due primarily to habitat destruction, hunting, environmental pollution, and the introduction of nonnative species. Our study of the biodiversity and ecology of the water birds at Oakland Lake began in September 2007. Oakland Lake is a freshwater glacial lake in Bayside, Queens, New York and is a subunit of Alley Pond Park. Oakland Lake and the surrounding parkland are important resting and feeding areas for birds traveling along the Atlantic Coast migratory flyway. Much of the habitat along this important migratory route has been destroyed and the majority of what remains has been significantly degraded. During the three years of this research 32 species of water birds have been identified at Oakland Lake belonging to eight zoological families in seven orders (1 species of Gaviiformes, 1 species of Podicipediformes, 1 species of Pelecaniformes, 7 species of Ciconiiformes, 13 species of Anseriformes, 3 species of Gruiformes, and 6 species of Charadriiformes). The results from the first three years of this study are given along with information about the geography, history, ecology, and biodiversity of Oakland Lake.

**Testing the Fitness of the Bacteriophage Phi6 Host Range Mutants. Shalini Singh<sup>1</sup>, Bruce Sun<sup>2</sup>, Kevin Jhun<sup>2</sup>, Mark J. Johnson<sup>1</sup> and John J. Dennehy<sup>2</sup>, <sup>1</sup>Queensborough Community College and <sup>2</sup>Queens College, Flushing, NY.**

Allee effects are positive correlations between population densities and per capita population growth rates in small populations. Previously a putative Allee effect was observed for the bacteriophage  $\Phi 6$  growing on the host *Pseudomonas pseudoalcaligenes*, but not on the host *P. phaseolicola*. Since the previous experiment determined phage productivity over 24hr and viral multiplicity of infection (ratio to host or MOI) likely varied considerably during this period, additional experiments are required to confirm this effect and to control for variation in viral MOI. The objective of the present work two-fold 1) to confirm the Allee effect growth patterns when viral MOI is controlled in one-step growth assays, and 2) to ascertain if other phages exhibit Allee effect-like population growth. We approach these objectives simultaneously by performing one-step growth assays using the dsRNA virus  $\Phi 8$ , a distant relative of  $\Phi 6$ . Our basic protocol is to inoculate cultures of  $\Phi 8$  host *P. phaseolicola* LM2489 or *P. pseudoalcaligenes* with 10, 100, 1000, 10000, or 100000 phage, permitting one cycle of infectious growth, then terminating the experiment and enumerating the resulting phage progeny. Results showing a positive correlation between phage initial inocula and overall productivity will be construed as support for the Allee effect hypothesis. Another independent project I worked on with a few colleagues was on the concept of emerging viruses that pose serious threat to global public health and economy. Under some ecological conditions, viruses may gain mutations that allow them to attach to and infect new hosts, a process known as host range expansion. Previously we isolated 18 bacteriophage Phi6 mutants able to infect a novel host, *Pseudomonas pseudoalcaligenes* ERA (East River Isolate A). All 18 mutant phage possessed unique nonsynonymous substitutions in P3 gene, which codes for pilin binding protein responsible for host attachment. Here we determined the absolute fitness of each Phi6 mutant on its standard laboratory host, *P. phaseolicola* and on the novel host, *Pseudomonas pseudoalcaligenes*. We have the results for 3 of the 18 mutant phi6 bacteriophage and from those three one of them is significantly more fit than the others. In future experiments, we will use these mutants to test the hypothesis that virus absolute fitness is positively correlated with probability of emergence.

