

Brooklyn

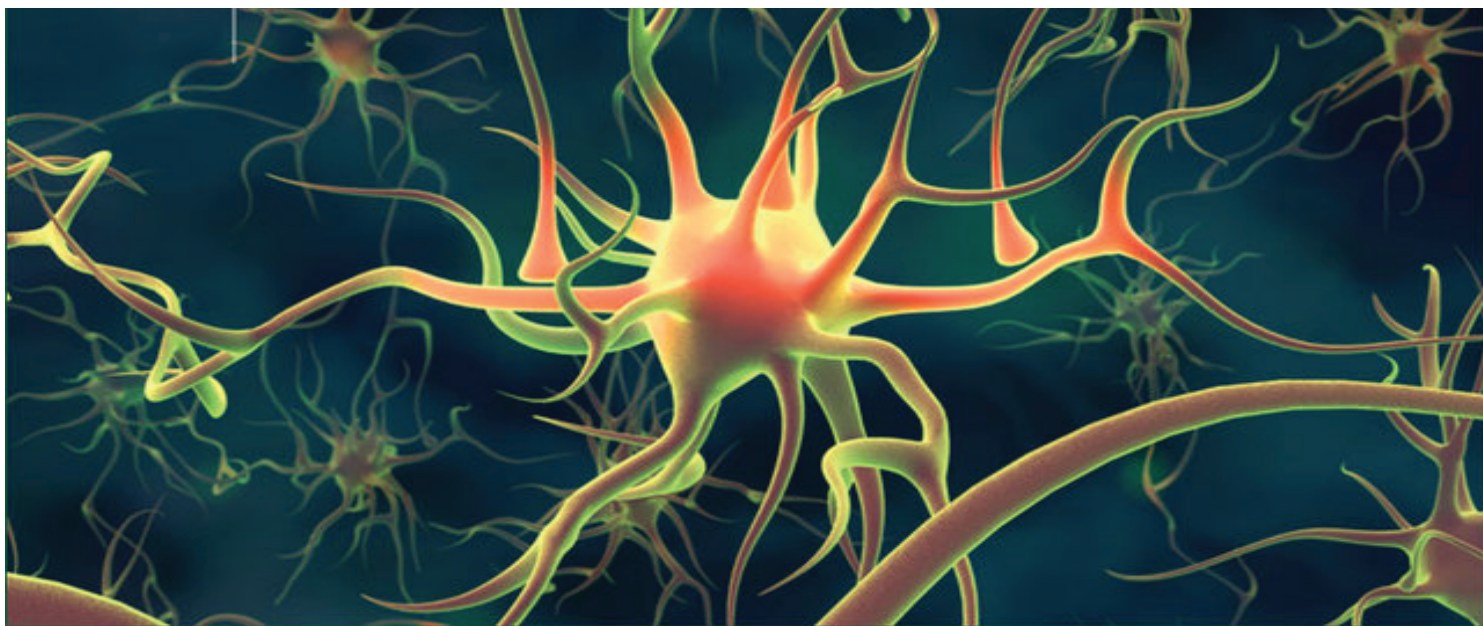


College

Science Research Day

May 14, 2010

ABSTRACT BOOK



**Sponsored by
Dean of Research and Graduate Studies
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GK-12 "City as Lab"**

20TH ANNUAL BROOKLYN COLLEGE SCIENCE DAY



PROGRAM

9:30 AM	POSTER SETUP
10:00—12:00	STUDENT PRESENTATIONS AND JUDGING (SECOND FLOOR)
12:15 PM	LUNCH IN THE GOLD & MAROON ROOMS (SUBO)
12:30 PM	WELCOME AND REMARKS
	PRESENTATION OF AWARDS
	High School Division
	Undergraduate Division
	Graduate Division

ALL ARE INVITED TO LUNCH IN THE GOLD & MAROON ROOMS

PRESENTER KEY

High School — [HS]
Undergraduate — [UN]
Graduate — [GRAD]

PSY – 1 CORRELATIONS BETWEEN SENSITIVITY TO REWARD AND PUNISHMENT AND INTROVERSION, NEUROTICISM, MORAL DEVELOPMENT, AND THE REGULATION OF APPETITIVE AND AVERSIVE MOTIVES

Ezra Dayan (HS) and Mr. Stuart Benas, Magen David Yeshivah High School, Brooklyn, NY

The present study investigates correlations between sensitivity to reward and punishment and a teenager's introversion, neuroticism, moral development, and regulation of appetitive and aversive motives. Questionnaires were distributed to seventy participants who attend Magen David Yeshivah High School in Brooklyn, NY. The first hypothesis: "The more sensitive a teenager is to reward and punishment, the greater his/her moral development" was not supported by the data. The second hypothesis: "The more sensitive a teenager is to reward and punishment, the more he/she will regulate appetitive motives" was partially supported by the data. The third hypothesis: "The more sensitive a teenager is to punishment, the more likely he/she will regulate aversive motives to yield positive results" was supported by the data. The fourth hypothesis: "The less sensitive a teenager is to reward and punishment, the more likely he/she will demonstrate an introverted personality" was partially supported by the data. The fifth hypothesis: "The more sensitive a teenager is to reward and punishment, the more likely he/she will demonstrate neuroticism" was partially supported by the data.

PSY – 2 COLLEGE GRADE POINT AVERAGE: THE ROLE OF DEMOGRAPHIC, HEALTH, NEUROPSYCHOLOGICAL, AND PSYCHOLOGICAL VARIABLES

Lindsay Anderson (GRAD), Laura A. Rabin and Joshua Fogel, Brooklyn College, Brooklyn, NY 11210

A wealth of cognitive and noncognitive variables have been linked to academic achievement. A sample of 203 ethnically diverse undergraduate college students completed questionnaires assessing intellectual functioning, personality, sleep quality, executive functions, procrastination, depression, anxiety, and various demographic variables. Linear regression analysis was used to determine the variables associated with the outcome of self-reported grade point average (GPA). Non-white race, alcohol use, and estimated IQ score were significant predictors of GPA. Study implications are discussed.

PSY – 3 ASSOCIATIONS BETWEEN DISORDERED EATING AND ATTITUDES TOWARD COSMETIC SURGERY IN A DIVERSE SAMPLE OF UNDERGRADUATE WOMEN

Carmen Carrion (GRAD), Laura A. Rabin (Brooklyn College), Sarah Weinberger-Litman, Kathleen Galek (Spears Research Institute)

We explored the association between disordered eating and attitudes towards cosmetic surgery in a sample of 81 female undergraduate students. We hypothesized that individuals more likely to endorse cosmetic surgery as a means of achieving a desired physical outcome would show higher levels of disordered eating. Results supported our hypothesis, which is not surprising given media pressures on young women to attain certain beauty ideals. Implications for at-risk populations and future research directions are discussed.

PSY – 4 THE ASSOCIATIONS BETWEEN MEANING IN LIFE, RELIGIOUS ORIENTATION AND SELF-TRANSCENDENCE

Christopher W. Shannon (UN), Laura A. Rabin (Brooklyn College), Sarah Weinberger-Litman (Spears Research Institute, Healthcare Chaplaincy) and Kathleen Galek (Spears Research Institute, Healthcare Chaplaincy)

The presence and search for meaning in life are linked to psychological well-being. Religious orientation and spirituality may insulate against certain types of psychological distress. Using a large, ethnically and religiously diverse undergraduate sample, we investigated how religiosity and spirituality influence meaning in life. Results revealed that those with an intrinsic orientation toward religion rated

higher in presence and lower in search for meaning in life, and this orientation corresponded with higher levels of spirituality.

PSY – 5 NEURAL STRUCTURES INVOLVED IN SENSORY-SPECIFIC ASSOCIATIONS IN FLAVOR PREFERENCE CONDITIONING

Janina Scarlet (GRAD) Vincent Campese, Matthew I. Fein and Andrew Delamater, Brooklyn College-CUNY, Brooklyn, NY 11210; Graduate Center-CUNY, New York, NY 10016

Two experiments analyzed the roles of basolateral amygdala (BLA), orbitofrontal cortex (OFC), and gustatory cortex (GC) lesions, as well as GC-BLA disconnection in the formation of sensory specific associations in flavor preference and magazine approach paradigms. It was found that while none of these structures are involved in the formation of sensory specific associations in the conditioned flavor preference paradigm, both the BLA and the OFC are involved in the formation of these associations in a Pavlovian instrumental transfer and that only the OFC is involved in the formation of these associations in a US devaluation task. These results allow us to have a better understanding of the nature of the formation of the sensory-specific associations across these paradigms.

PSY – 6 PREFERENCES FOR SACCHARIN AND SUCRALOSE IN MICE

Chaya Goodman (UN), Karen Ackroff and Anthony Sclafani, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Saccharin and sucralose are commonly used sweeteners found in many beverages (common brands are Sweet'N Low and Splenda, respectively). Behavioral responses to sweet taste are often studied in rodent models. Although saccharin is commonly used, it is not strongly attractive to rodents. In the current study, the relative attractiveness of saccharin and sucralose were assessed in mice (C57BL/6 strain). In one study, two groups of mice were given an ascending concentration series (0.1, 0.3, 1, 3, 10, 30, and 100 mM) of one sweetener vs. water. In the second study, new mice were given sucralose vs. saccharin, using the same concentration range. The first study showed that mice in the sucralose group drank more sweetener and preferred it to water at a wider range than the saccharin group. In the second study, mice preferred sucralose over saccharin at most concentrations, but saccharin was preferred at the highest concentration, perhaps due to increasing sucralose off-taste. This study shows that sucralose is preferred to, and stimulates greater intake than saccharin, probably due to saccharin's more prominent bitter off-taste. Thus sucralose can serve as an attractive, noncaloric sweet taste for rodent studies.

