MACUB

IN VIVO

The Publication of the Metropolitan Association of College and University Biologists

Winter, 2004 Volume 25, Issue 2

When Science is Controversial

36th Annual MACUB Conference

Hosted by

Wagner College

November 1, 2003

A Publication of the Metropolitan Association of College & University Biologists

Serving the Metropolitan New York Area for 37 Years

IInstructions for Authors

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.

Articles can be submitted electronically to *invivo@mec.cuny.edu* or mailed as a printed copy (preferably with a diskette that contains the file) to the Editorial Board at Medgar Evers College. All submissions should be formatted double spaced with 1 inch margins. The title of the article, the full names of each author, their academic affiliations and addresses, and the name of the person to whom correspondence should be sent must be given. As a rule, full length articles should include a brief abstract and be divided into the following sections: introduction, materials and methods, results, discussion, acknowledgments and references. Reviews and short communications can be arranged differently. References should be identified in the text by using numerical superscripts in consecutive order. In the reference section, references should be arranged in the order that they appeared in the text using the following format: last name, initials., year of publication. title of article, journal volume number: page numbers. (eg. - [1]Hassan, M. and V. Herbert, 2000. Colon Cancer. *In Vivo* **32:** 3 - 8). For books the order should be last name, initial, year of publication, title of book in italics, publisher and city, and page number referred to. (eg. - Prosser, C.L., 1973. *Comparative Animal Physiology*, Saunders Co., Philadelphia, p 59.). Abbreviations and technical jargon should be avoided. Tables and figures should be submitted on separate pages with the desired locations in the text indicated in the margins.

In This Issue:

Call for Manuscripts

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Follow the Instructions to Authors on page 2 and submit your manuscripts to the Editorial Board.

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Opening Conference Remarks by President Gary Sarinsky

For the past few years we have been inundated with multiple issues pertaining to ethics. These issues have transgressed many realms and have impacted numerous segments of our society. Corporations, through their financial officers have resorted to financial misdeeds that have cost thousands of innocent investors and employees huge sums of money.

Politicians have engaged in questionable practices involving favoritism, acceptance of gratuities and the awarding of contracts to their major contributors. Colleges and universities have been accused of grade inflation and rewarding wealthy alumni with special privileges regarding admission standards for their offspring.
Unquestionably, the majority of arenas in which ethical standards have been compromised and sacrificed were mediated by greed, desire for personal gain and by measures that would benefit a select few.

As educators, we also face issues that have numerous ethical overtones. For the most part, our audience is the uninitiated, they are our students who are easily influenced by our pronouncements and often take for granted that what we espouse. Our students come to us with diverse backgrounds, abilities and future goals. We teach non-majors who are often enrolled in our courses for the purpose of satisfying degree requirements, we instruct career majors whose ambitions and future plans may lead them to vocations in the health sciences, education, research or any other field in which a college education is a prerequisite. We must never loose track of the fact that to many of our students, we represent role models and our assertions and declarations are accepted as gospel truth.

It behooves us as purveyors of science education to maintain ethical standards, which will inspire and motivate our students to follow a similar course as they mature, develop and enter the professions of their choice. Science is not devoid of issues that impinge upon ethical standards. What tends to set ethical issues in the sciences apart from ethical issues unrelated to the sciences is that greed and self-gain are not the primary beneficiaries of the proponents and antagonists who view opposite sides of an ethical concern.

Issues relating to stem cell research, abortion, use of animals for research purposes, drug testing and evaluation, and unbiased instruction and discussion of evolutionary principles and theory, are but a few of the areas receiving increased attention in the biological arena and are issues that have promulgated intense interest and debate. Often our students possess preconceived notions, formulate decisions based upon emotions and ignorance and are easily influenced by glib one-sided biased presentations of views that can easily manipulate their decisions on ethical issues.

The ability to arrive at fair and just conclusions relevant to ethical matters in the sciences and to do so untainted by propaganda is a far more difficult task than is generally recognized or conceded. It is incumbent upon us, as science educators to inculcate in our students the skills necessary to evaluate, judge and in an unbiased manner arrive at conclusions relating to ethical questions and topics. Ethics and ethical issues should not be avoided but should become a major thread that weaves through all of our courses. Open and honest discussions will enable our students to hone and perfect their ability to reason and to formulate conclusions and opinions that engender unbiased decision making. Our goal is to provide the tools with which this goal can be accomplished.

The Fall 2003 Conference Poster Presentation Abstracts

Poster Presentation Award Winners

First Place (tie)

Establishment of a Knowledgebase for Cyanophage and Cyanobacteria Genomics, Tin-Chun Chu, Patricia Platner and Shi-Fang Hsu, Montclair State University. Faculty Mentors: Dr. Lee H. Lee, Dr. John J. Gaynor, Dr. Quinn Vega, Dr. Chunguang Du and Dr. Bonnie Lustigman.

A knowledgebase website for cyanophage and cyanobacteria project has been initiated. This is for the purpose of sharing information among collaborators and the scientific community. All the data that will be generated in the laboratory will be compiled, analyzed and posted on the cyanogroup knowledgebase site: *http://www.cyanogroup.com/*. Major features of the site will include the background information of freshwater and marine cyanobacteria and cyanophage; data analysis - both DNA sequence and phylogenetic analysis and related links for the cyanogroup. The cyanogroup genomic, knowledgebase would provide DNA sequence analysis tools for users to search and query any related information stored in the database. Sequence analysis program designed specifically for DNA sequence analysis will be incorporated into the website. After input of the query sequence by the user, the analysis program would automatically start the DNA sequence analysis, perform BLAST searches against the local database, and then return the final results to the user. The local database of the knowledgebase contains genomic information of cyanobacteria and cyanophages, including two major parts, the NCBI genome database and laboratory sequencing data. This provides users with efficient search information in one location without the need to reference other websites or databases. Regular information update of the local database will be performed to maintain the high accuracy of the analysis and BLAST search.

rIL-2VV + Vaccinia Melanoma Oncolysate - Pulsed Dendritic Cells (DC-MelVac): A Second-Generation Melanoma Vaccine. Swarna Deenadayalan, Nebil Aydin, Khorshed Alam, Louie Llames[1] and Marc Wallack. Department of Surgery, St. Vincent's Hospital - Manhattan / New York Medical College, 153 W 11th Street, New York, NY 10001. Funded by the National Immunotherapy Cancer Research Foundation. *[1]Corresponding author: (lllames@svcmcny.org)*

Malignant melanoma is the most lethal and aggressive form of skin cancer. Approximately 50,000 new cases are diagnosed this year. The major risk factor for melanoma is excessive exposure to ultraviolet radiation including sun exposure resulting to skin burns. While surgical therapy can cure a significant portion of patients with early stage melanoma, this procedure does not cure melanoma that had spread to other sites (Stages III and IV). Recently, interferon-alfa therapy has shown to be effective in patients with high risk for metastases. However, this therapy has shown to exhibit significant toxicity. Therefore, new adjuvant therapies are being investigated. Our laboratory has made a number of advances in melanoma cancer research. A first-generation melanoma vaccine although showed clinical efficacy in initial clinical trial, it did not show a significant clinical efficacy in the Phase III, randomized clinical trial. However, some subsets of patients showed clinical benefit with this vaccine. Currently, an improved second-generation melanoma vaccine (DC-MelVac) has been prepared with the following improvements: (1) antigenic quality is improved by using five melanoma cell lines in the production of the Vaccinia Melanoma Oncolysate (VMO) vaccine; (2) immune stimulation is improved by adding recombinant vaccinia virus encoding interleukin-2 gene (rIL-2VV) as a potent adjuvant, as well as use patients own dendritic cells (DC); and (3) vaccine presentation in the patient is improved by a two-step administration method. We anticipate that by early next year this vaccine will be introduced into a Phase 1 Clinical trial as an IND after FDA approval.

Second Place (tie)

Expression of Melanoma-Associated Antigens in Human Dendritic Cells Pulsed with Vaccinia Melanoma Oncolysates[1]. Nebil Aydin, Swarna Deenadayalan, Khorshed Alam, Marc Wallack, and Louie Liames[2], Department of Surgery, St. Vincent's Hospital - Manhattan / New York Medical College, 153 W 11th Street, New York, NY 10011. [1]Funded bytheNational Immunotherapy Cancer Research *Foundation.[2]Corresponding authorlliames@svcmcny.org*.

Dendritic cells (DCs) have had steadily increasing appreciation in immunology research due to their unique ability in initiating primary immune response through their potent capacity to present antigens to naive T lymphocytes. Rapidly growing interest in the use of DCs as a tool for active specific immunotherapy has been considered as a vaccination strategy for the treatment of patients with cancer. In present study, we determined the ability of DCs to express Melanoma-Associated Antigens (MAA) from a monovalent Melanoma Vaccine (DC-MelVac). Human peripheral blood mononuclear cells (PBMC); were isolated from whole blood. Monocytes were then purified from PBMC by a 2-hour adherence step at 37^0C in complete X - VIVO 15 media. Thereafter, DCs were subjected into differentiation using X-VIVO 15 containing Gentamycin (10 mg/ml) and a cocktail of cytokines (5mg/vial IL-4 and 500 μg/ml GM-CSF). After 7 days of culture the DCs were pulsed with 4.0 mg of Mel-2 cell line derived Vaccinia Melanoma Oncolysate (VMO) for 48 hours. DC post-pulsing maturation was examined by flow cytometry immunofluorescence labeling using DC mAb markers (CD11c, CD14, CD80, CD83, CD86, CD209 and HLA-DR). While mAb markers against MAA, namely: GD_3, High MW Proteoglycan, HLA-DR1a, Mr 130,000 glycoprotein, Gp75 (75kD) / TRP-1, Mart-1 Fusion protein, MonosialogangliosideGM_2, Transferrin receptor, Nuclear Transport Factor and Melanoma Peptide Ag-1 were used to determine percentage expression and presentation of these antigens by DCs. Morphological changes were also confirmed using transmission electron microscopy.

Characterization of the Polygonal Antibody Against RET Co-receptor GFRa-2. Anna Cartier, Montclair State University. Faculty Mentor: Dr. Quinn C. Vega.

RET is a receptor tyrosine kinase required for kidney development and neural migration in mammals. RET is activated through a tripartite mechanism involving RET, a ligand and a membrane bound co-receptor. RET can be activated by four separate ligands, GDNF, Neurturin, Artemin and Persephin, through association with co-receptors GFRa-1, GFRa-2, GFRa-3 and GFRa-4, respectively. Although the required proteins are known, the mechanism by which RET is activated is still unclear. In order to help determine the mechanism of RET activation, it would be helpful if the proteins could be analyzed in more detail. While antibodies against RET have been used for this purpose, antibodies against GFRa-2 are not widely available. For this project, antibodies against GFRa-2 were produced. A peptide corresponding to the amino terminus of GFRa-2 was covalently attached to a carrier protein and injected into rabbits. At specific time points after injection, bleeds were taken from the rabbits and the presence of GFRa-2 antibodies was analyzed. Analysis of the pre-immune serum in relation to the immunized rabbits shows that the pre-immune serum does not recognize Gfra-2. Specificity studies also revealed that the antibody does not recognize its closely related family member, GFRa-1. Sensitivity of GFRa-2 antibody was investigated by varying the antibody concentration and varying the concentration of the GFRa-2 protein. Future studies will look at the ability of this antibody to work in immunofluorescence and for immunoprecipitations.

Third Place (tie)

Identification of Hypoxia-Sensitive Genes in the Ischemic Rat Testis. Anjaly Chandramoulyl and Mona Patel, Biology Department, Monmouth University. Faculty Mentor: Dr. Michael A. Palladino.