**Photoinduced Current in Chromatophores From *Rhodobacter sphaeroides*. Rickanda Smith<sup>1</sup>, James Baird<sup>1</sup>, John W. Harrold<sup>2</sup>, Kamil Woronowicz<sup>2</sup>, Daniel T. Mastrogiovanni<sup>2</sup>, Eric L. Garfunkel<sup>2</sup>, Paul G. Falkowski<sup>2</sup>, Robert A. Niederman<sup>2</sup> and Michele Vittadello<sup>1</sup>, <sup>1</sup>Medgar Evers College and Graduate Center of CUNY and <sup>2</sup>Rutgers, The State University of NJ.**

Light-driven electron transfer in biological systems is a blueprint for renewable solar energy conversion to chemical fuels. In particular, chromatophores from *Rhodobacter sphaeroides* afford a fully functional and robust photosynthetic apparatus ideal for biophysical investigations of electron transduction. These chromatophores are vesicular organelles budding from the intracytoplasmic membrane of *R. sphaeroides* which include reaction centers and light harvesting complexes LH1 and LH2. In this study we have investigated the morphology, the fluorescence kinetics and the photocurrent generation of chromatophores from *R. sphaeroides* deposited onto gold surfaces. Three types of bacterial cultures were grown under different light irradiance high light (1100 W/m<sup>2</sup>), intermediate light (100 W/m<sup>2</sup>) and low light (25 W/m<sup>2</sup>) in order to vary the ratio between LH1 and LH2. It was shown that in high, intermediate and low light conditions the LH1-to-LH2 ratios were, 3.25:1.00, 71:1.00 and 1.00:1.00, respectively. We successfully isolated and purified the chromatophores corresponding to each light condition and immobilized them onto gold electrodes. The morphology of the chromatophores on gold was assessed by Atomic Force Microscopy. We demonstrated by *in situ* fluorescence measurements a significant residual quantum yield of photochemistry in the photoactive films on gold as opposed to *in vivo*. The proposed bioelectrodes were capable of generating sustained photocurrent under white light as shown by chronoamperometric measurements. This study point out that chromatophores from *R. sphaeroides* grown in high light conditions are the most suitable for heterogeneous integration in photoelectrochemical devices.

**Vertebral Abnormalities in *Menidia beryllina* in Flushing Meadows Lake. Grace Song<sup>1</sup>, PoKay Ma<sup>1</sup>, Athanasia Pavlou<sup>1</sup> and Nidhi Gadura<sup>2</sup>, <sup>1</sup>Queens College, Flushing, NY and <sup>2</sup>Queensborough Community College, Oakland Gardens, NY.**

*Menidia beryllina*, commonly called Inland Silverside, is indigenous to Meadows Lake in Flushing, New York. Over the past three years, we have observed abnormalities of this fish including scoliosis, which is a curvature of the vertebral column. Our first hypothesis is that this curvature is a developmental event associated with growth, which predicts that there is a positive correlation between size and extent of curvature. To test this hypothesis, I will quantify my data on scoliotic fish, to examine the severity of curvature versus size. Our second hypothesis is that the initial location and progression of curvature are not random: the first curvature sets in on the hæmal lordosis, and the last two caudal kyphosis follow almost simultaneously, and extends anteriorly. This hypothesis will be tested by following the progression of curvature.

**Stress Axis Hormones Induce Triglyceride Filled Nodule Formation in Vascular Smooth Muscle Cells. Pamela Tello, Michelle Vigliotti, and Jodi F Evans, Molloy College, Rockville Centre, NY.**

Homeostatic stress, such as that which occurs in diabetes, is associated with increased risk for the development of atherosclerosis. Atherosclerotic plaques of the artery wall are associated with both lipid accumulation and fibrous and/or calcified tissue accumulation. Vascular smooth muscle cells (VSMC) are derived from mesenchymal stem cells (MSC) which are capable of differentiating into adipocytes, chondrocytes and osteoblasts. MSC of the bone marrow are pushed toward the chondrogenic and adipogenic phenotypes in the presence of the stress hormones glucocorticoid and adrenocorticotropin (ACTH). This led us to hypothesize that the proliferative VSMC of the Goto-Kakizaki (GK) diabetic rat, when exposed to stress hormones will present an adipocytic and/or chondrogenic-like phenotype. VSMC of the GK rat were cultured using conditions that favor the multi-potential differentiation of MSC and were either left untreated, were treated with ACTH, dexamethasone (DEXA) or both. Cells were stained for lipid using oil-red-o, proteoglycan matrix using alcian blue and cell density using methylene blue. DEXA increased lipid nodule formation above the untreated control but the combined ACTH and DEXA treatment led to a significant increase above DEXA alone (lipid nodule #'s per field, DEXA  $2.56 \pm 1.63$  vs. A+D  $6.67 \pm 1.68$ ). These data suggest that stress hormones may contribute to VSMC matrix accumulation and lipid production during atherosclerosis development in diabetes.