PSY – 7 RESIDUAL GLUCOSE TASTE IN T1R3 KO BUT NOT TRPM5 KO MICE

Steven Zukerman (GRAD), Robert F. Margolskee and Anthony Sclafani, Brooklyn College, Brooklyn, NY 11210

Deletion of the genes for the sweet taste receptor subunit T1R3 or the signaling protein Trpm5 greatly attenuates sweetener preference in mice. However, knockout (KO) mice missing T1R3 or Trpm5 develop preferences for glucose but not fructose in 24-h tests which is attributed to the post-oral reinforcing actions of glucose. The present study probed for a residual glucose taste sensitivity in KO mice. When water deprived, T1R3 KO, Trpm5 KO and C57BL/6 (B6) control mice displayed similar lick rates for 8% glucose and 8% fructose in 1-min, 2-bottle choice tests. However, when food deprived the KO mice licked very little for either sugar while B6 mice continued to lick for both sugars in 1-min tests. Yet, when the test was extended to 1 h, the T1R3 KO mice now displayed a significant glucose preference (66%) while the B6 mice preferred fructose (59%). In 1-h, 1-bottle tests, the T1R3 KO and B6 mice licked more for glucose than fructose and both groups preferred glucose in a subsequent 1-h, 2-bottle test. However, the glucose preference was greater in T1R3 KO than B6 mice (86 vs. 67%, $p=0.0014$). The Trpm5 KO mice remained indifferent and licked very little for either sugar in these 1-h tests. When tested 24 h/day, however, the Trpm5 KO mice licked much more for glucose than fructose in 1- and 2-bottle tests. The 1-hr data suggest a residual glucose taste sensitivity in T1R3 KO mice which may be mediated by their intact T1R2 sweet receptor or a glucose polymer (Polycose) taste

receptor. Trpm5 KO mice lack this residual glucose taste but learned to prefer glucose to fructose in 24-h tests based on post-oral glucose reinforcement. This type of reinforcement also appears responsible for the preference B6 mice display for glucose over fructose.

PSY – 8 A MORE CONSERVATIVE APPROACH TO TRAINING A CONDITIONED INHIBITOR

Matthew I. Fein (GRAD) and Andrew Delamater, Department of Psychology, Brooklyn College- CUNY, Brooklyn, NY, 11210

Two studies using a within subjects design with rats in a conditioned magazine approach paradigm aimed to investigate questions raised about possible confounds implicated in research involving conditioned inhibition. Issues such as stimulus generalization and unequal treatment of control stimuli may lead to behavior that resembles conditioned inhibition but may be otherwise. The results indicate that controlling for these confounds can still lead to a conditioned stimulus acquiring inhibitory properties.

PSY – 9 THE VISUAL CONTROL OF SKIN CONTRAST BY CHROMATOPHORES IN THE CUTTLEFISH (SEPIA OFFICIANALIS).

Stavros Hadjisolomou*¹ (GRAD) and Frank W. Grasso ^{1,2}, ¹The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ² Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY

The Coleoid cephalopods are renowned for their intricate body patterning abilities. They are able, in milliseconds, to change their external appearance to match their environment. Evolution has adapted this system to be effective at deceiving vertebrate visual systems; offering an extreme capacity for camouflaging or crypsis. Color changing is the result of the combined action of the chromatophore, iridophore and leucophore cells in the skin. The coordination of the chromatophores resides within the central nervous system. We undertook a controlled study of the neural controlled chromatophores using high-speed (100 Hz) video acquisition to capture the spatial and temporal variations of chromatophore activity on a patch of cuttlefish skin in response to a transient input (brief intense light flash). Videos containing reflected light intensity off the skin of the cuttlefish were analyzed in both spatial and temporal Fourier analysis to estimate the transfer function of the entire cuttlefish nervous system control arc from eye to chromatophore. Reflected light intensity from the skin was significantly higher after the flash ($p < 0.001$). The average response latency was 0.22 seconds and the average response duration 4 seconds. This study contributes key measurements to our understanding of how nature allows for contrast control in cephalopods.

PSY – 10 CHEMICAL STIMULUS AND SUCKER RESPONSE IN *OCTOPUS BIMACULOIDES*

Savithri Nair ¹ (GRAD), Josh Barocas¹ and Frank W. Grasso ^{1,2}, ¹The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY, ²Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY

The neuroanatomy of octopuses has been extensively studied (Graziadei, 1971; Wells, 1972), but the functional anatomy of the arms and particularly the suckers is not well known. Coordinated sucker movement has been shown in goal-directed arm movements (Grasso 2008; Hadjisolomou & Grasso, 2009) and Altman (1971) demonstrated that acidic stimuli presented to a sucker rim trigger a withdrawal reflex of the sucker. We hypothesized that chemical stimuli presented to a sucker's rim would affect the behavior of adjacent suckers via the interconnected ganglia that traverse the octopus arm. We undertook a study to determine whether or not chemical stimuli could reliably elicit a multi-sucker response. We stimulated suckers on a restrained octopus with four different chemical stimuli (acid, base, octopus and artificial sea water) contained in a piece of agar. We videotaped the stimulated, five proximal and five distal adjacent suckers and scored the frequency of their movements. Sucker responses ranged from no reaction, to movements, to attachment, to passing the

stimulus from sucker to sucker. A one-way ANOVA to test the effect of chemical stimuli yielded no significant differences in numbers of adjacent suckers recruited to respond to the different chemical stimuli ($F(28,3) = 1.541, p > .05$). A chi-squared test for differential attachment by the suckers was significant ($\chi^2(3) = 78.23, p < 0.01$) indicating that the sucker-rim sensors were able to discriminate between the chemical stimuli. These results suggest that chemical stimuli are processed at the sucker ganglia but chemical information might not be passed to adjacent suckers to coordinate sucker activity.

PSY – 11 THE DIFFERENCES AND SIMILARITIES BETWEEN BLACK AMERICAN AND CARIBBEAN PARENTING METHODS (P.E.A.R.L.S.)

Nino Sanadze (HS), Barrington Harvey and Dr. Christine McWayne (NYU), James Madison High School.

The current study investigated the relationship between the black parenting techniques and school readiness in pre-school children. Past studies have not emphasized positive parenting in black communities. The purpose of P.E.A.R.L.S. is to explore positive aspects of parenting in black parents attending Head Start. While doing this research, we have developed our own research question based on the focus groups we transcribed. It was observed that challenges for the parents came from outside pressure and wanting the best for their child. It was also found that the Caribbean parents were more involved and concerned with their child's education and discipline despite the challenges that come with adapting to a culturally new environment. These findings have important implications for future research. The African American population still makes up a big portion of the total population of United States. It is often the case that, Caribbean people are often mistaken for African Americans and their cultural differences are disregarded. However, studies that have assessed Black Americans have concentrated specifically on either Caribbean immigrants or African-Americans, and as a result the similarities and differences between their cultures were overlooked and not analyzed. One study performed by Syracuse University and Eastern Connecticut University examined the influence of parenting styles, parent child academic involvement at home, and social behaviors among kindergarten –age children of Caribbean immigrant parents.

PSY – 12 USING A KHEPRA ROBOT TO MODEL PHOTOTAXIS IN MOTHS

Lawrence Tse¹, (HS) Kamil Kloskowski² and Frank W. Grasso^{2,3}, ¹Midwood High School, Brooklyn, NY 11210 ²The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ³Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY

The purpose of this project is to study the mechanisms that control phototactic behavior of moths. Particularly, we seek to model a conflict resolution strategy for competing behaviors, which is a general problem of wide interest. When a moth flies towards a light source (phototaxis), it must be aware of its surroundings, avoiding collision with obstacles, such as trees. These two behaviors, tracking light and avoiding obstacles can sometimes come into conflict and lead to dithering or counter-productive behavior. Our hypothesis is that it is possible for a robot to be able to resolve conflicts between phototactic behavior and obstacle avoidance behavior in order to reach the light source. The moth provides an existence proof that a solution is possible. The development of the control systems was implemented in two phases. We implemented a program written in C inspired by the behavior of biological moths. The effectiveness of the strategy was evaluated by loading the control code first into a simulated environment to control a simulated agent and later in a robot implementation to run in a real-world physical environment. In the first phase the time of each trial was recorded, and it took the robot more time to get around the obstacle compared to the time without the obstacle. In the second phase, it was noted that the robot took less time to reach a target radius from the light source that we defined as success. In the end all the trials made came out successful in, where the robot had reached the light source. We conclude that this conflict resolution strategy is effective in permitting an agent to pursue a task while avoiding environmental hazards.

PSY – 13 SCANNING OF ACOUSTIC SPACE USING A MODEL OF A BAT EAR

Alex Afanasyev (HS)¹, Gregory Perrin² and Frank W. Grasso^{2,3,1} Midwood High School, Brooklyn, NY 11210 ²The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ³Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY.