Testicular torsion is a medical emergency caused by rotation of the testis around the spermatic cord creating a decreased oxygen supply (hypoxia) and injury of the affected testis due to reduced blood flow (ischemia). Testis ischemia results in germ cell damage that can lead to permanent aspermatogenesis and impaired fertility. Molecular processes involved in germ cell damage in the ischemic testis are poorly understood. The goal of this project was to use differential display PCR analysis to identify and clone hypoxia-sensitive genes in the ischemic testis. Total RNA from normoxic adult rat testes and 1-hour surgically-induced hypoxic testes was reverse transcribed to synthesize complementary DNA (cDNA). Differential display was carried out with G, A, and C 3'-anchored oligo $(dt)_{11}$ primers and 55 arbitrary 13mers. Amplified products were separated by agarose gel electrophoresis and differentially displayed cDNAs identified by a minimum 1.5 fold change in expression (up- or down-regulation) and reproducibility in at least two of three samples (n = 3). Differentially displayed cDNAs were cloned, then sequenced and evaluated by BLAST analysis of GenBank. To date, 10 differentially expressed genes have been identified. Five genes were up-regulated and five were down-regulated in the ischemic testis. These genes represent diverse functional categories including: sperm development (transition protein 2, protamine 1, cappa 3); heat shock responses (Hsp7O); RNA splicing (Zis); and metabolism (V-type ATPase). In conclusion, identifying hypoxia-sensitive genes will provide valuable insight about molecular mechanisms involved in ischemic injury of the testis. Supported, in part, by a Grant- in-Aid for Creativity Award from Monmouth University. [1]Equal contributors to this project.

Irreversible binding of Endothelin-1 to Endothelin-A Receptors and Internalization of the Ligand - Receptor Complex in Nociceptor Like Neurons. Michaes Zemedkun[1], Laurence S. Jouavilie[1] and Garv R. Strichartz[1,2], [1]Department of Anesthesiology, Perioperative and Pain Medicine, Brigham and Women's Hospital and the [2]Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School, Boston, MA.

A sharp, radiating back pain is usually observed in patients with metastatic breast and prostate cancers. It is hypothesized that this pain is due to a mediator dependent signaling between the tumor cells and the spinal nerve roots. One of these potential mediators is Endothelin-1. Reversal of the pain behavior by ET_A receptor antagonists and abundance of ET_A receptors on small-diameter DRG neurons suggest the pain induction of ET-1 to be exclusively mediated through ET_A receptors. Accompanying the various *in vivo* and *in vitro* ET-1 experimental results was desensitization of the ET_A receptor mediated effects from primary exposures. This project attempts to unveil the, mechanism of this observation and contribute the further understanding of the role of ET-1 in various pain like states. Nociceptor like neurons (ND7/104 cells) were cultured for 48-72 hrs with the media chanced everyday. Cells were incubated with 5O pM of [^{125}I]-ET-1 for various times, one set at room temperature (~22°C) and another at 4°C. These cells were then incubated with 100 nM non-iodinated ET-1 for three hours. To remove the surface bound [^{125}I]-ET-1 and detect internalization, some of these cells were washed with 1 ml, 2.5 pH, 50 mM. glvcine solution for ten minutes at 4°C (x3). Cells were scraped after addition of 2 ml of NaOH and amount of [^{125}I]-ET-1 associated with the cells was detected with scintillation counters. Competition experiments were also done by incubating the cells with different concentration of non-iodinated ET-1 (0.1 nM-1 µM) for ten minutes and followed bv co-incubation with 50 pM of [^{125}I]-ET-1. The change in receptor availability after short-term exposures to ET-1was also addressed by incubating the cells with 50 pM [^{125}I]-ET-1 without or with l00 nM non-iodinated ET-1 (to estimate non specific binding). It was observed that over 80% of the [^{125}I]-ET-1 bound to the cells was not removed after incubation of the cells with l00 nM of non-iodinated ET- 1. A following acid wash was able to remove an additional of less than 40% of the total bound [^{125}I]-ET-1. One-minute exposure to 2 nM of non-iodinated ET-1 inhibited 50% of the bindings after 10 minutes of incubation with NBS, but was brought back to 90% after 1 hr. One minute exposure to 20 nM ET-1 reduced the binding by 60% after 10 minutes incubation with NBS and remained similar after l hr. From the above results, it can be concluded that ET_A receptors have high affinity to ET- 1 both at high and low temperatures. Comparison of the data with literature indicated that the component of [^{125}I]-ET-1 that was not removed by acid wash was internalized through receptor-mediated endocvtosis. The IC_{50} of the competition reaction was determined to be ~1nm.

Poster Abstracts

Confirming the Presence of Human IL-2 Insert in Reconstructed *p*SC65 and Recombined Vaccinia Virus on Preparation for Treating Melanomas[1]. Khorshed Alam, Swarna Deenadayalan, Nebil Aydin, Marc Wallack, Louie Liames[2] and Z.M.G. Sarwar Jahangir, Department of Surgery, St. Vincent Hospital / New York.Medical College, Cronin 667,153 W 11th Street, New York, NY 10011. [1]Funded by the NICRF. [2]*Corresponding author lliames@svcmcny.o-rg).*

Human IL-2 DNA was obtained from ATCC in *Escherichia coli* as an insert in *p*BR322. IL-2 DNA was isolated and incorporated at *Pst*I site in *p*UC19, redigested with H*ind*III, single stranded overhangs were made double stranded, digested again with *Sal*I and the fragment was inserted into pSC65 in between *Sal*I and S*ma*I sites. The construct was subjected to homologous recombination with vaccinia virus using monkey kidney cells (CV-1). In this experiment, we regrew the cells containing pSC65-IL-2 in LB-ampicillin media at 37^{o}C and the *p*SC65-IL-2 DNA was isolated following Promega protocol for Magic Minipreps with modifications. The DNA sample was digested using *Hind*III and *Pst*I alone and in the IL-2 insert was separated by agarose gel electrophoresis. The presence of IL-2 was confirmed by size in length. Separately, a large sample of the pSC65-IL-2 was digested with *Pst*I alone, the DNA fragments were separated by agarose gel electrophoresis. Part of the gel containing IL-2 DNA was severed and the DNA was electroeluted for sequencing. In parallel, we designed the following two upstream and downstream IL-2 primers, 5'- ATGTACAGGATGCAACTCCTGTC -3' and 5'-TCAAGTCAGTGTTGAGATGATGC-3' and was used successfully to amplify both the recombined *p*SC65-IL-2 and vaccinia virus indicating the presence of the IL-2 insert.

EphB2 May Influence Motor Axon Growth Through The Somites. Jonven Attia[1], Catherine Krull[2], Melissa Douglas[3], Rebecca McLennan[2], Sinead O'Connel[2], [1]Kingsborough Community College, [2]the University of Missouri-Columbia and [3]Medgar Evers College.

During neural development motor axons grow precisely to their final target regions to innervate muscles. We are interested in identifying the molecules that guide motor axons and in understanding how they work. Members of the Eph family of receptor tyrosine kinases and their ligands, the ephrins, are thought to play key roles in the guidance. Recently, we discovered that the EphB2 receptor tyrosine kinase (RTK) was expressed by motor axons as they traveled through the somites. To test whether EphB2 RTK is required for motor axon guidance, we blocked EphB2 function using specific peptides that interfere with EphB2 binding to its ephrin ligands in trunk explants. Control explants were fixed in 4% paraformaldehyde and stained with anti-neurofilament antibody to mark all axons, and anti-ephrin-B2 antibody, to label the posterior half of the somites. In control explants, motor axons entered the somites at their correct time and position; analysis is in progress to examine the effects of disrupting EphB2 signaling on motor axon growth. We also begun to examine expression of EphB2 in greater detail during the stages that motor axons project through the somites to target limb muscles. EphB2 is expressed on axons as they stall and sort at the base of the limb. Together, these results suggest that EphB2 RTK is necessary for motor axon growth during neural development.

J. Attia is a participant in the MEC/KCC Bridge to the BA Program funded by NIGMS grant 1R25GM62003. M. Douglas is a participant in the Medgar Evers Biology CSTEP program funded by the NYSDOE grant 0516011058. This project was funded by an NSF-REU (Life Science) award to Dr. John David of the University of Missouri.

The CDK5 Protein is Widely Expressed in Apoptotic Testicular and Nerve Cells of Canaries in Later Stages of Their Song Production Period. Mahmudul Bhiyan[1] Alireza Shirazian[2], Andleeb Hassan[2], Dr. Zahra Zakeri[2] and Dr. Patricia Schneider[1]. [1]Queensborough Community College [2]Queens College.

CDK5, a member of the cyclin dependent kinase family of serinelthreonine protein kinases, is expressed in apoptotic cells displaying fragmented DNA. This study examined CDK5 protein expression in apoptotic cells of nerve and testicular tissues of canaries. Swiss Webster mice were used as a positive control. We have used histochemical techniques for detection of CDK5 protein expression. We have also performed H&E staining to detect nuclear condensation, as well as TUNEL POD for detecting DNA fragmentation, to examine the level and location of apoptotic cell death in testicular and nerve cells of canaries in latter stages of their song production period when the testes are beginning to shrink and the High Vocal Center (HVC) neurons are beginning to degenerate. Our results show that CDK5 protein is widely expressed in locations where DNA fragmentation and nuclear condensation are also observed. This suggests that CDK5 might be playing a role in apoptosis of nerve and testicular cells in adult canaries.

Mahmudul Bhuiyan is a participant in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (grant 1 R25 GM65096-01).

Up-regulation of Mouse Brain MOR-1A Opioid Receptor by Chronic Morphine Treatment. Dusan Bogunovic, Arumugam Premkumar and Gavril Pasternak, Laboratory of Molecular Neuropharmacology, Department of Neurology, Memorial Sloan Kettering Cancer Center, New York, NY.

The object of this study was to determine whether chronic morphine administration, which produces both tolerance and dependence, is associated with changes in mRNA levels of the mu opioid receptor (MOR-1) splice variants. RT- PCR studies showed large variability in the mRNA levels of most of the MOR-1 variants among animals, making their assessment difficult. MOR-1A mRNA levels, however. were relatively consistent, enabling, us to examine changes following either a single (acute) or multiple (chronic) morphine administration. Using semi-quantitative PCR chronic morphine treatment increased MOR-IA mRNA levels by approximately 2-fold, using beta-actin as an internal control. A single morphine injection failed to significantly change MOR-1A mRNA levels. These preliminary studies suggest that the changes in receptor levels may be relevant to the development of tolerance and/ or dependence. Additional studies are needed using more quantitative approaches, such as real-time PCR, to confirm these observations with MOR-1A and examine potential changes with the other splice variants.

Distribution of Copper in Tissues of *Crassostrea virginica*. Mark Boykin[1], Juan Luxama[1], Agita Romeo[2], Margaret A. Carroll[1] and Edward J. Catapane[1]. [1]Medgar Evers College and [2]Kingsborough Community College.

Jamaica Bay (JB), NY contains metals and other pollutants. We showed *Crassostrea virginica* spats transplanted to JB accumulated copper and other metals, copper reduced gill mitochondrial 0_2 utilization *in vitro* and copper pretreatments heightened this effect. Copper pretreatments also reduced gill glutathione S-transferase (GST) activity and prevented its induction in response to p-nonylphenol, a pollutant, suggesting oysters growing in a copper polluted area may experience physiological difficulties if challenged by organic pollutants requiring detoxification by GST. We are studying distribution of copper in *C. virginica* spats tissues transplanted to JB and grown 1 year either 1 foot below the surface or 1 foot above the sediment. Tissues were dissected, freeze dried, digested in nitric acid and copper measured using electrothermal vaporization with deuterium lamp background correction in an AA spectrophotometer fitted with a graphite furnace. Copper was distributed in tissues in pg/g amounts, with adductor muscle and shell having very low amounts. The values correlate well with published studies of whole animal copper levels of oysters grown in other polluted areas. Copper distribution is not homogeneous and paradoxically, despite heavy copper contamination of the sediment, oysters grown 1 foot above the sediment accumulated less copper than those grown at the surface.