**Preliminary Investigations of Distyly in *Primula acaulis*: Morphological and Molecular Characterization of Short- and Long-Styled Plants. Andres Thomas and Farshad Tamari, Ph.D. Kingsborough Community College, Brooklyn, NY.**

Distyly is a mating system in which a dimorphism exists in the reproductive organs of hermaphroditic angiosperms. Self-incompatibility, which is often associated with distyly, refers to a strong self- and intra-morph incompatibility. The molecular biology of distyly and self-incompatibility in the Primulaceae remains relatively unknown. We hypothesize that *P. acaulis* is distylous. To ascertain distyly in this species we measured the female and male reproductive organs of five short-styled and five long-styled plants using a pair of Vernier calipers. A one way analysis of variance (ANOVA), comparing the lengths of female and male reproductive organs, indicates that *P. acaulis* is distylous, but not reciprocally herkogamous. It is also hypothesized that there are molecular differences in the reproductive tissues of short- and long-styled plants for genes involved in self-incompatibility such as alpha-dioxygenase. Our preliminary results indicate that alpha-dioxygenase does PCR amplify from the genome of both short- and long-styled plants, however, this finding needs to be confirmed. In the future, a proteomics investigation will be initiated to compare protein profiles of the reproductive tissues of short- and long-styled plants. The ultimate goal of this research is finding and removing self incompatibility barriers in *P. acaulis* to increase seed and plant yield. This work was supported by grants 2R25GM06003 of the Bridges to the Baccalaureate Program of NIGMS and grant 0537101091 of the CSTEP Program of the NYS Department of Education.

**Phenol Power: A Study of the Antimicrobial Effects of Polyphenolic Tea Compounds. Jennifer Todd, Lauren Strawn, Jonathan Jimenez and Tin-Chun Chu. Seton Hall University, South Orange, NJ.**

Both green and black tea contains polyphenolic compounds which are responsible for the antimicrobial characteristics of both teas. The major polyphenols in black tea are theaflavins. The theaflavins tested were theaflavin (TF-1), theaflavin-3-monogallate (TF-2A), theaflavin-3'-monogallate (TF-2B), and theaflavin-3,3'-digallate (TF-3). In addition, black tea crude extract, black tea powder, and oligonol were tested. Five concentrations of the tea compounds were made: 1.0, 2.5, 5.0, 7.5, and 10.0g/L. *Pseudomonas aeruginosa*, *Enterobacter aerogenes*, *Escherichia coli* and *Staphylococcus epidermidis* were the bacteria used in this study. The antimicrobial abilities of the compounds were determined by the zone of inhibition (ZOI) and the bacterial growth. Against *S. epidermidis*, the minimum concentration was 5.0g/L for TF1, TF2, TF3, and oligonol and 2.5g/L for black tea crude extract and black tea powder. Against *P. aeruginosa*, the minimum concentration was 5.0g/L for all compounds except TF3, whose minimum concentration was 7.5g/L. Black tea crude extract had the largest ZOI against *S. epidermidis* while oligonol had the largest ZOI against *P. aeruginosa*. The tea compounds showed synergistic antimicrobial effects with various antiseptics including mouthwashes and hand sanitizers.