We undertook this project to further our understanding of the bat's echolocation ability. It is well known that many actively bats scan their surroundings using acoustic signals, an ability called echolocation. The ultimate goal of this work is to design a new type of acoustic sensor, modeled from the outer ear shape of echolocating bats. We explored the theory that ear shape permits a passive, frequency-based scanning of space requiring no movement. Here, we used an audio speaker as a sound source to mimic the bat's echolocation calls and tested the spatial and frequency sensitivity of a physical outer ear mode that included BioMimetic features from the ears of bats which were tested at horizontal angles between 0 and 120 and between 240 and 360 and vertical angles of 0, 30, 60, -30 and -60. The differences between the model ears were the outer ear shape and an outer ear structure. In prior research, we found that the outer ear may allow a bat to scan its surroundings without active movement. With each model ear tested the sensitivity varied from 0 to 30 to 60 degrees depending on the model ear and its spatial orientation. Here, we demonstrate that, like those we previously studied, this new and more open ear shape shows sensitivity to sounds of different frequencies at different angles. This provides further evidence that the shape of an ear can produce an acoustic scanning of space without movement, an effect we and others have called Frequency Swept Fanbeams (FSFs).

PSY – 14 PLAYING VIDEO GAMES AFFECTS THE ABILITY TO LEARN AND UNDERSTAND

Sarah Younus (HS), and Ermal Mujaj, New Utrecht High School, Brooklyn, NY

Students spend many hours playing video games. This affects their grades in school because it takes time away from studying and doing homework. It also affects their ability to think and understand what they are learning in school. Students should spend less time playing video games because being able to learn and understand in school is important.

Problem: Does playing video games decrease your ability to learn and understand?

Hypothesis: If you play video games then you will decrease your ability to learn and understand

The materials used are the video game *Modern Warfare 2*, gaming consoles (*X-box* or *PlayStation 2*), and the tests

Students will play video games and then take a test to see how playing the games affected their scores on the test.

For a control, these students will take a similar test before playing the video games. The 'before' and 'after' scores will be compared to each other. If our hypothesis is correct then the scores after playing the games will be lower.

We tested our hypothesis on five subjects so far. Four showed a decrease in performance while one achieved a better grade on the test after playing the video game.

The data shows that our hypothesis was supported; we will have to repeat the experiment, using the data from more subjects in order to draw a more valid conclusion.

We hope that our results will persuade children to play fewer video games a day.

PSY – 15 MECHANICAL LOAD AND SUCKER RECRUITMENT IN *OCTOPUS BIMACULOIDES*

Josh Barocas (UN)*¹ Savithri Nair¹ and Frank W. Grasso^{1,2,1} The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ²Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY

Cephalopods in general and octopuses in particular possess the most sophisticated brains and nervous-systems among invertebrates – comparable in complexity to that of a higher mammal such as a cat. While the neuroanatomy of the cephalopod nervous system has received detailed study, the function of the connections between the various ganglia controlling the behavior suckers in *octopus* has never been explored., owing to the technical challenges.. Prior studies have shown that

mechanical signals from the sucker rim are sent down the axial nerve cord (Rowell, 1963) to trigger reflex responses. We hypothesized that greater numbers of suckers would be recruited to respond to mechanical stimulation of a single sucker by mechanical stimuli of greater intensity. To test this hypothesis, we devised a method of restraint such that all suckers are made accessible to stimulation and video recording. We stimulated single mid-arm suckers with rim-covering caps and varied the weights delivered on alternate trials. We recorded the movements of the five nearest proximal and distal suckers. More suckers responded more often to heavier weights ($F(9, 30) = 5.94, p < 0.05$), and the nearest suckers responded the most frequently. This finding suggests that the mechano-receptors on the rim of the sucker can send differential signals along the ganglia of the arm that can differentially recruit adjacent suckers.

PSY – 16 ELEVATED BRIEF SYMPTOM INVENTORY SCORES IN OUTPATIENTS WITH ACQUIRED BRAIN INJURY: PSYCHOPATHOLOGY OR COGNITIVE/PHYSICAL SYMPTOMS?

Travis A. Alvarez (UN)₁, Joseph F. Rath, Rusk Institute of Rehabilitation Medicine, NYU Langone Medical Center, New York NY 10016 and Brooklyn College of the City University of New York, Brooklyn, NY 11210

The Brief Symptom Inventory (BSI) is a commonly used self report symptom inventory designed to measure psychological symptoms in medical populations, psychiatric patients, and community non-patients. Past research has revealed an overlap between acquired brain injury (ABI) symptoms and the psychological distress symptoms tapped by the BSI. These prior findings call attention to the need for separate BSI norms for ABI patients. The purpose of this study is to create and compare three BSI subscales (psychiatric, brain injury, and cognitive deficit) across ABI patients and non-ABI controls. Compared to normal controls, we anticipate the ABI patients to have elevated scores for the brain injury and cognitive deficit symptoms and no significant elevations on the psychiatric subscale. By omitting brain injury related symptoms from the BSI, scores for ABI patients are expected to decrease from their usual elevated level. It is anticipated that our results will demonstrate the probable misinterpretation of elevated BSI scores for ABI patients as an indicator of psychopathology as opposed to merely reflecting the cognitive/physical symptoms of the brain injury.

PSY – 17 THE RELATION BETWEEN SELECTED DEMOGRAPHIC FACTORS AND LEVEL OF CONSERVATISM

Aliza G. Sklar(UN)₁, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

One hundred Brooklyn College students in a convenience sample were surveyed to study the effect of social influences (SI) on level of conservatism (C). A positive effect of SI on C was hypothesized after controlling for the confounding effect of socio-economic status, the qualifying effect of gender, and the intervening effects of religiosity and psychopathology. Structural equation methodology was used to test a path model addressing this hypothesis.

PSY – 18 EFFECT OF SEASON ON MONK PARAKEET (*MYIOPSITTA MONACHUS*) NEST SIZE

Alfie Supan (UN) and Frank W. Grasso, Department of Psychology, Brooklyn College of the City University of New York, Brooklyn, NY 11210

Monk parakeets (*Myiopsitta monachus*) are an invasive species that construct and maintain large, multi-chambered stick nests year round. These nests are built on manmade as well as natural substrates. A more complete understanding of the factors that determine their unusual nest construction behavior would aid ongoing efforts to reduce their impact on human farming and urban infrastructure. A digital, photographic record was made of five nest sites of naturalized monk parakeets in Brooklyn, NY at intervals over a one year period. Estimates of nest size were made from these photographs to quantify variations in nest size over between spring of 2008 and 2009. Significant differences in nest size were found to follow a quadratic model [$F(3, 5) = 131.75, p < 0.01$]. This

seasonal pattern indicates that monk parakeet nest construction activity, while year-round, shows seasonal epochs of intensified construction during the breeding season and that this pattern is not due to chance.

PSY – 19 EFFECT OF SHELL SIZE ON FOOD HANDLING BEHAVIOR OF CARRIBEAN SLIPPER LOBSTERS (*SCYLLARIDES NODIFER*)

Maksim Vlasjuk ^{*1} (UN) and Frank W. Grasso ^{1,2,1} The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ²Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY

Better understanding of *Scyllarides nodifer* food acquisition behavior, can potentially lead to better management of this species where it is important to the fishing industry and local economies. Slipper lobsters are obligate bivalve (clams, oysters etc.) feeders that use elaborate food-handling behaviors ("shucking") to remove the edible bivalve from its hard defensive shell. We hypothesized that the size of the shell would alter the strategy the slipper lobster employed. To test this we looked for variation in the number of chips made by the lobster on bivalve shells during the shucking process. We collected shells from 92 shucking episodes from seven slipper lobsters and counted the number of chips the lobster made in the shell rims. Both valves of the shell were divided into three regions, and then the total number of chips for each region and total were counted and entered into a database. We also measured each clam's shell the length, width and depth. A second order curvilinear regression showed that the number of chips followed a u-shaped function with the greatest number of chips found in medium-sized shells and lesser numbers for smaller and larger shells, $F(89) = 4.80$, $p < 0.05$. This may be a consequence of the slipper lobster needing to make fewer chips, in a small clam in order to open it, while larger shells may offer the lobster better leverage to pry open the shell, requiring fewer chips. Overall these differences are indicative of a shift in behavioral strategy with changing food item size in slipper lobsters.

SOC – 1 PREVALENCE OF DIABETES IN AFRICAN-AMERICAN COMMUNITIES: RISK FACTORS AND PREVENTION

Greg Smithsimon and **Eleonor Leger** (UN), Department of Sociology, Brooklyn College, Brooklyn College-CUNY, Brooklyn, NY 11210

Rates of Type II diabetes are significantly higher in low-income minority groups such as African Americans as compared to other non-minority groups. While Type II diabetes is a medical disease, the social and physical context found in at risk groups plays a significant role in understanding the prevalence of the disease in African American communities. Type II diabetes is a race specific social disease. In looking at the social pressures in the form of misperception of diabetes prevention, engaging in risky behaviors, lack of food resources, and poverty, risk factors for Type II diabetes, the social and physical context is shown to more fully explain the high rates of Type II diabetes in African American communities. Reviewing journal articles from scientific databases under the search terms of diabetes, prevention, risk factors, health disparity and community, these risk factors contribute extensively to the high rates of diabetes in communities. Without the treatment of Type II diabetes as a race specific social disease, risk for Type II diabetes increases significantly, but also allows for unhealthy social and physical conditions to exist. Diabetes therefore, cannot be seen as just another medical condition but is an indicator of a larger social and health disparity found in low-income minority communities. Therefore, to address issues of diabetes intervention in African American communities, prevention programs must be relevant to the communal and cultural community and emphasize early intervention.