The work was supported by grants 1R25GM62003 of NIGMS, 0516011058 of NYSDOE, 657200034 of PSC-CUNY, DOD grant ISP02EUG17, and CUNY Groundworks Program. We thank Frank M. Flower & Sons, Inc., Oyster Bay, NY for supplying oysters.

Measurement of Down-Regulation in the RET Signaling Pathway in Response to GDNF, Kelvin Caban, Montclair State University. Faculty Mentor: Dr. Quinn Vega.

RET is a receptor tyrosine kinase that can be activated by a ligand, glial cell line-derived neurotrophic factor (GDNF) and a co-receptor, GFRa. This association activates cellular processes leading to either cell division or differentiation. RET, GDNF and GFRa are required for kidney development and neural migration. Activating mutations in RET have been shown to cause three forms of cancer (MEN2A, MEN2B and FMTC). Although GDNF-dependent RET activation has been documented, it is less clear how this signaling pathway is stopped. In order to look at down-regulation of the RET signaling pathway, the presence of the receptors at the surface and changes in transcription in response to GNDF were measured. With respect to transcriptional regulation, cells containing endogenous RET and the co-receptor were treated with GDNF for increasing amounts of time. RNA from the cells was collected and the RT- PCR reaction was performed. The products of the RT-PCR reactions were then analyzed on a 1% agarose gel. RET expression was detected in the experiment and future experiments will focus on identifying GDNF-dependent changes in RET expression. With respect to surface localization of the receptors, transfected cells were treated with biotin in the presence or absence of biotin. Surface labeling was detected. Future experiments will focus on the changes in the level of surface receptors in response to GDNF.

Chlorophyll Content in *Z. marina* L. Grown in a Laboratory Microcosm Under Varying Light Conditions. Paul Calder, Anthea M. Stavroulakis, Mary I Ortiz and Arthur Zeitlin, Kingsborough Community College, Brooklyn, NY, USA.

Decreased light availability is believed to be responsible for diminished growth of eelgrass in many areas. Eelgrass (*Zostera marina* L.) is found in the North Atlantic and Pacific Oceans, and provides shelter and food for a number of marine organisms. Water clarity is improved, and sediment is stabilized where there is eelgrass growth. Even though *Z. marina* can be found in a variety of places in New York, it does not grow in Jamaica Bay, which is adjacent to Kingsborough Community College. This research is part of a larger project whose coal is to restore eelgrass to Jamaica Bav. Eelgrass still grows along the southern shore of Long Island. In Long Island at Shinnecock Bay, growth is abundant. Plants collected from Shinnecock Bay were placed in Jamaica Bay laboratory microcosms with varying light conditions. Plants grown under twelve-hour light cycles were compared to others receiving six-hour light, which simulated de- creased light availability. Chlorophyll pigments were extracted from the leaves, which were ground with a mortar and pestle in spectroanalyzed acetone, then in 95% ethanol. Extracts were analyzed spectrophotometrically at 663 nm (A_{663}) for chlorophyll *a* and at 645 nm (A_{645}) for chlorophyll *b*. Differences in chlorophyll content between plants grown under the different light cycles were detected over the experimental period. This could be indicative of plant productivity and survival potential in the Jamaica Bay environment. Differences detected in chlorophyll levels could relate to the plants photosynthetic activity (rate) and productivity. Decreased light may be responsible for diminished eelgrass growth. Additional experimentation and fieldwork comparisons should provide information to confirm this observation. The results from this work may aid in the restoration efforts of *Z. marina* to Jamaica Bay, NY.

Effect of Temperature and Food Source on Growth and Collection of Embryos of Various Taxa of Fruit Flies. Giselle Carmichael[1], Rachael Gilbert[2] and Arnold Fleisher[1], [1]Kingsborough Community College and [2]the American Museum of Natural History.

Fruit flies are divided into many taxa. *Drosophila melanogaster* traditionally serves as a model organism for virtually all aspects of biology including genetics and development. To do genetic and early developmental analysis in fruit flies, the correct protocol has to be determined which will generate large numbers of embryos. Not all taxa would be expected to have the same preferences and things to consider include: type of container, age and number of flies for mating purposes, food source, and incubation temperature. While the optimum protocol to raise *D. melanogaster* is well established, less is known for other taxa. In this study we determined the optimum temperature and food source for growth and collection of large numbers of embryos from five taxa of fruit flies: *Chymomyza procuemis*, *Drosophila psuedoobscura, Drosophila viritis*, *Seaptomyza palmae*, and *Zaprionis tuberculatus*. The number of embryos was recorded using an embryo production scale. The five taxa preferred different incubation temperatures, ranging from 20° to 27° C. None preferred one type of agar to the other and only *Z. tuberculatus* preferred to lay eggs in the agar rather than on fruit peels. Optimizing collection for different taxa of fruit flies is important because it will allow researchers the opportunity to compare gene expression and development of *D. melanogaster* to other taxa of fruit flies.

G. Carmichael is a participant in the MEC/KBCC Bridges to the BA Program which is funded by grant 1R25GM62003 from NIGMS. We thank the American Museum of Natural History, NY for providing the opportunity to conduct this project.

Study of the Combined Effects of Zinc and Cadmium on the Growth of Cyanobacteria *Anacystis nidulans*, Miguel Carreno, Gendy Carela, Jaime Salazar, Montclair State University. Faculty Mentors: Dr. Lee H. Lee and Dr. Bonnie Lustigman.

Anacystis nidulans is a unicellular cyanobacterium, which lives in fresh water habitats and is often used as an indicator of the presence and level of pollution in environments. They have been especially recognized for their ability to depict contamination of heavy metals, such as mercury, aluminum, lead, zinc and cadmium. The effects of these metals on the growth of *A. nidulans* have been studied separately. It has been reported that 25 mg/L of zinc chloride and 50 mg/l of cadmium chloride were able to completely inhibit the growth of the cells. A preliminary study of the combined effects of zinc and cadmium demonstrated that there was a strong synergistic effect that resulted from the combination of both metals. In this study, 1, 5, 10, 15, 25 and 50 mg/L of zinc chloride was respectively combined with 1, 5, 10, 15 and 25, and 50 mg/L of cadmium chloride to study the effect of the combination of these two heavy metals on the growth of the cells. The growth was monitored by direct count and turbidity studies, and morphology was checked periodically. This study indicated that there was a synergistic effect with respect to the heavy metals used. In cultures inoculated with 1, 5, 10 mg/L of zinc chloride and 1, 5, 10 mg/L of cadmium chloride, growth was not inhibited. Combinations of 15 mg/L zinc chloride and 15 mg/L of cadmium chloride slightly affected the growth of the cultures. Combinations of 25 and 50 mg/L completely inhibited the growth of *A. nidulans*. Statistic analysis showed that the control was not significantly different from concentrations of 1, 5, 10 mg/L; combinations of 25, 50 mg/L of zinc and 25, 50 mg/L of cadmium were significantly different from all other treated conditions and the control. A pH study was conducted at the end of the experiment; results showed that if growth was present, as with 1, 5, 10 and 15 mg/L of zinc and cadmium, the pH was above 9. If there was no growth, as observed with 25, and 50 mg/L of zinc and cadmium, the pH was near neutral.

Urban Air Monitoring for Counter-Terrorism Surveillance: Investigating Nitrite as an Indicator for the Nitro-Explosive 2,4 DNT. Isfahan Chambers and Wilbert Hope, Medgar Evers College. Faculty Mentor: Dr. Wilbert Hope.

Indoor nitrous acid measurements have been reported at ranges between 5% and 15% of $N0_2$ concentrations. Nitrous acid ($HN0_2$) may be formed in the gas phase and by heterogeneous hydrolysis of nitrogen dioxide (NO_2). Nitro-explosives (including 2,4 DNT) are sources of nitrogen dioxide and may contribute to nitrite levels in aqueous medium. We have adapted the 2,4-dinitrophenylhdrazine (2,4DNPH) - high performance liquid chromatograph (HPLC) method used to determine nitrite in natural water for the determination of nitrite in indoor air. Can this method be used as a counter- terrorism surveillance mechanism monitoring the air for nitro-explosives? Indoor air was drawn over small amounts of 2,4 DNT placed in heated glass chambers (to represent 11 kg 2,4DNT in a $27m^3$ room), and then bubbled through impinger fluid of 1 μM sodium bicarbonate solution. The impinger fluid was later analyzed for nitrite by the 2,4DNPH-HPLC method. When 2,4 DNT was heated a higher concentration of $N0_2^-$ was obtained in the impinger fluid. Heating simulates degradation of 2,4 DNT over time. Air drawn over 2,4 DNT heated at 80EC contained nitrite at concentrations 7 times that of the base value. These results show that it is possible for $N0_2^-$ concentration in indoor air to increase if a large quantity of 2,4 DNT is stored in a room over an extended period of time.

Innovative Assessment of Sources of Fecal *E. coli* in the Manasquan River Estuary. Suzanne DeLorenzo, Monmouth University. Faculty Mentor: Assistant Dean, John A. Tiedemann.

The Manasquan River Estuary contains approximately 1,500 acres of shellfish beds that are comprised primarily of hard clams (*Mercenaria mercenaria*), which have an estimated dockside value of $1.2 million. However, degraded water quality conditions necessitated closure of the estuary to shellfishing in 1961. Currently, water quality conditions remain poor to marginally poor throughout the estuary. As a result, the upper estuary remains closed to shellfish harvesting and special harvest restrictions are in place in the mid- to lower estuary. Suspected pollutant sources in the region include agricultural runoff from pastureland and animal holding areas, leachate from landfills and hazardous waste sites, runoff from roads and other developed areas, siltation from stream bank modification and erosion, marinas and boating activity, as well as high densities of resident wildlife, waterfowl and other bird species. Utilizing new methodologies known as Bacterial Source Tracking (BST), we are completing a study designed to determine specific sources of fecal pollution in the Manasquan River Estuary. BST couples ambient monitoring with multiple antibiotic resistance (MAR) testing and ribotype DNA fingerprinting, and presents tremendous potential for the definitive identification of sources of fecal *E. coli* contamination. Initial efforts focused on development of a searchable database of MAR patterns and DNA fingerprints for fecal *E. coli* isolated from humans, pets, farm animals and wild animals. Next, 42 sampling stations were established in the estuary. Surface water, bottom water, and sediment samples have been collected at these stations monthly since May 2002. Currently, we are analyzing MAR patterns and DNA fingerprints for *E. coli* isolated from the water and sediment samples to discriminate sources of fecal *E. coli* contamination by comparison to the MAR pattern and DNA fingerprint database.

Blood Bands of Frogs. Donald Dorfman and Kenneth E. Briley, Jr., Monmouth University.

Plasma and hemoglobin (Hb) bands from bullfrogs, *Rana catesbeiana*, and green frogs, *R. clamitans*, were obtained by agarose gel electrophoresis (Titan Gel High Resolution Protein System, Helena Laboratories, Texas). Blood was collected from tadpoles at different stages of development (i.e. none, two, and four legs), from both species by severing the tail of tadpoles, and from the iliacs of adults. Plasma and red blood cells were separated by centrifugation. After separation, red blood cells were lysed by maceration and freezing. Samples were electrophoresed for 24 minutes, then stained with Coomassie Blue. Density traces were developed using Bio-Rad Quantity One, Version 4.3 (California). Hb patterns indicate bullfrog tadpoles have one cathodic Hb at any tailed stage, and at least three anodic bands. Adults have only anodic Hb band. Green frog tadpoles have one cathodic Hb at any tailed stage, and at least two anodic bands as adults. Bullfrog tadpoles have one cathodic and seven anodic plasma bands, whereas adults have one cathodic and five anodic plasma bands. Green frog tadpoles have one cathodic and five anodic plasma bands, while adults have one cathodic and six anodic bands.

Keys to Cyprinodontidae of New Jersey. Donald Dorfman and John Powell, Monmouth University.