**Extra-pair Paternity in Birds: Studying Variations Among Populations With the Genetic Diversity Hypothesis. Lainga Tong and Mohamed Lakrim, Kingsborough Community College, Brooklyn, NY.**

Extra-pair paternity is highly variable in birds between species and between populations of the same species. In intra-specific level, the genetic diversity hypothesis suggests that females seek extra-pair copulation to increase the genetic diversity of their broods so that females are more likely to seek extra-pair copulation when there is more genetic variation among males. It has been proposed that island populations have a lower genetic variation than their mainland counterparts. Here I made a comparison analysis of the frequency of EPP in island populations and their mainland counterparts. The result showed that the frequency of EPP was consistently lower in island populations. The result suggested: (1) island populations characterized by low frequency of EPP, (2) the frequency of EPP and genetic variation may have positive correlation in intra-specific variation, (3) the frequency of EPP should be depend on the percentage of broods showing at least one extra-pair young.

**Effects of Caffeinated Drinks on Pulse Rate of Red Worms (*Eisenia foetida*).** Andrea Toxqui<sup>1</sup> and Georgia Lind<sup>2</sup>, <sup>1</sup>Brooklyn College, Brooklyn, NY and <sup>2</sup>Kingsborough Community College, Brooklyn, NY.

Caffeinated and energy drinks are very popular with college students to help them to stay alert and perform better at school. I wanted to investigate how caffeine can affect or harm the human body. We followed a protocol used with black worms (Lesiuk, 1999) to study the effects of caffeine on the pulse rate of red worms (*Eisenia foetida*). The red worms were soaked in different types of caffeinated solutions for 15 minutes; their pulse rates were observed using a dissection microscope. In general, their pulse rate increased in response to the solutions. When they were treated with a popular energy drink (Red Bull) at full strength, they died. We then tested ingredients in Red Bull and found one combination that also resulted in death. Surprisingly, in contrast to other caffeinated drinks, espresso coffee caused a decrease in the worm's pulse rate. Also, when the worms were exposed to caffeine, they secreted a white, creamy material that microscopically appeared to be clumps of eggs. We recognize that the red worm's anatomy differs from the human body. Nevertheless, red worms have blood vessels, nervous and muscular systems that might allow us to relate our results to humans. This work was supported by grants 2R25GM06003-05 from NIGMS and 0537101091 from the NYS Department of Education.

**Chromosomal Aberrations Cause by the Chemotherapeutic Agent Mitoxantrone on In vitro Human Peripheral Leukocytes.** Roseanna Valant and Ammini Moorthy, Wagner College, Staten Island, NY.

The purpose of this study is to assess the chromosomal damage caused by Mitoxantrone, an anti-neoplastic, antitumor drug that is used in the treatment of various types of cancer. Chemotherapeutic drugs in general target dividing cells in the body and since cancer cells are transformed with no control over their cell cycle, more of the cancer cells are affected by these treatments. These chemo drugs however do have an effect on normal dividing cells. This senior research project is aimed at studying the effects of Mitoxantrone on normal human white blood cells. Using peripheral human leukocytes, four *in vitro* cultures (control plus hypo, normal and hyper dosage of Mitoxantrone) are set up from normal healthy individuals. The cultures are harvested after 68-78 hours using conventional procedures. Slides are made using flame drying technique, stained with Giemsa stain and observed under 1000x magnification using an Olympus microscope. Structural and numerical aberrations and changes in mitotic indices are noted from all four samples and photographically recorded. Statistical evaluation of the results will give us an indication of the magnitude of damage caused by these drugs. The studies are in the preliminary stage and the results collected so indicate that the drug Mitoxantrone does cause both structural and numerical aberrations on human chromosomes from peripheral leukocyte cultures.

**The Effect of Heavy Metals on Exopolysaccharides in Cyanobacteria *Synechococcus* sp. IU 625.** Cesar Augusto Villamil, Estefania P. Cabezas, Jose Leovigildo Perez and Lee H. Lee, Montclair State University, Montclair, NJ.