SCAS – 1 THE USE OF GESTURES IN THE DESCRIPTION OF COMMON VERSUS UNCOMMON OBJECTS IN UNBALANCED (ENGLISH AND RUSSIAN SPEAKING) BI-LINGUALS

Anna Rakovsky (UN), and **Ekaterina Silva**, Department of Speech Communication Arts and Sciences, Brooklyn College-CUNY, Brooklyn, NY, 11210

This study examines the use of gestures in unbalanced bi-linguals. In mono-lingual language users gesturing co-occurs with speech especially when speakers describe uncommon objects and/or cannot retrieve a word. It was therefore hypothesized that unbalanced bi-lingual would gesture more in their weak language/Russian (that is usually characterized by weakened lexical access compared to the dominant language) and while describing uncommon objects. Nineteen bilingual adults participated in an experimental task that required the labeling of pictures of common and uncommon objects. The participants were filmed. The number of gestures per second was calculated for each participant in each of the four conditions (uncommon versus common objects and weak language/ English versus dominant language /Russian) and the analysis of their gestural behavior was coded based on the classification developed by McNeill (2000).

The results failed to support the hypotheses. There was no significant difference between a) proportion of gesturing during the common and uncommon conditions and b) proportion of gesturing during the English/Dominant language versus the Russian/Weak language condition. These results may come from the fact that participants spoke more in the English (common and uncommon object) conditions and when they failed to retrieve words in the Russian (common and uncommon objects condition) they sometimes neither spoke nor gestured. The difference between the findings and the literature on the role of gesturing in lexical retrieval by monolinguals, which is heightened or increased in the context of word retrieval problems, suggests that the role of gesturing may be different in bi-lingual and monolingual speakers

SCAS – 2 THE LINGUISTIC LANDSCAPE OF KINGS HIGHWAY BETWEEN EAST 1ST AND EAST 19TH STREET

Victoriya Nevrianskiy (UN) and **Tamara Pisarevskaya**, Department Speech Communication Arts and Sciences, Brooklyn College-CUNY, Brooklyn, NY 11210

Linguistic landscaping is a relatively recent subfield of the sociology of language. It focuses on the language(s) used on written signs in public spaces in particular locations. It involves their analyses in relation to the demographics and language policy of that neighborhood. It has been used to examine the status of different languages in multilingual cities in Israel, Japan, France, the Netherlands, Spain etc

The aim of this study was to conduct the first linguistic landscaping study of a neighborhood in Brooklyn, that includes many multilingual areas. Forty five randomly chosen public signs displayed in Kings Highway between East 1st and East 19th Streets- a commercial multilingual area- were analyzed.

The results revealed that English dominates on commercial signs (74.5%) and on the awnings of 80% of the businesses- a finding that was expected given the dominance of English in the USA. The findings also showed that Hebrew is the dominant foreign language on Kings Highway signs (14.20%) while Russian is the dominant foreign language on the awnings of Kings Highway businesses. The latter finding with respect to the distribution of languages other than English reflects the demographics of the neighborhood. In contrast the former is not easily explained on the basis of demographic data: in order to account for this finding the social and cultural roles of Hebrew in New York City has to be considered.

SCAS – 3 BEYOND THE “HERE” AND “NOW” IN TODDLERS ACQUIRING ENGLISH, FRENCH AND RUSSIAN

Ludmila Pukhovich (UN), Speech Communication Arts and Sciences, Brooklyn College-CUNY, Brooklyn, NY 11210

The goals of this study were: a) to identify the early acquisition patterns of the use of language to refer to objects and events out of context; b) to investigate the similarities and differences across three languages- English, French and Russian given that to date only one study focused on the emergence of this aspect of language acquisition in English; c) to determine whether parental input has an impact on this aspects of language development. In order to do so transcripts of language samples of two year old toddlers interacting with their caregivers were extracted from the CHILDES database (MacWhinney, 2000). The coding system adapted from Adamson and Bakeman (2006) considered

Symbolic Highlighting, Spatial Displacement and Temporal Displacement. The results reveal that across three languages that toddlers' language contains more instances of Symbolic Highlighting and Temporal Displacement than Spatial Displacement. While this aspect of the result points to the similarities across languages (and possibly cultures), the results pertaining to the impact of caregivers' language on the use of decontextualized language by the toddler are more ambiguous. These results shed light on the identification of universal patterns in language and cognitive development, and the (limited) effects of the input on acquisition patterns.

Supported by an internship from YELED V'YALDA RESEARCH INSTITUTE

BIO – 1 QUANTITATIVE MEASUREMENT OF CELL ATTACHMENT OF *AGROBACTERIUM TUMEFACIENS* TO PLANT HOSTS WITH THE FLOW CYTOMETER

Anna Petrovicheva (GRAD), Leslie Aguirre, Tim Davitadi and Theodore R. Muth
Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 12210, City University of New York
Graduate Center, New York, NY 10016

Agrobacterium tumefaciens is a bacterium that is able to infect a diverse array of plants. Typically the bacteria attach to plant roots and transform the plants cell to induce crown gall tumors, a type of plant cancer. The mechanism of attachment in the infection process is not yet fully understood. Using *Arabidopsis thaliana*, a member of the mustard family and *Nicotinia benthamiana* BY-2 cell culture as the binding target, we will evaluate several infection mutants using the methods developed for this study.

Bacterial attachment or adhesion has been measured through plate counts, microscopy and indirectly through transformation. The most common direct attachment measurements have used plate counts, which are labor intensive. To measure attachment we created an efficient quantitative measurement assay that improves upon the past methods. Using the flow cytometer, the number of bacteria attached to the root surface can be measured in a shorter time period. In addition we will use bead binding and plate binding assays to assess attachment of the mutant strains.

From these methods we can identify mutant bacterial clones, or mutant plant lines, which exhibit enhanced attachment or inhibited attachment. These methods will be useful in selecting high attachment and virulence mutants to be used in agricultural biotechnology and the high attachment, low virulence mutants can be used to prevent Crown Gall disease in crop plants.

BIO – 2 DETERMINATION OF *AGROBACTERIUM TUMEFACIENS* T-DNA CHROMOSOMAL INTEGRATION TIMING

Solomon Bisangwa (UN), Theodore R. Muth, Emmanuella Auguste and Monica Wat,
Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Agrobacterium tumefaciens is a soil bacterium which causes crown-gall disease in infected dicot plants. Crown-gall disease, marked by tumor growth, is the result of the transfer of tumor inducing genes from *A. tumefaciens* into the host's chromosome. Scientists have been able to exploit the ability of *A. tumefaciens* to introduce genes into plant genomes to create transgenic crops. The purpose of the experiment described here is to elucidate the timing of integration of the tumor-causing DNA into its plant host's chromosome. Roots of the plant *Arabidopsis thaliana* were infected with *A. tumefaciens* and genomic DNA was collected at six time points between 0 and 72 hours. Real-time PCR was then used to detect levels of bacterial DNA transferred into the plant root cells after different exposure times to *A. tumefaciens*. A bacterial chromosomal gene encoding a 16S chromosomal subunit protein and a Ti-plasmid gene, encoding the VirD2 protein, which is not transferred to the host, were used as controls for bacterial contamination and non-integrated Ti-plasmid genes respectively. The Real-time PCR results indicated that the template copies for the 16S bacterial chromosomal gene were present in comparable levels to the T-DNA. This suggests that there was too much bacterial contamination to come to a useful conclusion about integration timing. A more effective clearing of bacteria from the roots is required to assure that results are more reliable. PCR primer efficiency will also be standardized using *A. tumefaciens* genomic DNA.

BIO – 3 CAN FOLIC ACID REDUCE ANTIMICROBIAL DAMAGE IN *ESHERICHIA COLI*?

Ullah H. Mohammed (HS), Abraham Lincoln High School, Ocean Parkway, Brooklyn, NY
11235

Folic Acid is an essential organic molecule needed for the formation of nucleotides and hemoglobin in humans. It also lowers homocysteine levels in the blood which might reduce heart disease. This research project was designed to determine if folic acid enrichment may reduce cell damage in bacteria.

Folic acid was introduced to the culture media used to grow *E. coli*. In early trials 400 mcg of folic acid was added to two tubes of nutrient broth. One or two drops of hydrogen peroxide were added to one of the tubes. After 24 hours of incubation at room temperature the cultures were transferred to Petri

dishes containing nutrient agar. After 24-48 hours growth in these dishes were compared to cultures grown without additional folic acid. At this time, results show that bacterial growth of *E. coli* was slightly stimulated with additional folic acid. It was especially apparent in the cultures containing hydrogen peroxide. On the other hand, these findings suggest that it would be inadvisable to add folic acid to the diets of people being treated for bacterial infections, *E. coli* in particular. In general, caution is advised when taking food supplements. A very recent study published in the November 18, 2009 issue of The Journal of the American Medical Association indicated that although folate deficiency may promote cancer growth, excess folic acid accelerated the growth of tumors.