There are three genera and five species of Cyprinodontidae in New Jersey, including *Fundulus diaphanlis*, *F. heteroclitus*, *F. majalis*, *Cyprinodon variegatus*, and *Lucania parva*. *Fundulus* spp., as juveniles, may be difficult to distinguish, but as adults, they and the two other species are easily differentiated. In this study, the electrophoretic patterns of plasma and hemoglobin were determined for the five species. Subsequently, keys were made to identify differences in patterns for each species for the two parameters. The methods for electrophoresis and the preparation of the dichotomus keys are presented on separate laminated cards. Integration of the protein peaks, the number of peaks, their similarity or lack of similarity, and their migratory positions were used to develop the keys. Fishes examined had six to eight plasma peaks and two to four hemoglobin peaks. Generally, most fishes have multiple hemoglobins. Human serum and hemoglobin were used as controls to illustrate their patterns relative to those of the fishes.

Sunfish Length Comparisons. Donald Dorfman and Tom Smith, Monmouth University.

Different measurements are employed by researchers to determine fish lengths, including standard fork, origin of tail, total length, and total length tail compressed. A study of the lengths of pumpkinseed (*Lepomis gibbosus*) and bluefish (*L. macrochirus*), collected from the N.J. State fish hatchery, and from local fresh waters were made using the measuring methods mentioned to develop a program that would be of use to fisheries workers for these species. The equations for the spreadsheets were formulated using the Maple TM statistics package employing a least squares fitting of a linear regression line to the data. Regression slopes were generated for each species. The program allows the user to enter a single measurement, then relate this number to other measurement systems. This program is useful for comparison not only of measurements from previous studies of these species, but also of these species obtained from polluted waters where, for example, tail fin erosion may occur, precluding certain types of measurements. Copies of this program for both species, and for white perch, *Morone americans*, developed from a prior study (Dorfman and Smith, 2003), are available from the senior author.

Optical Diffusion Properties of Yeast. Cassandra Dumornay, Simone Edwards, Clarence Theodore, Dr. Tak Chung, Dr. Peter Wong, and Dr. Patricia Schneider. Depts. of Physics, Chemistry and Biology, Queensborough Community College, Bayside, NY.

The biochemical properties of yeast were investigated by analysis of photon diffusion. Yeast cells were grown under standard conditions in a shaker water bath. Cells were separated from the liquid media by centrifugation, washed with distilled water and fabricated into slabs. A He-Ne laser was focused on the yeast slab and the transmission profile was captured with a digital camera. Random walk modeling was used to obtain the scattering mean free path and the absorption coefficient of the yeast samples. Preliminary data indicates that the dextrose concentration of the broth in which the yeast was grown correlates with the scattering property. This suggests that optical diffusion may be a useful technique for detecting changes in cell density and/or size.

Cassandra Dumornay, Simone Edwards and Clarence Theodore are participants in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (grant 1 R25 GM65096-01).

A Comparative Study of Pole Cell Differentiation Among Members of the Family Drosophilidae. Candice Fraser[1], [1]St. Francis College and [2]American Museum of Natural History. Mentors: Kathleen Nolan[1], Arnold Fleischer[2] and Al Phillips[2].

We are interested in the evolution of early development in insects. *Drosophila melanogaster* is a well known experimental model organism that has been used to study many of the fundamental principles of genetics and development. In a comparative framework, we are analyzing early developmental events in species of flies that are related to *D. melanogaster*. These taxa are *Drosophila pseudoobscura*, *Zaprionus tuberculatus* and *Chymomyza procnemis*. We are specifically interested in the evolution of the events that determine the generation of the germ line. It has been said that mutation is the raw material for evolution, but only mutations that occur in the germ line get passed on to the next generation. Thus, it is more correct to say; only mutations in the germ line are the raw material for evolution. In this study we analyze the dynamics of cell division in the formation of the germ line in four Drosophilid species.

Phylogenetic Analysis of *Micrurus fulvius* (Serpentes: Elapidae) Haplotypes Using ND4 mtDNA Sequences. Mike Friedman[1] and Inshan Ali[2], [1]American Museum of Natural History and [2]Saint Francis College. Faculty Mentor: Dr. Kathleen Nolan[1].

The purpose of this study was to investigate the phylogeography of the eastern coral snake (*Micrurus fulvius*) in the context of a broader study of the phylogenetics and co-evolution of the scarlet king snake (*Lamptopeltis triangulum elapsoides*) and *Micrurus fulvius*. We sequenced approximately 840 base pairs of the NADH Dehydrogenase Subunit 4 gene for 20 specimens of *Micrurus fulvius* from the states of Florida and South Carolina and found 18 apparently variable sites. Gene tree construction using parsimony produced 19 most parsimonious trees. The consensus tree showed no resolution. Our conclusion was that the ND4 gene has insufficient variation to determine population structure or make phylogenetic inferences for Florida *Micrurus fulvius*.

Placement Effects Growth of the American Oyster *Crassostrea virginica* in Jamaica Bay, New York. Liliya Gumenik[1], Wendy Barreiro[2], Johanna Espinoza[1], Gary Sarinsky[1], Edward J. Catapane[2], Margaret Carroll[2] and Ebere Nduka[2]. [1]Kingsborough Community College and [2]Medgar Evers College.

Jamaica Say was abundant with oysters until the early 1900's when they began to disappear. Our earlier work found that oyster spats placed in Jamaica Say at two sites (Kingsborough Marina and the Coast Guard Station) grew well when suspended one foot below the water surface. Now we examine if growth and survival are influenced by placement near the sediment as compared to the surface. Spats were suspended one foot below the surface and one foot above the sediment at both sites. Water temperature, pH, turbidity, salinity, conductivity, chlorophyll-a, and dissolved oxygen were taken to monitor and compare water quality at both depths at each site. Spat growth was determined by measuring shell lengths on the anterio-posterial axis (height) as well as on the transverse axis (width). Spats positioned just off the sediment grew faster than those at the surface. After one year bottom dwelling spats were 23% and 12% larger at the Kingsborough and Coast Guard Station sites, respectively, as compared to the top spats. Animal width showed similar increases. Survival continues to be good at all sites. The study continues to show Jamaica Bay water quality is suitable for oyster growth under the controlled conditions of our experiments and that there is a significant increase in growth rate of oysters positioned at the bottom.

This work was supported by grants 1R25GM62003 of the Bridges to the BA Program of NIGMS, 0516011058 of NYSDOE, 657200034 of PSC-CUNY and the Groundworks Program of CUNY. We thank Frank M. Flower and Sons, Inc., Oyster Say, NY for supplying oysters.

Study of the Effect of Ferric Chloride on the Growth of Cyanobacteria *Anacystis nidulans* Shi- Fang Hsu, Patricia Platner, Tin-Chun Chu, Montclair State University. Faculty Mentors: Dr. Lee H. Lee and Dr. Bonnie Lustigman

Anacystis nidulans is a unicellular cyanobacteria. It has been proposed as a good indicator or environmental contamination in fresh water habitats, especially for heavy metals. Previously, the effect on the growth of *A. nidulans* with many heavy metals has been studied such as cadmium, mercury, lead etc. In this study, various concentrations of ferric chloride (0, 10, 25, 50, 100, 150, 200 mg/L) were added separately in the *A. nidulans* culture in the presence or absence of EDTA. The growth was monitored by direct count by using hemocytometer and turbidity studies by using spectrophotometer. The morphology and pH of the cultures were checked periodically. The results suggested that this organism is quite tolerant to the presence of ferric chloride. At concentrations of 10, 25 and 50 mg/L of ferric chloride, the growth of the cells was not affected. At lower concentration; 10 and 25 mg/L, the growth was enhanced when compared with the control. The growth was severely inhibited at 150 mg/L and completely inhibited at 200 mg/L. The cyanocidal concentration is 150 mg/L. The pH levels increased with the amount of $FeCl_3$. A pH study was conducted at the end of the experiment, and it was found that if there was growth, as in the case of the cultures inoculated with 10, 25, 50 mg/l of ferric chloride, the pH was above 9. If there was no growth, as seen in cultures with 150 and 200 mg/L of ferric chloride, the pH was about 3 to 4. This suggests that the inhibition of the growth of those cyanobacteria.at high concentrations may be due to the combination of heavy metals and acidic conditions.

Analysis of Floatable Debris and Coliform Bacteria in Protected and Recreational Beach Environments. Turkesha L. Huggins, K. M. Lett, S.V. Morris, C.G. Bermudez. Faculty Mentor: M.E. Dawson, Ph.D., Peter A. Lanzetta, Ph.D., Arthur N. Zeitlin, Ed.D., Kingsborough Community College and Medgar Evers College.

Floatable debris washing up on public and protected beachfronts is an environmental concern in New York City. Previously we examined the type and amount of floatable and non-floatable debris on several recreational versus limited access sandy beaches. Environmental factors, such as heavy rainfall and subsequent sewage outflow were investigated as contributing factors to debris accumulation. Approximately one-hour post high tide, surveys were taken in a clearly defined area. Not surprisingly, it was found that regular public beach maintenance, such as raking and trash removal, drastically reduced the amount of floatable debris recorded. Interestingly, the limited access areas still accumulated significant amounts of debris, indicating that the origin of this debris must be an outside source. This year, studies were extended to include water sampling for *E. coli* using a LaMotte coliform test kit. Water samples from both recreational, and non-recreational beaches continuously tested positive for *E. coli.*, indicating that environmental concerns are not limited to floatable debris, but also include bacterial contamination. We are interested to determine if the amount of floatable debris found in each environment is contributory to the bacterial contamination, and if high levels of coliforms lead to threatened and/or actual beach closings.

Nuclear-Organellar Communication: Altered Nuclear Gene Expression Profiles in a Yeast Mitochondrial DNA Mutant. Kiranpreet Khurana, Tara Settineri, and Furhad Miah. Dept. of Biology & Molecular Biology, Montclair State University, Upper Montclair, NJ 07043. Faculty Mentors: Drs. John J. Gaynor and Quinn C. Vega.

Mitochondrial biogenesis requires the cooperation of both nuclear and organellar genomes. Many important mitochondrial proteins are heterologous, requiring subunits encoded for by both the nucleus and mitochondrial DNA (mtDNA). Examples include the F_1 ATPase, rproteins, and protein components of the respiratory chain. In an effort to investigate this cooperation, we have used yeast microarray chips to interrogate the changes in the transcriptome of *Saccharomyces cerevisiae* in the presence (wild type DL- 1) and absence of mtDNA (DL- 1 rho^0). The wild type and rho^0 mutant had identical nuclear backgrounds, although the rho^0 mutant had a petite phenotype due to the absence of functional mitochondria. Genes involved in mitochondrial and cell wall biogenesis, cellular stress responses, and glycolysis were induced in the petite mutants. ATP-binding cassette transport proteins were also induced and this has been linked to multidrug resistance. In contrast, genes involved in the assembly of the F_0-F_1 ATP synthase as well as genes involved in aerobic respiration were repressed in the petite mutant. Our findings support previous reports of a retrograde response in yeast, involving the adaptation of nuclear gene expression levels at times of mitochondrial dysfunction and have implications for the role of the mitochondrion in apoptosis, cellular aging and the response to stress.

Distribution of Biogenic Amines in Tissues of *Crassostrea virginica*. Candice King[1], Cynthia Angeles[1], Ebere Nduka[2] and Edward J. Catapane[2]. [1]Kingsborough Community College and [2]Medgar Evers College.