Exopolysaccharides are polymeric carbohydrates that may be released from glycocalyx layers, plasma membranes, or external membrane complexes depending on the microorganisms. The production of exopolysaccharides may be a defensive mechanism utilized by many bacteria, archaea, algae, and fungi to survive toxic conditions and stressful environments. It is the major component of biofilm and it can cause problems in the environments and medical fields. One specific exopolysaccharide (consists of fucose, mannose, galactose, and glucose) was found in the outer layer of *Synechococcus* sp. PCC 6308, a species very similar to *Synechococcus* sp. IU 625. In this study, *Synechococcus* sp. IU 625 cultures were grown in the presence of various concentrations of zinc chloride (0, 10, 25 and 50 mg/L), cadmium and cupric chloride (0, 5, 15 and 30mg/L), and mercuric chloride (0, 0.1, 0.5 and 1 mg/L). The growth was monitored by turbidity study using spectrophotometer at 750nm. The quantitative measurement of exopolysaccharide production was derived from glucose equivalents using the Phenol-Sulfuric Acid Colorimetric Assay. The results suggest that the exopolysaccharide production is specific to the type of heavy metal.

**The Hard Clam (*Mercenaria mercenaria*) Does Not Appear to Serve as a Vector for Dermo (*Perkinsis marinus*) in Jamaica Bay, NY.** Stephanie Vivieca, Gary Sarinsky and Craig Hinkley, Kingsborough Community College, Brooklyn, NY.

In the early 1900's, the Eastern oyster (*Crassostrea virginica*) began to diminish and now none are known to exist. Water pollution and dermo (*Perkinsis marinus*), a parasitic protozoan, are believed to be responsible for their decline. Previous research performed on oysters grown from spats in Taylor floats under controlled conditions show that some of the oysters have become infected with dermo. Since it was thought that dermo was passed from oyster to oyster, the question that these results raise is how did they become infected? Some literature suggests that bivalves and scavengers can serve as vectors for dermo. Since there are no known oysters in the bay, it is hypothesized that the hard clam (*Mercenaria mercenaria*) serves as a vector for dermo. Gill and mantle tissue was excised from hard clams collected in Jamaica Bay. DNA was isolated and PCR amplifications were carried out using the mitochondrial cytochrome c oxidase 1 (CO1) gene and dermo specific primer sets respectively. The CO1 and dermo amplified products were subjected to agarose gel electrophoresis. CO1 was present while dermo was not found in all six samples. The results of these experiments showed that the clams tested were not vectors for dermo.

**Curcumin Inhibits Sindbis Virus Infection in Vero Cells. Parth Vyas and Sandra D. Adams, Montclair State University, Montclair, NJ.**

Turmeric (*Curcuma longa*) is one of the oldest and most widely used herbal spices, originated in Southeast Asia, where it was the single most valuable herb for ancient ayurvedic (herbal) medicine. Its active ingredient, Curcumin, has been recognized to have powerful antiviral, antibiotic and antibacterial properties in several viruses including Hepatitis C, HIV and Japanese encephalitis virus. Nonetheless, no studies have been conducted on Curcumin's ability to inhibit Sindbis virus (SinV), the virus responsible for the Sindbis fever, a common condition in many parts of the world. In this study, Vero cells were infected with SinV in the absence and presence of low concentrations of Curcumin. Concentrations were determined by conducting a trypan blue assay and highest dose-range concentrations (obtained by Sigma) with non-toxic effects to cells were used. Viral titers were then quantified by plaque assays. In this study, we found that Curcumin treated cells showed a lower cytopathic effect when compared to non-Curcumin treated cells when infected with sinV. Furthermore, this data was supported by a lower viral titer on Curcumin treated cells than non-Curcumin treated cells. We have shown that Curcumin effectively inhibits SinV in Vero cells and moreover shows potential use in future Sindbis fever preventatives.