BIO – 4 PHYLOGENETIC ANALYSIS OF *COMOCLADIA* (ANACARDIACEAE) USING CHLOROPLAST AND NUCLEAR SEQUENCE DATA

Francine R. Camacho (HS), Brooklyn Academy of Science and the Environment and Brooklyn Botanic Garden, Susan K. Pell, Brooklyn Botanic Garden and John D. Mitchell, The New York Botanical Garden

The genus *Comocladia* contains ca. twenty species that are widely distributed in the Caribbean, northern Central America and Mexico. Species are shrubs or trees that are mostly unbranched and cause contact dermatitis. Phylogenetic data for the cashew family (Anacardiaceae) has previously indicated that the genus is monophyletic and sister to *Metopium* in a larger clade of other contact dermatitis causing genera. Limited *Comocladia* sampling in family level phylogenies and the recent discovery of a new *Comocladia* species in Belize and Guatemala led to an investigation of the phylogeny of this relatively unstudied genus. For this project, DNA was extracted from multiple samples of seventeen *Comocladia* species as well as eight samples of closely related genera. Sequence data from two genomes was utilized: cpDNA trnLF and rps16, and nrDNA ETS and ITS. The resulting phylogenies add greater support for the monophyly of *Comocladia* and its sister relationship with *Metopium*. Preliminary data indicate that the new species is sister to the Mexican species, *Comocladia engleriana*, a finding consistent with the current geography of these two species, but somewhat surprising in a morphological context.

BIO – 5 HOW EFFECTIVE ARE ESSENTIAL OILS COMPARED TO OVER-THE-COUNTER MEDICINE IN CURTAILING FUNGAL GROWTH?

Eugene Antaniak (HS) and Miranda Pereyra, Abraham Lincoln High School, Brooklyn, NY 11235

This project was design to test alternative treatments for fungal infections. Antifungal medications are available as over-the-counter remedies for fungal diseases of the skin. Some essential oils, such as cinnamon and thyme also have antimicrobial properties. Using these oils in varying concentrations may be effective antimicrobial substances. These oils may be used when standard medications cause allergic reaction. They may be more easily attainable and less costly in poorer regions of the world. Also, they may be effective and safe for use on crops.

Pure cultures of *P. notatum* and *A. niger* were transferred to petri-dishes containing potato dextrose agar using an inoculation loop. Each trial contained a control, an over-the-counter medication and essential oils of cinnamon, thyme, peppermint, jasmine, and lavender. 100% and 5% concentrations of alcohol and vegetable oil were used a solvents when the oil was diluted. Growth was monitored over a 5 day period.

Essential oils of cinnamon and thyme in concentration of 5% with alcohol and 5% with vegetable oil were as effective as over-the-counter fungal medications. When tested on strawberries, grain alcohol was substituted for isopropyl alcohol. It prevented mold growth for at least a one week period when compared to the control.

BIO – 6 DOES BACTERIAL EXPOSURE TO LOW DOSE U.V. RADIATION ALTER ANTIBIOTICS EFFECTIVENESS IN VITRO?

Jhoan Campusano (HS), and Crystal Hu, Abraham Lincoln High School Brooklyn N.Y., 11235

This project will determine what role if any, ultraviolet radiation have on the effectiveness of antibiotics on *Escherichia coli* and *Micrococcus luteus*.

For each trial, pure cultures of *Micrococcus luteus* were transferred to two Petri dishes containing sterile agar. One of the dishes was placed in sanitizing cabinet containing an ultra violet germicidal bulb for one minute. After 24 hours at room temperature bacterial growth from each of the 2 plates were transferred to two tubes containing nutrient broth. After another 24 hours the cultures were transferred to the surface of two Petri dishes. An antibiotic disk was placed in the center of each plate. After 24 hours the diameter of the zones of inhibition were measured in millimeters and compared. The results showed that after being exposed to UV radiation, bacteria were either more resistant to or more susceptible to antibiotics.

A second method used the antibiotics ampicillin, chloramphenicol, and tetracycline. An antibiotic disc was placed in the center of a Petri dish containing a bacterial culture of *E. coli* or *M. luteus*. The experimental dishes were then exposed to 2 minutes of radiation. Results showed all bacteria were more susceptible to antibiotics with larger zones of inhibition. *E. coli* and *M. luteus* are more susceptible to antibiotic damage when exposed to low dose ultraviolet radiation.

BIO – 7 ENDANGERED SEAHORSES FOR DINNER? *phyC* DNA SEQUENCE DATA IDENTIFIES SEAHORSES FOR SALE IN NYC CHINATOWN?

Ishmael K. Akahoho (HS), Marcia N. Foster, Dr. Pell, and Mrs. DeFelice, B.A.S.E. High School and Brooklyn Botanic Garden

Seahorses (genus *Hippocampus*) are endangered species, but up to now there has not been any conclusive way of telling which of the species being sold in different areas in the world are threatened or endangered. We decided to investigate the seahorse species sold in New York City's Chinatown to determine whether the species sold there are among those listed on the ***International Union for Conservation of Nature (IUCN) Red list***. Sequences of the cytochrome b gene were generated for each species that was purchased. The species identified were *Hippocampus trimaculatus*, *Hippocampus ingens*, and *Hippocampus algiricus*. *Hippocampus trimaculatus* and *Hippocampus ingens* are vulnerable to extinction according to the IUCN and *Hippocampus algiricus* is listed as "data deficient." The data from this research shows that *Hippocampus algiricus* is traded internationally and thus may be listed as threatened in the future. This shows that the rules for distributing seahorses should be strictly enforced.

BIO – 8 ANALYSIS TO DISCRIMINATE BETWEEN AGROBACTERIUM BIOVARS

Danielle Lombardi (UN), and Igor Britan, Dr. T. Muth, Department of Biology, Brooklyn College – CUNY, Brooklyn, NY 11210

Often in the course of microbiological research, it is necessary to identify closely related species of bacteria. *Agrobacterium*, which is both an important plant biotechnology tool and a harmful plant pathogen, infects economically important agricultural crops. *Agrobacterium* contains three unique biovars: *A. tumefaciens*, which causes crown gall disease; *A. vitis*, which causes tumors and necrosis on grapevines; and *A. rhizogenes*, which causes hairy root disease.

The goal of this experiment was to devise a procedure that would discriminate between similar strains of *Agrobacteria* using a new technique called High Resolution Melting (HRM).

The HRM procedure is able to both amplify and detect even a single base pair difference in the targeted amplicon. This single base pair variation can mean the difference between two strains of two very closely related species. In effect, this process avoids otherwise costly and time-consuming biochemical identification procedures.

Over the course of the semester, the experiments demonstrated that two biovars, *A. tumefaciens* and *A. vitis*, could be differentiated based on their unique melting curves. The next step is to expand on the initial experiment and use HRM for strain typing all *Agrobacterium* biovars. Currently, we are working on a pair of unique primers that can be used to amplify DNA from these three biovars and no other species to further increase the practical applications of our findings. In theory, a database can be compiled listing the standard melting temperatures of various species of *Agrobacterium*. This database could then be expanded to include other pathogenic bacterial species.

BIO – 9 INTERRUPTION OF MEMORY CONSOLIDATION IN FRESHWATER CRAYFISH

Christian Paylor-Smith (UN), Jennifer Basil, Ph.D. and Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

This experiment deals with crayfish memory and behavior. It is a four day experiment, and the crayfish must be able to run through the experiment everyday with approximately 24 hour intervals. This gives the crayfish enough time to consolidate memory. There are basically two parts to their brain. One is in their anterior dorsal cephalothorax while the other is connected to their eye stalks, and is called the Hemiellipsoid body. Our objective is to determine whether a crayfish stores their long term memory in the Hemiellipsoid body. We first let the animal explore and habituate to the tank/arena for 40 minutes for 3 days. We then cool the eye stalks for 20 minutes after the Day 3 trial. Previous experiments have shown that cooling the entire animal has inhibited memory to consolidate, and on the Day 4 trial, the crayfish has lost memory and has to re-habituate to the setting. Cooling just the eye stalks of the crayfish will result in the crayfish losing its long term memory. Similar results would indicate that crayfish store their memory in the Hemiellipsoid body.

BIO – 10 MORPHOLOGICAL AND MOLECULAR IDENTIFICATION OF GREAT SALT LAKE MICROALGAE

Cassana K. Fisher-Ramos (UN), Sophia Registe, Dmitry Brogun, Duc Tran, and Juergen Polle, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

The Great Salt Lake is one of the largest terminal lakes in the world. Although it exhibits unusual saline concentrations, it surprisingly is home to a wide variety of living organisms including microalgae and brine shrimp. The Utah aquaculture industry at the Great Salt Lake heavily relies on brine shrimp, which feed on microalgae such as *Dunaliella* and diatoms. Identifying the microalgal populations, which promote a healthy increase in brine shrimp growth and populations will be beneficial to the aquaculture industry. To this end, biweekly sampling from different lake locations is conducted. Cells are cultivated on a medium, which mimics their natural habitat by providing the appropriate salt and mineral concentration. After two weeks of exposure to continuous daylight fluorescence light of $\sim 50 \mu\text{E m}^{-2} \text{s}^{-1}$, an assessment of the different microalgal population is made by counting the colonies. The sampling process is followed by cell sorting algal samples to isolate unialgal populations for identification. Isolates are then examined by light microscopy as well as subsequent DNA isolation and nuclear rDNA internal transcribed spacer regions (IT)

BIO – 11 IS THE G1 CELL CYCLE FACTOR CDK-4 NECESSARY FOR PROLIFERATION OF GERM CELLS IN CAENORHABDITIS ELEGANS?