Biogenic amine are neurotransmitters and hormones in animals. They have not been well studied in oysters, particularly *Crassostrea virginica*. We studied their presence in *C. virginica* using an isocratic, ion-pairing HPLC analysis with fluorescence detection to resolved norepinephrine, epinephrine, dopamine, 3,4-dihydroxyphenylacetic acid, 3,4-dihydroxyphenylalanine, tryptophan, tyrosine, serotonin, 5-hydroxytryptophan, N-acetyl serotonin, tyramine and octopamine in a twenty minute run. It lacked sufficient sensitivity to identify amines in small tissue samples. We explored pre- and post-column derivitization methods with benzylamine and terbidium chloride to increase detection limits and purchased a more modern spectrofluorometer. The newer instrument was more sensitive allowing detection of lower levels of amines using native fluorescence. Tissues were dissected, weighed, homogenized, centrifuged, filtered and injected into the HPLC system fitted with a BDS Hypersil C18 column and a Hitachi F-1 050 Spectrofluorometer with a 12 μL flow cell. The mobile phase was 50 mM acetate buffer (pH 4.7) with 1 mM EDTA and 1.1 mM SOS, and methanol (85%/15%, v/v). We identified and quantified norepinephrine, epinephrine, dopamine and serotonin in mantle, gill, heart, palps, posterior adductor muscle and visceral ganglia in low amounts (100s of ng/g) which correlates well with published reports of related bivalves. We believe the study will be an important step in elucidating neurobiological and neuroendocrine functions in *C. virginica* and of these biogenic amines in general.

This work was supported by grants 1R25GM62003 of NIGMS and the Groundworks Program of CUNY. We thank Frank M. Flower and Sons, Inc., Oyster Bay, NY for supplying oysters.

The Effect of Dibutylphthalate (DBP) on Rodlet Cells in Tissues of the Platyfish, *Xiphophorus maculatus* (Teleostei: Poeciiiidae). Anatoliy Konovalov, College of Staten Island (CUNY). Faculty Mentor: Dr. Charles R. Kramer.

An enigmatic cell, the rodlet cell, exists in tissues of both freshwater and saltwater teleosts. Although this cell was identified over a century ago, its origin and function still remain unresolved. One proposed function for the rodlet cell is that of defense whereby this cell forms part of the fish immune response. In fish exposed to environmental contaminants and or infectious agents, the rodlet cells increase in number as compared with unexposed individuals. It was the purpose of this study to investigate the rodlet cell response in the platyfish, *Xiphophorus maculatus*, exposed to the environmental contaminant, di-n-butylphthalate (DBP), for up to eight days. Several tissues were examined including gills, gallbladder, liver, spleen, gonads, heart, kidneys and intestine. The greatest effect was seen in the gill epithelium where an average of 488 cells were present by the end of eight days exposure. The unexposed control fish had an average of 10 cells after five days. Furthermore, the number of rodlet cells in the experimental fish increased with exposure time. After a one day exposure to DBP, 113 cells were counted; at five days, 918 were observed. These results lend support to the endogenous tenet of rodlet cell origin. Therefore, our findings suggest that the rodlet cell is involved in an as yet unspecified immune response in the platyfish, *X maculatus*, triggered by exposure to the xenobiotic, di-n-butylphthalate.

Preferences for Same-sex Shoaling in Zebra Fish (*Danio rerio*). Janefte Lebron, Wagner College. Faculty Mentor: Brian G. Palestis.

We quantified zebra fish shoaling by comparing time spent by test fish near stimulus fish to time spent near an empty compartment at the opposite end of a narrow tank. Only visual cues were available. Test fish spent significantly more time near stimulus fish than near the empty compartment, in both same-sex and opposite-sex pairings. In both males ($p<0.025$) and females ($p<0.05$), shoaling was significantly more frequent in same-sex than in opposite-sex pairings. We have confirmed this preference for members of the same sex by giving fish a choice between groups of males and females. However, our experiments took place in the afternoon, while zebra fish spawn in early morning. We also plan to test for sex segregation within mixed sex shoals.

Preliminary Studies on the Growth Inhibitory Effects of Neem Seed Extract Azadirachtin on *Drosophila melanogaster*. Janette Lebron, and Vincenzo DiMaggi, Wagner College. Faculty Mentors: Dr. Ammini Moorthy, Prof. Linda Raths and Dr. Anthony Pfister.

The key insecticidal ingredient that is found in the neem tree *Azadirachta indica* is azadirachtin. Azadirachtin is an organic molecule that is structurally similar to the insect hormone ecdysone. Ecdysone controls the process of metamorphosis as the insect passes from larvae to pupae to adult stages. Technical grade azadirachtin extracted from neem seed kernel was used in this experiment. The purpose of this study was to determine the growth inhibitory effects of various concentration of neem seed extract on the metamorphosis of Drosophila. Female Drosophila flies were kept in apple-juice agar culture with various concentrations (10^{-3}, 10^{-5}, 10^{-7} M) of azadirachtin for a 48-hour period. The eggs laid by the flies were monitored for their rate of metamorphosis for a period of 18 days at a temperature of 20^{o}C. Preliminary results indicate that azadirachtin at 10^{-3}M prevents most of the eggs from hatching out into first instar larvae and few first instar larvae that hatched out all died within a few days. The other two concentrations resulted in significant slow down and disruption to normal rate of metamorphosis. Further studies using a larger population of flies and 10^{-4} M concentration of azadirachtin (since 10^{-3} M turned out to be toxic to the point of being lethal and yielded no analyzable results) is necessary to obtain statistically significant results.

Bacterial Diversity in the Lower Hudson River Along a Salinity Gradient. Jeffrey Lee[1], Jean Rothe[2], Rob DeSalle Ph.D.[3], Carolle Bolnet Ph.D.[1]. [1]Medgar Evers College, [2]Columbia University and [3]American Museum of Natural History. Faculty Mentor: Dr. Carolle Bolnet.

The Hudson River is a fragile ecosystem with many living species that contribute to its health and well- being. From the Atlantic sturgeon to bacteria, all living things interact and play an important role in the well being of the ecosystem. We studied bacterial diversity along a salinity gradient in the Hudson River in order to examine the diversity factors involved in the river's ecosystem. In determining which species of bacteria live in the river, we collected sub-surface and deep-water samples along a salinity gradient. Sub-surface and deep-water samples were collected in three locations along the river representing three different salinity levels. After filtering the water samples, DNA was extracted from the bacteria directly from the filters using a protocol specifically for our purpose. Polymerase Chain Reaction (PCR) was performed using the 16s rDNA forward and reverse primers. Using M13 forward primers and Big Dye, cycle sequencing was done using an automated capillary fluorescent sequencer (ABI 3730). The sequences were cleaned up and blasted on GenBank. The results will be used in identifying precisely the bacteria population in the Hudson River along a salinity gradient.

This work was supported by a grant DEB/0203466 of the UMEB program of the NSF.

Investigating Species Boundaries in *Drosophila aldrichi*. Melissa Leonidas[1], Carolle Bolnet, Ph.D.[1], Deodoro Oliveira, Ph.D.[2] , Rob DeSalle, Ph.D.[2] [1]Medgar Evers College and [2]The American Museum of Natural History. Faculty Mentor: Dr. Carolle Bolnet.

The evolution and divergence of the *Drosophilidae* (fruit flies) has been a favorite subject of evolutionary biologists for a century. The fruit fly *Drosophila aldrichi* which is a member of the *Drosophila repleta* species group is the subject of this study. *Drosophila aldrichi* is difficult to distinguish from closely related species in the *repleta* species group and may have many cryptic species. Our goal was to test whether or not *D. aldrichi* was a Areal" species by conducting a phylogenetic analysis of DNA sequence information, and also comparing it to its sister species *Drosophila wheeleri*. We gathered 22 *D. aldrichi* and 4 *D. wheeleri* from separate regions including Mexico and the United States. Our phylogenetic analysis does not support the notion that *D. aldrichi* consists of more than one species. Our results reveal that *D. aldrichi* and *D. wheeleri* cannot be distinguished by molecular data. Our geographic distribution analysis shows that *D. aldrichi* and *D. wheeleri* are geographically isolated from each other. In conclusion, we have found that *D. aldrichi* is one species by itself and not a cryptic species. Our molecular data suggest that *D. aldrichi* and *D. wheeleri* are not separate species. However the geographic distribution does support the theory that *D. aldrichi* and *D. wheeleri* are two different species strictly based on their differences in location.

This work was supported by a grant DEB/0203466 of the UMEB Program of the NSF.

Quantitative Analysis Employing *lacZ* Reporter Genes in Early *Drosophila* Embryopenesis. Kawasi Lett[1], J. Peter Gergen[2] and Deborah Swantek[2], [1]Kingsborough Community College and [2]Stony Brook University.

Drosophila melanogaster serves as a good model for genetic studies because of its short life span and small genome size. Genetic manipulation enables us to use this model to understand the dynamics of gene expression. Our research focuses on using the modular GAL4 system in order to regulate gene expression in the early blastoderm stage of *Drosophila* embryogenesis. A promoter mediates the expression of the yeast transcription activator GAL4 (involved in the galactose pathway), and then directs transcription of the GAL4-responsive UAS target gene (upstream activator sequence). The distinctive characteristic of this system is that the GAL4 gene and the UAS target gene are initially separated into two distinct transgenic lines. By using flies that have different levels of maternal yeast transcription factor, GAL4, we can quantitatively manipulate the expression levels of our gene of interest in the UAS transgenic line. This model of gene expression enables us to insert virtually any gene into the UAS transgene construct, including genes that are not indigenous to the *D. melanogaster* genome. We will be utilizing the bacterial gene *lacZ*, which encodes for the enzyme b-galactosidase. B-galactosidase will be ectopically expressed in the embryo, and the levels of gene expression can be quantified by the use of a chemiluminescent assay. Analysis of the results will indicate whether there is a correlation between the strength of the observed maternal GAL4 drivers and the b-galactosidase activity.

Kawasi Lett is a participant in the MEC/KBCC Bridges program funded by grant 1R25GM62003 of NIGMS. This project was sponsored by the SUNY AGEP funded by NSF.

Carmen L. Loperena, Mary T. Ortiz, Ph.D, Anthea M. Stavroutakis, Ph.D, Arthur Zeitlin, Ph.D., Kingsborough Community College, Brooklvn, NY, USA.

The growth and photosynthetic response of sea-grasses to underwater light availability has been correlated to reduction or absence of plants in certain regions. An attempt was made to study the effects of light reduction on the propagation of the submerged aquatic plant, *Zostera marina* L., more commonly known as Eelgrass. A laboratory microcosm was created using sediment and water collected from the Jamaica Bay, NY area. The simulated beds of eelgrass were subjected to light conditions as follows: Sample A received 12 hours of light per day (8 am-8 pm), and Sample B received 6 hours of light per day (11 am-5 pm).The light period for Sample B plants was centered in the cycle for Sample A plants. This mimicked dawn and dusk conditions in Sample B, since there was ambient light from the adjacent Sample A microcosm. Blade length measurements were made using a hole- punch technique using a 20-gauge needle. Length measurements were taken at 0, 2, and 4 weeks after transplantation. The average growth rates were 4.5 cm /week for Sample A, and 3.9 cm/week for Sample B for the first 2-week period. The average growth rates were 3.7 cm /week for Sample A, and 4.1 cm/ week for Sample B for the second 2-week period. The overall growth rates for the 4 week period were 3.6 cm/ week for Sample A, and 3.6 cm/week for Sample B. These results seem to show that a reduction in available light for photosynthesis has a negative impact on eelgrass, which is true for most plants, both aquatic and terrestrial. In Jamaica Bay, the consequences of human interference in natural processes, such as nutrient input, and other pollution, can be light reduction by the production of algae and other light-blocking matter in coastal waters. This causes a great impact on ecosystems that rely on eelgrass. This vital aquatic vegetation is essential to several key biotic and abiotic elements: It helps slow erosion of sediment, provides food and shelter for many species of marine life, and helps to maintain a water-cleaning- cycle beneficial, not only to marine- life, but to humans that swim and fish in these waters.

Fort Morgan Virus Activates Apoptosis in Vero Cells. Aimee Luers and Parul Patel, Montclair State University. Faculty Mentors: Dr. Sandra Adams and Dr. Reginald Halaby.