**Relationship Between Volume of the Dentate Gyrus and Neurogenesis in Adult Macaque Monkeys. Colette Waite<sup>1</sup>, Anna V. Rozenboym<sup>1</sup>, Jeremy D. Coplan<sup>2</sup> Tarique D. Perera<sup>3</sup> . <sup>1</sup>Kingsborough Community College, Brooklyn, NY, <sup>2</sup>SUNY Downstate Medical Center, Brooklyn, NY and <sup>3</sup>Columbia University Medical Center and New York State Psychiatric Institute, NY.**

Studies on primates show that neurogenesis in the dentate gyrus is suppressed by stress and increased in response to antidepressant treatment. Few research efforts assessed the volume of the dentate gyrus in the context of depression and neurogenesis. We aimed to investigate a relationship between behavioral, neurogenesis, and volumetric measures in non-human primates. Assessment of the behavioral profile of animals yielded a measure of depression-like behavior induced by the chronic stress paradigm. Animals were sacrificed and postmortem brain tissue was used to assess neurogenesis using cell labeling for doublecortin (DCX), which is a marker for immature neurons bromodeoxyuridine (BrdU) a marker for dividing cells, and neuronal nuclei (NeuN) a marker for mature neurons. Sections of postmortem tissue were used to estimate the volume of the GCL of the dentate gyrus. Significant correlations were found between all neurogenesis measures and dentate volumes. A significant inverse correlation was found between depression-like behavior measures and the dentate volumes. Our study shows that depression-like behaviors and reduced neurogenesis rates are associated with the volumetric changes in the dentate gyrus of adult macaque monkeys. This work was supported by grant 0537101091 of the CSTEP Program of the NYS Department of Education.

**Effect of *Ganoderma lucidum* on the Migration of Human Breast Cancer Cells. Di Wu and Regina Sullivan, Queensborough Community College, Bayside, NY.**

*Ganoderma lucidum*, commonly known as reishi mushroom is a medicinal herb used as supplement to prevent cancer and aids patients in chemotherapy. It has shown in previous studies that the extract of *G. lucidum* contains many biological compounds that possess potential anti-tumor activities, such as triterpenoid and polysaccharide. In this study, the shell-broken spore oil of *G. lucidum* is investigated to determine the inhibition on the migration of MDA-MB-231 cells, a highly invasive and metastatic human breast cancer cell line.

**Effects of Buthionine Sulfoximine Treatment on Early Spermatogenic Cyst Survival in Culture. Robert Yates, Crystal Pristell and Angela V. Klaus, Seton Hall University, South Orange, NJ.**

Cellular glutathione (GSH) is a known reducing agent and antioxidant against reactive oxygen species (ROS). Recent evidence from our laboratory suggests that the survivability of *Drosophila pseudoobscura* fly spermatogenic cysts in in vitro culture can be improved by adding exogenous GSH to the culture media (as compared to untreated controls). In the current work, we wish to determine what the effect of diminished endogenous GSH expression will be on spermatogenic cyst survival in vitro. Buthionine sulfoximine (BSO) is a known inhibitor of intracellular GSH production. By adding BSO to *D. pseudoobscura* spermatogenic cyst cultures and measuring the survivability of the different cyst types, we expect to see a decrease in cyst survival as compared to untreated controls.

**Effect of Carnitine on Brain Cell Survival.** Jose Zhagnay<sup>1</sup> and Maria L. Cotrina<sup>2</sup>, <sup>1</sup>Queensborough Community College, Bayside, NY and <sup>2</sup>Columbia University, NYC, NY.