Maria Mercedes (UN), Paul Fox and Tim Schedl, Ph.D. Department of Genetics, Washington University School of Medicine 660 S, Euclid Ave St. Louis, MO 63110

The nematode *Caenorhabditis elegans* is a model research organism used to study animal development, including development of the germline. One area of interest is to understand the cell cycle of the germline proliferative zone as a model of stem cell biology. Previous cell cycle kinetic studies by Paul Fox indicate that, similar to embryonic stem cells in numerous organisms, the germline proliferation zone in *C. elegans* lacks the gap 1(G_1) cell cycle stage, from mitosis to S phase. Currently, it is not well understood how cell cycle regulation in these cell types may be different from cell cycle regulation in general. In a typical cell cycle containing G_1 , progression through G_1 requires the cyclin dependent kinase CDK4. For example, a *cdk-4* deletion in *C. elegans* results in larval lethality due to cell cycle arrest. However, since germline cell cycle progression lacks G_1 , we hypothesized that the G_1 cyclin-dependent kinase 4 (*cdk-4*) may be dispensable for the germline cell cycle in *C. elegans*, suggesting novel regulation of cell cycle. In order to test this hypothesis, we decided to analyze germline proliferation in a *cdk-4* loss-of-function mutant. However, since *cdk-4* mutant animals have a larval lethal phenotype, we needed to create genetic mosaic animals that lack *cdk-4* function in the germline but not in somatic cells. For this, I used a strain containing a homozygous *cdk-4* null mutant in the genome that was rescued by a mitotically unstable extrachromosomal array that contains a wild-type allele of *cdk-4*. Among progeny that inherit the

extrachromosomal array through meiosis, loss of the array in mitotic cell divisions during development will generate mosaic animals. For the purpose of my experiment, a mosaic animal that lacks *cdk-4* in the germline was identified based on all its progeny showing a larval arrest phenotype (mother failure to transmit the array). I then examined the germline of these mosaic mothers and found that such mosaic animals had normal proliferation in the germline. According to this result, I conclude that *cdk-4* is not necessary for germline proliferation in *C. elegans*. This supports the notion that *C. elegans* germline putative stem cells lack a G1 stage and possess a unique form of cell cycle regulation

BIOL – 12 MICROALGAE AS A SOURCE FOR BIOFUELS

Rachele Dolce(UN), Eliza Wiech, and Juergen Polle Department of Biology, Brooklyn College of the City University of New York, 2900 Bedford Ave 200NE, Brooklyn, NY 11210, USA
The Graduate School and University Center, CUNY, 365 Fifth Avenue, New York, NY 10016, USA

In producing a renewable fuel of the first generation, corn has been the dominant feedstock source to generate ethanol. However, other studies showed that microalgae are a better feedstock for biofuel generation. Microalgae are unicellular photosynthetic organisms that are very diverse, grow relatively fast and adapt to almost all environments. Many microalgae can grow in saline or wastewaters and do not require agricultural land. Consequently, there also exists no dilemma for food or for fuel production. In considering the high price and the competing demand for oil, microalgae have become a forerunner for biological oil production. The goal of the project is to study algae as a feedstock for renewable oil production.

The main objective of this project is the screening of algal strains for lipid production. The first step in this project is to collect strains from different locations to ensure a great diversity of the collected samples. The collected environmental samples were grown in different media. The initial isolates were inoculated into liquid media and then cell sorted using flow cytometry. Screening of the resulting new strains of algae for lipid accumulation was done using Nile Red, a fluorescent dye that binds to neutral lipids triacylglycerides, TAGs. The expected outcome of this project is the identification of algae with high content of neutral lipids that can be potentially used for algal lipid production.

BIO – 13 FLOCCULATION OF FLO11

Esther Jean Gilles (UN), Cho Tan, Peter N. Lipke Department of Biology, Brooklyn College, Brooklyn, NY, USA

Flocculation is cell-to-cell interaction that leads to the formation of clumps. This interaction requires the Flo gene family that encodes calcium-dependent cell surface flocculins. Previous studies on Flo11 by Ramsook et al. (2009) have shown the amyloid-specific dye thioflavinS (THS) to inhibit flocculation whereas related dye thioflavinT (THT) potentiates flocculation. Our current studies assay the effects of the two dyes on flocculation of the flocculin-expressing yeast cells. Comparative studies of Flo11 yeast (Wt) cells vs. yeast cells mutant without Flo 11 (5B) were conducted. The decrease in optical density at 600nm in a spectrophotometer over a five minute period was used to determine the rate of flocculation of these two variants in the presence of amyloid dyes THS, and THT. Fluorescence microscopy was employed to visualize the flocs formed. Preliminary results showed that the THS was able to inhibit the flocculation caused by THT. The addition order of the dyes played a role on the rate of flocculation. But when the Flo11 Wt was treated with a mixture of THT and THS, the degree of flocculation was similar to the control with no added dye. These results indicate that the Flo family of gene is required for flocculation, and that the amyloid region within the yeast cell's surface can regulate flocculation.

BIO – 14 EXPLORING MICROALGAE AS NEXT GENERATION FEEDSTOCKS FOR BIOFUEL PRODUCTION

Ahmed Mirza (UN), Juergen Polle, and Andy Huang, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

With an ever more growing concern to become self-sufficient and independent of fossil fuels in the face of a highly volatile global petroleum market, several institutions under the auspices of the US government are actively engaged in the research and development of biofuels derived from

microalgae. To date there are only a few types of microalgae that have been selected for feedstock production in mass culture. Although the technologies for outdoor algal mass cultures have been available for decades, commercial cultivation of microalgae for bio fuels has not reached the cost point for feasibility. To increase the productivity of algal cultures, one option is to identify new strains that have superior characteristics for oil production. As the term microalgae refers to a very large and diverse group of photosynthetic organisms with different metabolic properties, it is hypothesized that an excellent production strain could already exist somewhere in nature, but it has not been identified yet. To identify new strains that could potentially be used later for mass-production of biofuels, we used a variety of sampling sites representing very diverse and often extreme environments. Following sampling, high-throughput isolation of strains is achieved by use of a cell sorter. After isolation new strains they are screened for triacylglycerides using a protocol involving the fluorescent dye Nile Red. Recent results regarding isolation and screening of new strains will be discussed in the framework of national efforts in the area of algae biofuels.

BIO – 15 THE EFFECTS OF AMPHOTERICIN B ON *SACCHAROMYCES CEREVISIAE* YEAST CELLS EXPRESSING ALS PROTEINS FROM *CANDIDA ALBICANS*

Mir Raza (UN), Melissa Garcia, and Peter N. Lipke, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

C. albicans are naturally found in the oral cavities and gastrointestinal microflora, however the fungi is the fourth most common cause of hospital acquired infections in chronically ill patients. The yeast creates highly drug-resistant biofilms by adhering to surfaces and growing numerous micro-colonies. Eight ALS proteins, found in the cell walls of *C. albicans* allow these cells to readily adhere to any surface. The model system in this study consists of *S. cerevisiae* cells which express ALS5 or ALS1 proteins. These cells were treated with different concentrations of Amphotericin B, placed in a plate with plastic wells, washed after 1.5 hours and were allowed to grow and adhere overnight. The cells were washed with buffer to remove non-adherent cells and the adherent cells were stained with Crystal Violet. The dye from the adherent cells was released by adding 10%SDS and the absorbance was measured. 10-70 µg/ml of Amphotericin B lowered the absorbance values of the cells expressing ALS proteins by half, but had no effect on the control cells without any ALS proteins. This suggested that Amphotericin B inhibits the adherence of *S. cerevisiae* cells which express ALS5 or ALS1 proteins by killing the yeast. Lower concentrations of Amphotericin B will be tested to find if the anti-microbial can inhibit adherence of the cells with minimal toxicity. On a biomedical level, inhibition of adherence of the cells means that the infections caused by *C. albicans* may be easier

BIO – 16 SOIL ISOLATES THAT CAN DEGRADE ASCETOSYRINGONE

Laura M. Senatus (UN), **Karla S. Dixon**, Brian E. Ford and Theodore R. Muth
Brooklyn College, Brooklyn, New York 11210, United States Microbiology, Department of Biology

A well-established component of the plant-wounding pathway, acetosyringone induces virulence factors in the plant pathogen *Agrobacterium tumefaciens*. Found in soil, *A. tumefaciens* causes a disease known as crown gall disease in many plant species, primarily dicots. This ubiquitous plant pathogen is responsible for tremendous agricultural losses as it reduces crop yields in both agriculture and viniculture. Any method to block this plant-pathogen recognition mechanism would save the agricultural industries countless dollars.