Fort Morgan Virus (FMV), a member of the *Alphavirus* genus and family *Togaviridae,* was isolated from nestling cliff sparrows, house sparrows, and cimicid bugs in eastern Colorado. FMV is a separate virus in the Western Equine Encephalitis Virus complex. Alphaviruses cause a wide range of diseases in animals and humans worldwide. FMV has been shown in the laboratory to cause acute encephalitis in infected mice. The primary target cells for FMV infection are neurons. There is increased vulnerability of immature neurons to infection and ultimately to apoptosis (programmed cell death). We investigated the induction of apoptosis in Vero cells (monkey kidney cells), following FMV infection. Early signs of cytopathic effect (CPE) can be observed in Vero cells at 24 hr postinfection. DAPI staining technique was used to detect chromatin condensation in apoptotic cells. This assay indicated that FMV-induced apoptosis can be studied in Vero cells and that this virus can activate an apoptotic pathway in infected mammalian cells.

On the Phylogenetic Position of Pseudochactas (Scorpiones: Pseudochactidae). Samara Maaliki, Saint Francis College. Faculty Mentors: Dr. Katheleen Nolan, Saint Francis College and Dr. Lorenzo Prendini, American Museum of Naturar History.

Pseudochactas ovchinnikovi Gromov, 1998, a new genus and species of scorpion, was recently described from a mountainous region of Uzbekistan and Tajikistan in central Asia. This scorpion displays a unique trichobothrial pattern and a mixture of buthid and non-buthid morphological characters, and was therefore placed in a monotypic family, Pseudochactidae, Gromov, 1998. Experts have debated about the phylogenetic position of *Pseudochactas* since its description and three competing hypotheses have been proposed. However, nobody had tested this cladistically until the present study, in which the phylogenetic position of the enigmatic genus was assessed using DNA sequence data from six loci (12S rDNA, 16S rDNA, 28S rDNA, 18S rDNA, Cytochrome Oxidase 1 and Histone 3) obtained and analyzed from exemplar species of all scorpion families to which it might be related.

Comparison of Stream Velocity with Sediment Particle Size. Erin Moody, Fairleigh Dickinson University. Faculty Mentor: Dr. Paul Benzing.

The goals of this research project were to characterize sediments and determine whether or not there is a correlation between stream velocity and sediment particle size in Loantaka Brook. The Loantaka Brook watershed is a major feeder to the Great Swamp. Kitchell Pond is found along the brook in Morris Township. Research was conducted at three sites along Loantaka Brook. At each site we stretched a tape measure between stream banks, taking velocity and depth readings as well as sediment samples at five points along the transect. We then processed the sediment samples to determine particle sizes. Using this information we were able to create stream cross-sections. Plotting stream velocity against particle size, we found that one of the three sites showed a high correlation between water velocity and sediment size, as the r2 value was 0.91. We propose two hypotheses for the differences between the sites: 1) The locations of the sites in relation to Kitchell Pond may affect stream flooding patterns. Decreased flood velocity in the site directly below Kitchell Pond may account for the decrease in sand at that point. Kitchell Pond may act as a settling basin, preferentially settling out larger particles.

Distribution of the Bacterial Genera *Pseudomonas* and *Bacillus* Within Ectomycorrhizae of Gray Birch (*Betula populifolia* Marsh.) in a Northern New Jersey Forest. Hai Nguyen, Michelle Pellicer and Eduardo A. Zappi, Caldwell College. Faculty Mentor: Dr. Eduardo A. Zappi.

Ectomycorrhizae of Gray Birch (*Betula populifolia* Marsh.) inhabiting distinct, adjoining microclimatic sites were evaluated for growth and bacterial associations during late summer. These fungus covered rootlets were less abundant in the superficial soil of the dry, warm upland study site than in that of the humid and cooler lowland site. Gram negative bacterial species of the genus *Pseudomonas* and gram positive, spore forming bacteria of the genus *Bacillus* were found associated with the mycelial mantle of ectomycorrhizae at both locations although in different proportions. The colony forming units (CFU's) of *Pseudomonas* were three times more numerous per unit weight of mycorrhizae at the lowland site than at the upland site. Bacillaceae were equally abundant at both sites, although at significantly higher numbers than *Pseudomonas*. Ectomycorrhizal mantles were further analyzed for bacterial associations on the outer versus the inner surfaces. A relative five- fold number of *Pseudomonas* was found to inhabit the inner compared to the outer mantle surfaces at the upland site, with little difference at the lowland site. No site specific differences in mantle surface preference were noted for the genus *Bacillus*. It is proposed that the unique *Pseudomonas* distribution may be attributed to the moisture retaining microenvironment of the inner mantle, which particularly benefits members of this genus when the ectomycorrhizae are growing in a drought prone soil.

The Effect of Luteolin, Apigenin, Naringenin and Hesperetin on the Proliferation and Cellular Localization of Protein Kinase C (PKC) Isoforms in Human Monoblastic Leukemia (U-937) Cells. Bridget Otoja[1], Mebeli Ali[2] and Cecil Joseph[2], [1]Medgar Evers College and [2]Long Island University Faculty mentor: Dr. Cecil Joseph, Long Island University.

Luteolin, apigenin, naringenin and hesperetin are bioflavonoids that are found in everyday fruits and vegetables, and beverages such as tea and red wine. Researchers have found that these flavonoids play crucial roles in protection against cardiovascular diseases, cancer and diabetes. We have investigated the effect of luteolin, apigenin, naringenin and hesperetin on cellular proliferation and cellular localization of protein kinase C (PKC) isoforins in U-937 cells by looking at the levels of protein in cytosolic and membrane extracts in control and phorbol ester-treated cells, and also by examining the growth and viability of cells. We have found that these flavonoids inhibit the growth of U-937 cells and show partial inhibition of the translocation of PMA-stimulated PKC beta 2 from the membrane to the cytosol.

Bridget Otoja is a participant in the Medgar Evers Biology CSTEP program funded by the NYSDOE grant 0516011058. We thank Dr. Joseph of Long Island University for providing this opportunity for her.

Vascular Plants of the Fairview Lake Watershed, Sussex County, New Jersey, Laura Pannaman, New Jersey City University and Kerry Barringer, Brooklyn Botanic Garden.

Fairview Lake is located in southwestern Sussex County, New Jersey, in a hollow below the east face of the Kiftatinny Ridge. The ridge is dry, but talus and thin, rocky soils at the base of the slope are moist and support a diverse flora with diverse plant communities, despite its small size. The 93-acre Fairview Lake Watershed was surveyed for vascular plants in 2000 and 2001 as part of a biodiversity survey of the area. More than one thousand collections were made. Three hundred twenty four species of vascular plants in 86 families were identified. Four species were found that are rare in New Jersey: *Callitriche palustris, Carex brunnescens, Saturaja vulgaris* and *Polygala paucifolia*. Seventy-nine species are not native.

Gender Differences in Cellular Response to Induced Cell Death. Carlos Penaloza[1], Marcella Smith-Powell[1], and Dr. Zahra Zakeri[2]. [1]Department of Biology, Queensborough Community College, Bayside, New York and [2]Department of Biology, Queens College, Flushing, New York.

Many autoimmune diseases exhibit variations in their affects on men and women. Genetic differences in somatic cells from deviations in chromosomal composition could in fact play a key role in how diseases are expressed. It is alleged that these gender differences are solely due to hormones, but this hypothesis does not account for the increased incidence rather than severity of some diseases in women. To investigate innate cellular characteristics, male and female cells from 10.5 embryonic and 17.5 embryonic liver, kidney and lung tissues were cultured *in vitro* then separately treated with the influenza A virus, ethanol and camptothecin. Cell death was quantified 24-48 hours post-treatment. Our results indicate that there are differences between the sexes and how they respond to stimuli at different developmental stages.

Carlos Penaloza and Marcella Smith-Powell are participants in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (grant 1 R25 GM65096-01).

The Ecology of Veganism: Saving The Earth's Water. Rosanna Pittelia and Donald Dorfman, Monmouth University.

The quality of the earth's water continues to suffer from the abuses of Man. The myriad abuses of this vital resource include the runoff into rivers and streams of chemicals, pesticides, and fuel residues, industrial dumping, and the animal wastes of dedicated ranches supporting the meat industry. Overall land use in America has been planned and managed with an emphasis on profitability and little concern for the long-term view of the ecology involved. This presentation focuses on the best possible strategy for reorganizing land use in the US while maintaining or exceeding the volume of food currently produced, utilizing the least possible amount of water, and producing the least resultant pollution. Recently, vegetarianism has become quite popular in the US. More restaurants and school systems have begun to feature meat-free meals that are both delicious and nutritious. An acre of land dedicated to organic farming yields more food, requires less water, and produces far less waste than the same acre of land might that is dedicated to ranching of any animal destined for the slaughter. This poster project illustrates the ways in which the ecology of the earth can benefit from even a slight shift from animal based to plant-based food systems.

Characterization of Clones from Cyanophage AS-1 DNA Library, Patricia Platner, Shi-Fang Hsu, Tin-Chun Chu, Montclair State University. Faculty Mentors: Dr. John J. Gaynor, Dr. Lee H. Lee, Dr. Quinn Vega and Dr. Bonnie Lustigman.

Anacystis nidulans is a unicellular freshwater cyanobacterium that is the frequent cause of algal blooms. These blooms pose a threat to aquatic ecosystems causing oxygen depletion and eutrophication in freshwater lakes. No satisfactory means for their prediction or prevention is currently available. It has been suggested that cyanophage (a cyanobacterial virus) is a regulatory agent and may be responsible for the disappearance and natural control of these algal blooms. Cyanophage AS-1, which was first isolated from a freshwater stabilization pond in Florida, infects both *Anacystis nidulans* and *Synechococcus cedrorum.* The primary goal of this project was to create a genomic DNA library of this important virus. The library was generated using the Lambda Zap7 II Predigested / CIAP-Treated cloning vector. 235 white (recombinant) colonies were selected and stored at -80^{o} C. The phagemids from the selected colonies were isolated using the Qiagen mini prep and the sizes of the inserts of AS- 1 DNA were determined by agarose gel electrophoresis. Sequence analysis of the inserts was carried out using an ABI 310 or ABI 3700 genetic analyzer. The sequencing data were submitted to GenBank for BLASTN and BLASTX similarity searches. Open reading frames were also identified. Seventeen clones with inserts less than 2 kb have been analyzed and a total of 13,425 bp of the 91 kb AS- I genome have been elucidated. Clones #210, 273, 283, 296, and 360 were reported to have DNA inserts with high sequence similarity to cyanobacteria. Two clones, #301 and 342, have DNA inserts with some sequence similarity to bacterial phytopathogens. GenBank search results also showed ten clones, #6, 8, 17, 84, 136, 290, 233, 265, 327, and 393, have inserts with no significant sequence similarity to previously reported DNA or protein sequences, indicating these DNA sequences may be specific to cyanophage AS-1.

A Budget for Total Reactive Phosphorus (TRP) Loads in a Eutrophic Pond. Michelle Saritoro. Fairleigh Dickinson University. Faculty Mentor: Dr. Paul Benzing.

Phosphorus is generally the nutrient found in freshwater ecosystems that limits plant and algal growth. TRP accounts for the small inorganic phosphates taken up plants. An overload of phosphorus leads to negative ecological impacts, including algal blooms, eutrophication, and anoxic conditions. Because Kitchell pond drains into the Great Swamp, an overload of phosphorus can lead to the same negative impacts on this wildlife refuge. The purpose of our research was to determine the TRP loads into and out of Kitchell pond. We identified one site just upstream of Kitchell Pond, and one site at the downstream outlet. We sampled these sites on four dates. On each sample date we took six water samples at each site, and determined stream discharge by mapping the stream cross section and taking flow measurements. We used a spectrophotometer to determine the concentrations of TRP. We then calculated TRP loads using by multiplying TRP concentration by stream discharge. We observed a large and growing algal mat present on our first two sample dates. Between our second and third sample dates this mat washed over the dam and did not redevelop. Our results indicate that when the algal mat was present more phosphorus was entering than leaving the pond. After the mat washed over the dam, concentrations in were the same as concentrations out. We suspect that the phosphorus not seen going downstream was stored in the algal mats as organic P, so it was not detected in the TRP.