Carnitine is an amino acid derivative with important mitochondrial functions. Carnitine transports some lipids into mitochondria for oxidation and energy production. It is also responsible of transporting toxic compounds out of the mitochondria. As heart and liver have some of the highest energy demands, carnitine is commonly prescribed to improve muscle performance and energy levels in a variety of disorders like ischemia, heart disease, cancer and osteoporosis. Little is known about the effects of carnitine in another organs with high metabolism, such as the brain. The objective of this work was to determine if carnitine can improve the mitochondrial integrity and cell survival of astrocytes, the main brain cell type involved in survival and metabolic support of neurons. To this end, we subjected primary astrocytes from mice brain in culture to a non-lethal insult of hydrogen peroxide and treated with carnitine. Using epifluorescence microscopy and propidium iodide, which labels nuclei of dying cells, we found that carnitine decreases astrocytic cell death by about 80%. Reduced cell death was not the result of a reduced inflammatory response because carnitine did not decrease the number of activated microglial cells (the main inflammatory and phagocytic cell type in brain) after hydrogen peroxide exposure. Labeling astrocytes with the fluorescent indicator MitoTracker, which labels mitochondria in active, living cells, showed no changes in mitochondria morphology after carnitine treatment. These results indicate that carnitine improves astrocytic survival by a mechanism independent of mitochondrial integrity. They also reveal the therapeutic potential of carnitine against neurodegeneration.

**Synthesis of Protein Scaffolds for Cartilage Tissue Engineering.** Jinhui Zhao<sup>1</sup>, Susheel K. Gunasekar<sup>1</sup> and Jin K. Montclare<sup>1,2</sup>, <sup>1</sup>Polytechnic Institute of NYU, Brooklyn, NY, and <sup>2</sup>SUNY Downstate Medical Center, Brooklyn, NY.

Cartilage tissue regeneration requires scaffolds that can specifically bind to and interact with the extracellular matrix (ECM) proteins on the surface of chondrocytes. Our goal is to generate scaffolds and to incorporate cell-binding motifs, arginine-glycine-aspartic acid (RGD) repeats, for cell adhesion. We intend to design scaffolds comprised of di- and tri- block co-polymers COMPcc-ZR and COMPcc-ZE-COMPcc. COMPcc is the self-assembling coiled-coil domain of cartilage oligomeric matrix protein, while ZR and ZE are a leucine zipper pair that aids in the formation of heterodimers. Upon mixing the block co-polymers highly cross-linked scaffolds may be generated by self-assembly. We have successfully incorporated RGD motifs in the block co-polymers, expressed in *E. coli* bacteria, and purified the proteins. Characterization of secondary structure and stability using circular dichroism (CD) is underway. Once these proteins are successfully synthesized and characterized, they will be subjected to template chondrocyte cell growth and tissue regeneration.

## MACUB 2010 Conference Member Presentations

**Carla Beeber and Carol Biermann**

Kingsborough Community College/CUNY, Brooklyn, NY

### **Universal Science Literacy:**

#### **The Benefit and Appeal of Biology Electives to Non-Science Majors**

Non-science majors (Liberal Arts students) are often required by colleges to take science classes in order to round out their knowledge base and develop science literacy. At Kingsborough Community College/ CUNY, there are several biology courses that will meet these students' degree requirements. Two of these classes are 3 credit, 3 hour lecture blocks: Biology of Women (Bio 28) and Marine Biology (Bio25). Analyses of students' impressions concerning these two courses demonstrated positive student feedback.

**D.R. Seebaugh, W.G. Wallace and W.J. L'Amoreaux**

College of Staten Island, City University of New York, Staten Island, NY

#### **Relationships Between Digestive Toxicity and the Assimilation of Ingested Elements by Grass Shrimp Collected Along an Impact Gradient**