The current study proposes to identify a bacterial strain capable of metabolizing acetosyringone. We hypothesize that such a bacteria cultured on or around agricultural crops would attenuate or hide the plant-wounding signal from *A. tumefaciens*. Two distinct and separate methods will be used to isolate an acetosyringone-metabolizing strain of bacteria, direct and indirect. The first method has the benefit of identifying directly the organism responsible (but not the gene). The second method would identify the gene of interest (but not the organism). The second method would avoid the well-established problem that over 99% of identified bacteria are not able to be cultured under laboratory conditions. We have observed fungal but not yet bacterial growth from the direct method and are establishing the protocols for the indirect method. *Supported by NIH-NIGMS MARC GM008078*

BIO – 17 IDENTIFICATION OF BACTERIA IN THE URBAN ENVIRONMENT BY PCR USING UNIVERSAL BACTERIAL 16S rDNA PRIMERS

Theodore R. Muth, Mike Golabek (GRAD) Mike Anthony, and Gabrielle Yarru, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Determining the diversity of microorganisms around us is very difficult due to the inability to culture many of them on plates. Metagenomics, the study of genetic material recovered directly from environmental samples, is one technique that allows us to elucidate the variety of microorganisms in our environment. By carefully examining various different methods for the sampling, testing out various DNA isolation and cloning kits and using different sets of universal bacterial 16S rDNA primers, we look to develop an efficient and effective protocol that will help us determine the diversity and relative abundance of different species of bacteria in the urban environment.

Eventually, the protocol that provides the best results will be used to identify and track the dynamic nature of bacteria in the urban environment over an extended time period. A study such as this can provide us with much information about the impacts of human beings and urbanization on the bacteria living in such an environment and if urban environments can serve as long-term reservoirs for potential human pathogens.

BIO – 18 CHARACTERIZATION OF THE FERM DOMAIN OF SIX MYOSINS ISOFORMS IN *TETRAHYMENA THERMOPHILA* VIA COMPUTATIONAL ANALYSIS

Che Martin (GRAD), and Shadi Pooyae, Shaneen Singh Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Myosins, (MYO) constitute a diverse family of molecular motor proteins involved in various cellular functions. The adaptability of these motors, depends critically on their C-terminal multi-domain tail region which allows them to bind to a wide variety of cargo molecules. One of the domains found in the tail region of 6 *Tetrahymena* myosin isoforms is the Four point-1, ezrin, radixin and moesin homology (FERM) domain. This FERM domain is believed to be involved in the linkage of cytoplasmic proteins to the membrane. Recent findings indicate that mutations in myosin can result in various clinical and genetic diseases; hence, this highlights the relevant importance for the characterization, and understanding of the domains within the tail region of Myosin.

Through the implementation of bioinformatics and proteomic tools, we have determined the tertiary structures and electrostatic characteristics for 6 of *Tetrahymena*'s 14 myosin isoforms: MYO1, MYO2, MYO5, MYO 7, MYO9 and MYO_PUT. The results presented here will provide a basis for further insight into how mutations in the tail region of different myosins could lead to diverse physiological conditions.

BIO – 19 COMPUTATIONAL MODELING OF CYCLOOXYGENASE AND LIPOXYGENASE IN *DROSOPHILA*

Yan Qi (GRAD), Jin Zhang, Department of Biology, Graduate Center-CUNY, New York, NY 10016 and Shaneen Singh, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Eicosanoids are important mediators in animals. They are involved in reproduction, immune system, ion transport and etc. Eicosanoids are oxygenated from C20 polyunsaturated fatty acids. Mammalian eicosanoid biosynthesis has three pathways, COX (cyclooxygenase) pathway, LOX (lipoxygenase) pathway, and epoxygenase pathway. However, little is known about enzymes in eicosanoid biosynthesis in *Drosophila*. In this study, we have attempted to identify the various components of the COX and LOX pathway in *Drosophila* using computational techniques. Confirming the existence of eicosanoid pathway in *Drosophila* will enable us to study the role of this pathway in signaling and inflammation.

COX, also called prostaglandin synthase, is the key enzyme in COX pathway, and it is essential for the synthesis of prostanoids, which are signaling molecules in inflammation. COX exists widely in vertebrates and invertebrates, and it plays an essential role in regulation of inflammation, which makes it the target of non-steroidal anti-inflammatory drugs (NSAID) such as aspirin. We show that the

Drosophila melanogaster protein, pxt is likely to be the key enzyme in this pathway using computational approaches.

In the LOX pathway, LOX converts arachidonic acids into HPETE (hydroperoxyeicosatetraenoic acid) and then HPETE can be reduced by PHGPx (phospholipid glutathione peroxidase) with thiols into HETE (hydroxyeicosatetraenoic), or further oxidized into LTA4 (lipoxygenase A4) or lipoxins by lipoxygenases. LTA4 is unstable and then be hydrolyzed by LTA4H into LTB4, or converted by LTC4 synthase into LTC4. LTB4H (LTB4 12-hydroxydehydrogenase) oxidized LTB4 into the final product 12-oxo Leukotriene. Using different computational tools, we have identified, modeled and analyzed several of the above described enzymatic components of this pathway.

BIO – 20 STUDY OF THE CATALYTIC MECHANISMS OF KATG: AN ENZYME INVOLVED IN THE VIRULENCE AND ANTIBIOTIC RESISTANCE OF *MYCOBACTERIUM TUBERCULOSIS*

Rabia Iqbal (HS) and Richard S. Magliozzo, Ph.D, Midwood High School and Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

The KatG enzyme in *M. tuberculosis* allows this pathogen to survive in the human body by degrading toxic H_2O_2 through the catalase cycle ($2H_2O_2 \rightarrow H_2O + O_2$). The project investigated the cause for the observance of Compound III of the catalase cycle after KatG degraded an excess of H_2O_2 and a lower catalase activity in these conditions. Spectrophotometric assays of purified *M. tuberculosis* and *B. pseudomallei* KatG were performed to determine if catalase activity recovered. Optical spectra of treated KatGs were recorded to reveal loss of heme. Catalase assays were performed and optical spectra recorded of KatG treated in excesses of PAA. Treatment of KatG with a 125,000 fold excess H_2O_2 resulted in almost full recovery of catalase activity after a 15-minute resting period. Pyridine hemochromogen assays showed that the observed loss of heme at higher excesses was due to its breakdown and not due to its transformation into a different heme species. The results supported a recently proposed model of the catalase cycle in Suarez et. al (2009) by showing that there is a temporary loss of catalase activity due to accumulation of Compound III, after whose decays allows KatG recovers activity. Treatment of KatG with PAA resulted in more heme damage because its catalysis yields peroxyl radicals.

BIO – 21 STRUCTURAL BASIS FOR HISTONE ACETYLLYSINE READOUT BY DPF3 DOUBLE PHD FINGER

Farhana Pinki (HS), and Haitao Li, Midwood High School and Structural Biology Program, Memorial Sloan-Kettering Cancer Center, NY, NY 10021

DPF3, characterized by a double plant homeodomain (PHD) finger is an epigenetic factor that regulates muscle development notably of the heart, and is a histone acetylation and methylation reader of the BAF chromatin remodeling complex (Lange et al., 2009). DPF3 represents the first PHD finger characterized to bind acetylated lysine residues on histone proteins, which is a function previously identified only for bromodomains (Lange et al., 2009). This study sets out to identify a new crystal structure of DPF3 double PHD finger without the blockage of the peptide binding surface on the free form state of DPF3 caused by crystal packing by designing the DB2 construct. This was done by engineering a mutant bromodomain from human Bromodomain and Plant Homeodomain Transcription Factor (BPTF) after the double PHD finger sequence of DPF3. Through techniques of molecular cloning, protein purification, crystallization, and x-ray crystallography, the free form structure of DB2 was solved at approximately 3.5 angstrom. The recently solved crystal structure of DPF3-DB2 in the free form state demonstrated that the potential peptide binding surface was open to solvent. Nuclear magnetic resonance confirmed that both pockets on DB2 participate in peptide binding. The results of this study are of significance because they provide means to solve the complex-structure of DPF3-DB2 with histone H3 acetylated at lysine 14 (H3K14ac), which will be of use in identifying new forms of gene regulation, expression and other implications of chromatin-remodeling complexes.

BIO – 22 HOW MANY GENES CONTROL GAMETE FUSION IN *CHLAMYDOMONAS*?

Ting-Yi Lai (UN), **Natasha Lamont**, **Rina Shrestha**, **Michael Fong**, **Christina Savchik**, **Ananda Das** and Charlene L. Forest, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

Chlamydomonas reinhardtii is a model organism used to study gamete fusion. We have used temperature sensitive and insertional mutants which are able to agglutinate but not fuse. Our main objective is to identify genes responsible for gamete fusion. A fusion-defective *Chlamydomonas* mutant (*fusM*) has been shown to affect a homolog of the gene *gsc1* in lily. In order to determine whether this gene is defective in our mutants, we complemented them with the *wt* version of the *gsc1* gene. We used a plasmid as well as a BAC from the *Chlamydomonas* BAC library (both containing the *wt* version of this gene). The plasmid and BAC were isolated from *E. coli* using the QIAGEN Plasmid midi kit and the *Chlamydomonas* cells were transformed using Kindle's glass bead method. Half of our mutants recovered the *wt* phenotype following transformation, suggesting that more than one gene is involved in fusion. To further analyze the gene causing the fusion defect, PCR will be used to amplify regions of the *gsc1* gene in *wt* and the mutants that were successfully complemented, and the products can then be sequenced and compared. We are currently running SiteFinding PCR to identify whether one or more additional genes prevent gamete fusion in our mutants that have not been complemented with the *gsc1* gene. We hope both sequencing and SiteFinding PCR will allow us to locate all the genes needed for fusion in this organism.

BIO – 23 WHAT CAUSES DEFECTS IN SEXUAL FUSION? USING *CHLAMYDOMONAS REINHARDTII* TO UNDERSTAND HUMAN FERTILIZATION.