Identification of Animal Tissue Samples Using Cytochrome *b* DNA Sequences (Mitochondrial DNA). Mala Subran, St. Francis College. Mentor: Dr. Kathleen Nolan and Angelique Corthals, AMNH.

The Ambrose Monell Collection, better known as the frozen tissue lab, houses many different types of animal tissues. The samples that have all their data recorded are stored in the permanent vats but sometimes the data are questionable. No one really has time to check these samples to see if they correspond with the information sent by the collectors. Our project was centered on the taxonomical identification of tissues which were held temporarily at the AMCC following a freezer melt down in one of the museum's collections. After contacting the relevant researchers, it became clear that all that was left of the data associated to those tissues were a mere 4 pages of scribbled field notes and whatever was written hastily on the vials and containers. The project was designed to verify the taxonomic identity of the tissues. Queries on GenBank helped us determine which region of the gene was to be sequenced and which tissue could potentially be selected. We chose to isolate and sequence cytochrome *b* of 13 tissue samples. The sequences were then compared to those registered in GenBank to positively identify the species. The result of the sequencing verified some of the taxonomical identification. More importantly, the sequence obtained for one specimen determined its species, which was previously unknown. This project has stressed the importance of having a sequencing protocol as part of the routine quality control of the specimens being accessioned at the AMCC.

Soluble Hexavalent Chromium cause Loss of Genetic Material in Synchronized Human Lung Cells, Sonia Teufacka, Spiros P Katsifis, University of Bridgeport, John Pierce Wise, Bioscience Research Institute, University of Southern Main, Portland, ME, Mentor: Spiros P. Katsifis.

Hexavalent chromium is a known human carcinogen and genotoxic metal. Statistical analyses reveal an increase in incidence of lung cancer among workers in industries that produce chromate and manufacture pigments containing chromium. Particulate chromium, such as zinc and lead chromate, is more potent. Unlike its soluble form, it is retained longer in interstitial spaces of tissues. Studies using human lung fibroblasts have shown that chromium causes DNA damage, disturbs DNA replication, and induces an accumulation in S- phase. In order to evaluate the depth of genetic damage and cell cycle disturbance caused by chromium, we investigated the effect of low doses of sodium chromate (Na_2CrO_4) on a synchronized, human lung fibroblasts cell line with an expended life span (WTHBF-6). We arrested the cells in M-phase by treating them with 10 ng/ml nocodazole for 16 hrs, released them for 30 min, and then exposed them to sodium chromate. We found that a 24 hr exposure to concentration as low as 2.5 μM sodium chromate induced DNA damage and loss of 13.6% of genetic material, resulting in the production of a population of lower ploidy. At intermediate doses, we observed a gradual reduction of the size of the normal population and increase of the lower ploidy population. At higher concentrations, 10 μM and 25μM, the entire population was affected, and a significant portion was apoptotic or dead.

Towards a Phylogeny of The Family Vibrionaceae Based On Non-Horizontally Transferred Genes. Angel Tibbs[1] and Melanie Harasym[2]. Carolle Bolnet[1] Program Advisor, [1]Medgar Evers College and the [2]American Museum of Natural History.

Organisms in the family Vibrionaceae are Gram-negative straight or curved rod bacteria. Until recently it was thou that microorganisms almost always pass on their genes through vertical transfer, from parent to offspring, and that little or no DNA exchange occurs among diverse species. However, recent evidence of horizontal transfer in literature abound. In order to construct a more reliable organismal phylogeny, one can choose a gene (or several genes) thought to be refractory to horizontal transfer. Our goal was to work toward a phylogeny of the family Vibrionaceae in order to accomplish this we have chosen eight genes that we presume to be refractory to horizontal transfer.

Computational Analysis of Thiolase 1 Isolated from the Glyoxysomal Fraction of Sunflower (*Helianthus annuus* L.) Cotyledons. Mohamed Anwar Bin Umer, Montclair State University. Faculty Mentors: Dr. Chunguang Du and Dr. James Dyer.

Plants are able to completely degrade fatty acids within the peroxisomes, while animals require an additional mitochondrial beta-oxidation system. Two separate thiolase activities have been isolated from the glyoxysomal fraction of sunflower (*Helianthus annuus* L.) cotyledons. Thiolase 1 shows activity only towards short chain acyl CoA, while Thiolase 11 exhibits activity towards both short and long-chain acyl CoA and 3- oxoacyl CoAs. We investigated the biochemical, structural and other features of the Thiolase 1 that will help us reveal more about this enzyme and possibly help in determining it's crystal structure. In particular we attempted to predict the secondary structure of the enzyme and also which amino acid residues of the enzyme might carry the most important functional role. For this, the raw data obtained from sequencing this enzyme in our lab was subjected to various computational analysis such as sequence analysis, hydrophobicity analysis and phylogenetic analysis, which helped us to determine the evolutionary relationship between enzymes in other organisms.

Relationship Between Clinical Parameters and N-Benzoyl-DL-Arginine-Napthylamide (BANA) Hydrolysis in Periodontal Patients. Ana Vanegas, Betsy Cruz, Dr. Raji Subramaniam, and Dr. Patricia Schneider. Department of Biology, Queensborough Community College, Bayside, NY.

Severe forms of adult periodontal disease are associated with anaerobic gram-negative bacteria, in particular *Prophyromones gingivalis* (coccobacillus), *Treponema denticola* (spirochete), and *Bacteriodes forsythus* (fuciform). These three bacteria produce an enzyme arginine hydrolase that is capable of hydrolyzing the synthetic substrate N-benzoyl-DL-arginine-2-napthyamide called BANA. This study investigated the significance of these pathogens in periodontal patients at a private dental clinic in Bronx, NY. The BANA test for detection of *Prophyromonas gingivalis*, *Treponema denticola*, and *Bacteriodes forsythus* was performed on subgingival plaque samples taken during routine scaling. We examined the relationship between BANA score and three clinical parameters: dental history, pocket depth, and bleeding on probing.

Ana Vanegas and Betsy Cruz are participants in the NIH Bridges to the Baccalaureate Program at Queensborough Community College (grant 1 R25 GM65096-01).

Determining Polymorphism in SSR Genetic Markers for Molecular Breeding in Soybean. Mauricia Victor[1], Kathleen Navarro[2] and Henry Nguyen[2], [1]Medgar Evers College and the [2]University of Missouri-Columbia.

Molecular breeding is a useful tool for plant breeders, utilizing genetic markers to ensure effective and efficient combination of valuable traits. It help breeders overcome limitations when making selections based on phenotype alone. Breeders can select individuals based on genetic compositions and be more confident that those individuals have a desired trait. The study sought to determine a set of polymorphic SSR (simple sequence repeat) genetic markers to screen 55 specified soybean populations for molecular breeding. SSR markers were chosen because of their known high rate of polymorphism. Seeds from all of the soybean cultivars that were used as parental lines in the specified crosses were collected and grown. DNA from each cultivar was isolated using the CTAB method. The DNA samples were diluted to a uniform concentration and PCR run using 10 different SSR markers. The products were separated by gel electrophoresis on a 3% agarose gel stained with ethidium bromide, and scored using an Alpha Imager UV exposure camera. Ten different SSR markers were tested. Marker 1 was polymorphic in 20% of the specified soybean populations and marker 2 was polymorphic in 23.6% of the populations. It will be necessary to test more SSR markers. Additional polymorphic markers are needed to develop a set for molecular breeding, and markers that have a higher percentage of polymorphism in the specified populations are desired.

Mauricia Victor is a participant in the BIOLOGY-CSTEP of Medgar Evers College which is funded by NYS Dept. of Education grant 0516011058 and a Summer Intern at the University of Missouri-Columbia. This project was funded by the Plant Genomics Internship Program of MU, Dr. Karen Cone, Program Director.

Changes in Growth in a Mutant of Arabidopsis with Impaired Chloroplast Division. Robin Walker[1], Roger Hangarter[2], Darron Luesse[2] and Jack Mullen[2], [1]Medgar Evers College and [2]Indiana University.

In leaves of *Arabidosis thaliana*, chloroplasts divide to form a large number of similarly sized organelles. They move according to the amount of sunlight the plant cell is receiving. If the plant receives less light they tend to move to the top and bottom of the cell. If they receive too much light they tend to move to the sides. We isolated a mutant in which chloroplasts do not move properly as measured by using a light detection system which tells the amount of light source that is transmitter through the plant leaf absorbed by the chloroplasts. We found that leaf cells in the mutant have single, elongated chloroplasts. Since they are enlarged they will probably not shift position at all in the plant cell. Iodine tests were run on the mutant and wild type plants to see the differences of starch content in the plant cell from normal to mutant. It was examined that the hypocotyls and roots of the mutants had less starch than those of the wild type. Other tests such as hypocotyls imaging and root tip analysis were done on normal and wild type plants to determine the growth effects of the mutants as compared to standard growth of a normal wild type. We found the gene for the enlarged chloroplast mutation is on chromosome five of *A. thaliana*. Several markers were used to map the gene responsible for enlarged chloroplasts. Once found it will be cloned and possibly utilized to find the proteins that affect chloroplast division. The overall outcomes of these experiments are to learn more about the gene that causes the chloroplast mutation and to see the growth effects that the mutation causes in seedling and adult plants.

R. Walker is a student participant in the BIOLOGY-CSTEP of Medgar Evers College which is supported by grant 0516011058 of the NYS Dept. of Education and was an REU Summer Intern at Indiana University.

Effects of Metals on Glutathione S-Transferase Activity in *Crassostrea virginica*. Andre Wallace[1], Inefta Reid[2], Margaret A. Carroll[1] and Edward J. Catapane[1], [1]Medgar Evers College and [2]Kingsborough Community College.

Bivalves are used for metal monitoring and bioaccumulation kinetics studies, but little is know about their biochemical responses to metals which cause oxidative stress by enhancing production of reactive oxygen species, depleting reduced thiols like glutathione (GSH), or inactivating antioxidating enzymes. Glutathione S-transferase (GST) is involved in Phase II detoxification catalyzing conjugation of electrophilic substrates to GSH. Substrates may be hydrophobic organic xenobiotics or in some cases heavy metals. Little is known about GST in invertebrates. Jamaica Say (JB) and areas of Oyster Bay (OB) in NY contain metals and other pollutants. We showed *Crassostrea virginica* spats transplanted to JB accumulated copper and other metals despite excellent survival and growth and that *C. virginica* preincubated in 100 mM copper sulfate had a 65% drop in gill GST activity. We studied *in vitro* effects of Cu^{+2}, Cd^{+2}, Fe^{+3}, Hg^{+2},and Pb^{+2} on GST activity in gill. Preincubation with 50 μg Cu^{+2} caused over 85% inhibition, and 125 μg Hg^{+2} and Fe^{+3} caused inhibition of over 70%. The enzyme was most resistant to Cd^{+2} or Pb^{+2}. Preincubation with low concentration of Cu^{+2} and any of the other metals resulted in greater inhibition than either metal alone suggesting a synergistic effect. Better understanding of the toxicological effects and adaptation of *C. virginica* to heavy metal pollutants should affect decisions made by federal and local regulators that protect ecosystems and continue to improve water quality in the NY harbor vicinity and other coastal waterways.

This work was supported by grants 1R25GM62003 of NIGMS, 0516011058 of the NYSDOE, 657200034 of PSC- CUNY and a CUNY Groundworks grant. We thank Frank M. Flower and Sons, Inc., Oyster Say, NY for supplying oysters.

Subcellular Distribution of Protein Kinase C-ε In MCF-7 Breast Cancer Cells. Francine Ward[1] and Alakananda Basu[2], [1]Medgar Evers College and the [2]University of North Texas Health Science Center. Faculty mentor: Dr.Alakananda Basu.