Aquatic invertebrates inhabiting urbanized estuaries are typically exposed to pollutants through multiple pathways, including the diet. Biochemical and physical processes within invertebrate guts can be impacted by ingested pollutants, which may influence the assimilation of essential elements (e.g., organic carbon) as well as pollutants. Pre-assimilatory digestive toxicity may result from a pollutant circulating in gut fluid. Post-assimilatory toxicity may result from incorporation of a pollutant into consumer tissues due to chronic exposure (e.g., feeding in impacted field conditions). This series of studies investigated the influence of chronic field exposure on the assimilation of ingested elements (Cd, inorganic Hg and organic carbon) and endpoints related to digestive physiology (gut residence time [GRT] and extracellular digestive protease activities) in grass shrimp, *Palaemonetes pugio*, collected within the New York/New Jersey Harbor Estuary. Shrimp from salt marshes surrounding Staten Island, NY were assessed for assimilation efficiencies (AE) during radiotracer pulse-chase feeding experiments. GRT was estimated using fluorescent markers and digestive protease activities determined via a novel near-infrared imaging technique. Increased assimilation of Cd and Hg was observed for grass shrimp collected from sites adjacent to industrialized Arthur Kill, relative to specimens collected from sites flushed with cleaner waters from Raritan Bay. Carbon AE did not vary for shrimp from the Staten Island study sites. This phenomenon may be attributable to digestive plasticity - i.e., increased GRT to compensate for post-assimilatory impacts on digestive enzyme activities in Arthur Kill shrimp. Stress-induced variability in gut function may, in turn, enhance assimilation of non-essential metals and have implications for accumulation and toxicity in impacted shrimp.

**Richard Stalter, Elizabeth Gray, Emanuel Pepitone, Candace Hernandez,  
and Samantha Hirt**

St. Johns University, Queens, NY

#### **A Preliminary Study of the Vascular Plant Species at Mettler's Woods, Somerset County, New Jersey**

Mettler's Woods, a 26 hectare old growth forest, is the only uncut upland forest in New Jersey. Mettler's Woods was sampled by Bard in 1949-1951 who identified one hundred twelve vascular plant species. The objective of this preliminary study was the identify the vascular plant species at Mettler's Woods during the spring and summer 2010 growing seasons and to compare these species with those present at the site at the conclusion of Bard's study in 1951. The most significant change in the vegetation at the woods was the population explosion of the non-native vascular plant species, *Microstegium vimineum*. Eighty five species of vascular plants have been identified to date during the spring and summer 2010 growing seasons.



# Conference Highlights



# 2011 Benjamin Cummings/MACUB Student Research Grants

## Purpose

The purpose of the Benjamin Cummings/MACUB Student Research Grants is to provide investigative research support for undergraduate students working under the supervision of faculty who are current members of MACUB.

Four grants of \$500 each will be awarded annually (provided by Benjamin Cummings.) In addition, each student research grant awardee will receive a one-year membership in MACUB and complementary registration for the 2011 Annual MACUB Conference (provided by MACUB.)

## Eligibility and Award Selection

Only undergraduate students working under the supervision of faculty who is a current member of MACUB may apply.

Undergraduates who are graduating seniors must plan to complete their research prior to graduation.

A student is only eligible to receive an award once.

Grant proposals will be evaluated and judged based on the scientific merit and overall quality of the proposed research experience.

## Requirements

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 or other forms of support.

All application materials must be submitted on-line at <http://www.macub.org> by February 1, 2011.

Grant awardees will receive notification by February 28, 2011.

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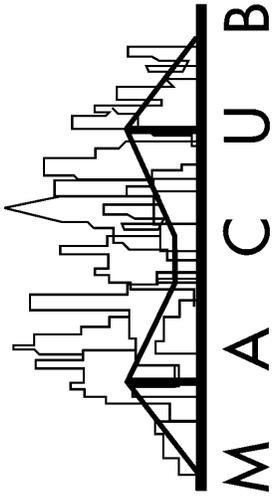
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**Save the Date**

**Saturday, October 29, 2011**

**The 44<sup>th</sup> Annual MACUB Conference  
at  
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Dr. Edward J. Catapane  
Department of Biology  
Medgar Evers College  
1150 Carroll Street  
Brooklyn, New York 11225