Protein Kinase C (PKC) is an enzyme that plays a key role in the signal transduction pathway. It consists of eleven different isoforms, which are grouped into three different categories: conventional, novel and atypical PKC. PKC-ε is one of the novel protein kinases involved with anti-apoptotic function within the cell. Our lab has previously shown that TPA (12-0-tetradecanoylphorbol-13-acetate), a protein kinase activator, induces translocation of PKC-ε from the cytosol to the plasma membrane. Tumor Necrosis Factor-α (TNF), a cytokine, induces apoptosis within breast cancer cells. Since TNF induces apoptosis and PKC-ε is an anti-apoptotic protein, we tried to investigate if TNF induces translocation of PKC-ε. In this study, we used the immunohistochemistry staining technique to reveal that TNF stimulates the translocation of PKC-ε from the cytosol to the plasma membrane. This study indicates that subcellular localization of PKC-ε is important for its anti-apoptotic function.

Francine Ward is a participant in the Medgar Evers Biology CSTEP program funded by the NYSDOE grant 0516011058. We thank Dr. Basu of the University of North Texas Health Science Center for providing this opportunity for her.

The Effects of Salinity on The Metabolic Rate of the Black Molly and the Bloodfin Tetra. Jerome Williams, St. Francis College, Brooklyn, NY. Faculty Mentors: Kathleen Nolan and Allen Burdowski.

The objective of this experiment is to compare and contrast fluctuations in the metabolic rate of both the Bloodfin tetra (*Aphyocharax albumus*) and the Black Molly (*Poecilia sphenops*), freshwater fishes. This lab exercise can be used in most undergraduate biology courses. This lab experiment acquaints students with the use of Logger Pro, a computer program which uses the Vernier^{tm} probe to create graphs based on obtained dissolved oxygen (DO) data. Both the Black Molly and BloodfinTetra are placed in separate sealed 50 ml flasks with salinity levels which range from 0 ppt-30 ppt). As the salinity level increases, the fish respiratory rate increases, and thus the amount of DO decreases. This should induce a steep inverse linear regression. Students can learn to observe the effects of different salinities on the metabolic rate of these freshwater fishes.

Retention and Function of Phospholipase D in Mast Cells. Oladapo Yeku[1], Guangwei Du[2] and Michael Frohman[2], [1]Medgar Evers College and [2]SUNY at Stony Brook.

Mast cells are immune cells that originate from precursors of the haematopoietic lineage and circulate in the blood and lymphatic system. Their distinctive quality is the possession of an IgE (immunoglobulin-ε) receptor that enables them to interact with antigens. The antigen-IgE-receptor complex triggers the cell to release histamine. Two phospholipase D (PLD) family members, PLD1 and PLD2, have been identified in mammalian cells. Both PLD1 and PLD2 are expressed in mast cells but are thought to be involved in different stages of degranulation, based on studies using overexpression of wild-type and mutant proteins. Our first goal was to focus on how the subcellular localization of PLD1 and PLD2 are regulated, using a series of mutated alleles that alter PLD associations with membrane lipids and protein partners. We also examined whether histamine release is altered in PLD1 down-regulated cells, using a cell line stably transformed with a PLD1 RNAi-generating plasmid. A better understanding of the regulation of PLD localization in mast cells and the roles it undertakes in degranulation will further our understanding of chronic allergy and anaphalaxis.

Oidapao Yeku is a participant in the Medgar Evers Biology CSTEP program funded by the NYSDOE grant 0516011058. This project was sponsored by the SUNY AGEP funded by NSF.

The Fall 2003 Conference Member Presentation Abstracts

Integrating Writing into the Biological Sciences Curriculum. Maureen N. Gannon. Department of Biology and Medical Laboratory Technology, BCC, CUNY.

Introducing writing into the science curricula has met with strong resistance from both faculty and students. Some common instructor complaints include; "Students should already know how to write before taking my course," and "I'm not an English instructor, I don't have the time or expertise to do this." In order to assess the validity of the latter complaint a grading rubric, similar to that employed the CUNY proficiency exam, was developed to mark student essays generated in a writing intensive section of Human Anatomy and Physiology. Use of the rubric significantly minimized the time required to grade assignments. The instructor for the course and a writing fellow graded all drafts of student essays. In general, the grade awarded to individual student essays by the instructor and the writing fellow was remarkably similar. This suggests science faculty have the ability to assess student writing, A significant correlation also existed between an individual student's grade on writing assignments and the performance on formative assessment of course content through multiple-choice type tests. Despite numerous student complaints, by the end of the course the majority of students recognized that the writing assignments had increased both their comprehension of key concepts and their ability to communicate their understanding to others. While using rubrics does not require a large investment of the instructors time, the planning and implementation of appropriate essay questions remains very time consuming. In addition, little time is available to allow for individual interaction between the instructor and the student. Ultimately, the extent to which writing can be successfully incorporated into an introductory science course will depend on the commitment of the individual instructor, the department and the institution.

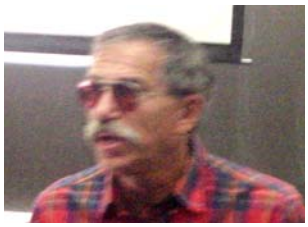
This work was supported by the Writing Across the Curriculum initiative at BC which is part of the Faculty Excellence Center, funded under a Title V grant to BCC.

Comparative Physiology of Two Monocentric Chytrids (Chytridiales), Mozaffar Hassan and Edward J. Catapane, Medgar Evers College.

The physiology of *Rhizophlyctis harderi* and *Rhizophlyctis rosea* is described. The two chytrids grew best between 20 to 25°C in a synthetic medium and in the range 20 to 30°C when cultivated in a nutrient solution containing bactotryptone and glucose. They grew best in alkaline media, required no exogenous vitamin and used ammonium and nitrate nitrogen as well as several amino acids. In contrast to their broad range of utilizable nitrogen sources, their carbon needs were met by glucose, mannose, cellobiose and maltose. D-galactose was utilized by *R. harderi* but not by *R. rosea*, and the latter showed growth with xylose at six weeks incubation, whereas the former did not grow. This paper further discusses the nutritional characteristics of the two organisms in order to expand our knowledge of their physiological characteristics.

Photosynthesis- A Multimedia Classroom Presentation. Mohsin U. Patwary, Biology Department, Medgar Evers College, City University of New York.

Photosynthesis is one of the most vital processes for living organisms on earth. It involves conversion of light energy into chemical energy in the form of ATP that in turn is used to synthesize carbohydrates and other organic compounds. We have developed a series of animated illustrations to show how this complicated process occurs in plants and in some other organisms. The illustrations include a generalized equation explaining the overall process of photosynthesis, leaf anatomy, Engelmann's experiment, photophosphorylations, chemiosmosis, Calvin-Benson cycle and a comparison of C3, C4 and CAM pathways. We anticipate that animating these illustrations would make them easier for General Biology students to understand this important process.



The Plant Communities of the High Line, New York City, New York, Richard Stalter, Zakhar Aranbayev, Farzana Baksh, Ilia Harris, Natasha Jordan, Anna Jung, Nidhi Mehta, Yana Mikhailov, Jessica Moussazadch and Lasheba Worthen, Department of Biology, St. John=s University, Jamaica, New York.

The plant communities at the High Line, an abandoned elevated commercial railroad, comprising 1.8 hectares, were identified during the growing season, 2002. Two arbitrarily defined plant communities exist on the High Line, tthe successional forb grassland community and the successional thicket, community. The largest community, the successional forb Grassland community was dominated by *Solidago juncea*, *Eupatorium hvssopifolium, Oenothera biennis, Daucus carota, Artemisia vulgaris, Potentilla, recta, P. argentea, Hieracium caespitosum, Centaures maculosa, Melilotus alba, Bromus tectorum, Poa pratensis, Sporobolus clandestinum, and Eragrostis capilaris.* The most common woody species associated with this community were *Celastrus orbiculatus* and *Rosa multiflora*. The second community was the successional thicket dominated by *Ailanthus altissima*. This small community, occupying less than 0.5 ha, contains several species found nowhere else on the High Line, *Quercus palustria, Eupatorium rugosum, Euphorbia cvathpora* and the largest population of *Aster novi-belgii*. Species richness at the High Line, 88 species/ hectare, may be greater per hectare than species richness in similar sized local urban environments.

Fall 2003 Conference Report

by

Dr. Brian Palestis
Department of Biological Sciences, Wagner College, Staten Island, NY

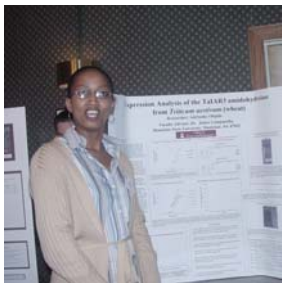
Wagner College hosted the 36th annual fall MACUB meeting on Saturday, November 1, 2003. The conference was attended by well over 300 members, continuing the trend toward larger and larger numbers. Dr. Kathleen Ahern, Wagner's Acting Provost and a member of the nursing faculty, and Dr. Gary Sarinksy, President of MACUB, opened the conference. The theme of the conference was "When Science Becomes Controversial: Professional Ethics and Research Limits", and both keynote speakers addressed controversial topics.

Dr. JoAnn Burkholder, of North Carolina State University, spoke on environmental issues and science ethics. She addressed the problem of conflicts of interest among scientists working for industry or government. Her own research has been controversial in North Carolina, because it has implicated one of the state's biggest industries, hog farming, in blooms of the toxic dinoflagellate *Pfiesteria piscicida*. Dr. Burkholder co-discovered this organism in 1991.

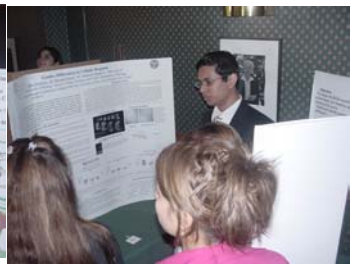
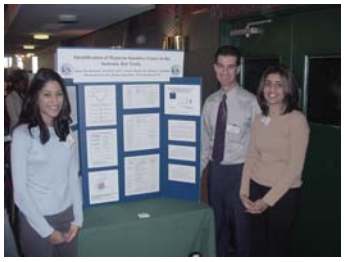
John Horgan, Jr., an award-winning science writer whose writing has often addressed the limits of knowledge, asked "What Does Science Really Know About the Mind?". In a talk that stirred up heated discussion, he reviewed a broad range of fields that attempt to understand human behavior, including neurobiology, psychiatry, and evolutionary psychology, and claimed that all of these attempts have failed.

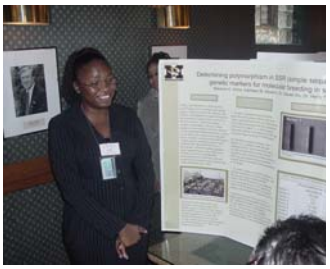
The annual fall MACUB conference also serves as a forum for student and faculty research. Students were certainly well-represented at the meeting, with over 60 posters presentations, an unprecedented number for MACUB. In addition, there were three member presentations and five workshops, several of which dealt with undergraduate science education.

Many individuals contributed to the meeting running smoothly, including Gary Sarinsky and the rest of the MACUB executive board, and the faculty, staff, and students of Wagner College.

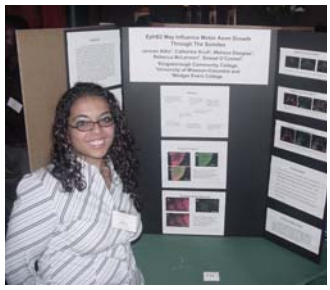







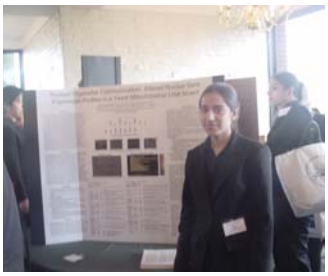
Conference Highlights













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

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