Melissa Aristede(UN), **Shirlanna Alexis**, **Louana Cheung**, **Arwa Gabr**, **Akil Hutchinson** and Charlene L. Forest, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

Chlamydomonas reinhardtii is a single celled green algae used as a model organism to understand sexual fusion. Like sperm and egg in humans, *C. reinhardtii* have two mating types, *mt+* and *mt-*, and can be used to understand issues in human fertilization. We have been working with conditional mutants and mutants created by insertional mutagenesis that are fusion-defective (they can recognize each other and adhere, but cannot fuse). Using the BAC 2F16, which contains a functional copy of the *GCS1* gene discovered elsewhere, each of the mutants has undergone transformation to see if there is any complementation. If the mutants are complemented, they regain their ability to fuse, indicating that a mutation in the *GCS1* gene is responsible for their defect in sexual fusion. At this time we have been able to complement about half of the mutants we have tested. Using PCR, we can sequence the *GCS1* gene in each of these complemented mutants. We can then compare the sequence with the wild type, using bioinformatics. If an insertional mutant is not complemented, SiteFinding PCR can be used to determine where the mutated gene is located in the *Chlamydomonas* genome. Complementation experiments are also performed for the temperature sensitive, UV induced mutants. However, because they have point mutations, we cannot use SiteFinding PCR. With these concurrent experiments running, we hope we can begin to understand what genes are directly responsible for sexual fusion in *Chlamydomonas* and if there are additional genes that play other roles in fertilization. Supported by a grant from The Eunice Kennedy Shriver National Institute of Child Health and Human Development.

BIO – 24 ISOLATION AND SCREENING OF MICROALGAL STRAINS FOR POTENTIAL USE IN BIO-FUEL APPLICATIONS

Robert Burns¹(UN) Dmitry Y. Brogun^{1,2}, Neha Shaik¹, Jürgen E.W. Polle^{1,2} Brooklyn College¹, Department of Biology, CUNY, 2900 Bedford Avenue Brooklyn, NY 11210 Graduate School and University Center², Division of Molecular, Cellular and Developmental Biology, CUNY, 365 Fifth Avenue, New York, NY 10016

Photosynthetic microorganisms are attracting considerable interest in the effort for developing renewable energy sources due to their high photosynthetic conversion efficiencies, diverse metabolic capabilities, superior growth rates and their ability to store energy-rich hydrocarbons. Microalgae are one type of these photosynthetic microorganisms capable of harvesting solar energy while converting CO₂ and water to organic macromolecules, which can provide several different types of renewable biofuels. With concerns about petroleum supplies and costs as energy demands grow worldwide the potential use of microalgal feedstocks for biofuels production has gained significant momentum over the past few years.

For biofuel production one of the most important features of microalgae is their ability to synthesize triacylglycerides (neutral lipids) and isoprenoids under stress conditions, because these molecules can be used to generate oil. Isoprenoid biosynthesis, offers an even richer source of next-generation biofuels than triacylglycerides. With the ability to produce branched-chain and cyclic alkanes, alkenes and alcohols of different sizes with diverse structural and chemical properties, this pathway could produce fuels or precursors to gasoline, diesel, and jet fuel additives or substitutes. Goal of this project is to isolate new microalgal strains that are potential sources of feedstock for oil production, and to screen these new strains based upon their growth rate and lipid concentration. This might subsequently lead to the development of cost-effective production of biofuels and biodiesels.

BIO – 25 COMPUTATIONAL ANALYSIS OF THREE LIPID BINDING DOMAINS IN ARABIDOPSIS THALIANA.

Itrat Fatima (UN), Husna Shaik and Richard Napier, Shaneen Singh Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Arabidopsis has one of the smallest plant genomes and was the first plant genome to be sequenced and use as part of many researches. In this study we use this model organism to understand the role and mechanism of three different lipid-binding domains that are key components of many different signaling pathways in plants. The three domains are the PX, the GRAM and the Sec-14 Domain. The phagocyte oxidase homology or PX Domain which has been implicated in membrane targeting and the recognition of lipids, called phosphoinositide, that are also important secondary messengers of signaling pathways. The importance of the structure and associated function of this domain in lipid binding remains highly understudied in plants. The GRAM Domain is approximately 70 amino acids in length and the secondary structure shows four beta strands and each of them contains a conserved aromatic amino acid residue. One of our main goals is to show where the actual GRAM domain is located in different proteins. The Sec-14 Domain is ubiquitous in eukaryotes, found mainly in phospholipids transfer proteins it is involved in the transfer and trafficking of vesicles, proteins and lipids from the Golgi apparatus. Its structure and role has been researched extensively in yeast and other eukaryotes, yet not much has been studied about this domain in plants. This study through the use of computational techniques, attempts to fill this void by trying to identify, model, analyze, and annotate functionally all PX, GRAM and Sec-14 Domains found in the genome of Arabidopsis.

BIO – 26 FLIGHT ACTIVITY PATTERN IN MONK PARAKEETS (*MYIOPSITTA MONACHUS*)

Fa'iz Bayo-Awoyemi ^{*1} (UN) and Frank W. Grasso ^{1,2} ¹The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ²Program in Ecology, Evolution, and Behavior, The Graduate Center, CUNY

Monk parakeets (*Myiopsitta monachus*) are an invasive parrot species native to Argentina. They are unique in their year round inhabitation and maintenance of large multi-chambered stick nests. The observation that monk parakeet's daily activities are centered on their nests with several daily departures and returns led us to hypothesize that the nests form a hub for organizing flocks for excursions such as foraging. Day long surveillance of one parakeet nest was recorded on VHS tapes on the Brooklyn College Campus. We measured the frequency of three types of parakeet flight activity starting at 12PM, in consecutive 5-minute periods over 6-hour observation bouts: local-flights (flights that began and ended on the nest), in-flights (arrivals at the nest) and out-flights (departures from the nest). We performed an autocorrelation analysis on each of the variables. There were 72 data points in total and we used a maximum lag of 69. The results showed a statistically significant ($p < 0.05$) cyclic pattern in the parakeet's total measured flight activity; every 100 minutes, there was a 15 minute period of no flight activity, which was preceded by bouts of high activity at the nest. During these periods, the birds were on some occasions, observed to enter the nest chambers as a group following their quiet periods; on others, the birds were observed to depart the nest as a group. We suggest that these periods of low locomotor activity involving groups of birds at the nest support the coordination of group activity between excursions from the nest.

BIO – 27 SEASONAL CHANGES IN NEST MAINTENANCE BEHAVIOR OF MONK PARAKEETS (*MYIOPSITTA MONACHUS*)

Christopher L. Petersen^{*1} (UN) and Frank W. Grasso ^{1,2,1}The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ²Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY

Monk Parakeets (*Myiopsitta monachus*), though native to Argentina, are an invasive parrot species found throughout North America and Europe. Their communal maintenance and year-round inhabitation of large, multi-chambered stick-nests is unique amongst parrots and birds in general, who tend to transiently build nests during the mating season. We present findings on an intensive focal studies of 2 nests located on the Brooklyn College campus for which extensive activity data were available from Spring of 2001. We made video recordings of nest-construction behaviors over a 6-month period that spanned the mating, egg incubation and fledging periods. From these videos we scored the frequency with which the parakeets added, manipulated, relocated, and removed sticks from these nests. From these analyses, we developed a measure of nest maintenance activity. We found that stick addition $F(2,62) = 4.47$, $p < 0.01$ and on-nest stick manipulation $F(2,62) = 4.97$ $p = 0.01$ were highest during the incubation phase followed by a precipitous drop in the fledging period. Two forms of stick relocation (within and between chamber) were highest during the mating phase $F(2,62) = 10.21$ $p < 0.01$, and 3.14 $p = 0.05$ respectively. We conclude that nest maintenance activities vary with different phases of the monk parakeet breeding cycle. Taken together these results provide evidence consistent with the idea that nest construction serves as a social display associated with mate selection in this species.

BIO – 28 NEST SITE SELECTIVITY IN MONK PARAKEETS

Jennifer L. Tortorici¹ (UN) and Frank W. Grasso ^{1,2}, Department of Psychology, Brooklyn College CUNY Brooklyn, NY, 11220¹The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ²Program in Ecology, Evolution, and Behavior, (Biology) and The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY

The aim of this study was to identify environmental variables that influence nest location selection in Monk Parakeets (*Myiopsitta monachus*). Monk Parakeets are an invasive species, native to Argentina, that has colonized much of the United States, including Brooklyn. Data on the types of sites Monk Parakeets prefer to nest in would be helpful to manage the risks this species poses to agriculture and urban infrastructure. We measured seven environmental variables (Small Trees, Medium Trees, Large Trees, Utility Poles, % Green Space, Distance to Green Space, Distance to Water) in 20 randomly selected, 4 square block quadrants in Brooklyn. 10 quadrants contained a current or former Monk Parakeet nest site, and 10 were randomly selected from quadrants unoccupied by monk parakeets. A Pearson product-moment correlation coefficient was computed to assess the relationship between presence of nest sites and the measured variables. There was a significant positive relationship [$r(18) = 0.45$ $p < 0.05$] between the presence of nest sites and the number of Medium (10-30ft) sized trees. None of the other variables showed significant correlations. The results show that Monk Parakeets prefer to nest in areas with a higher number of trees, but interestingly not green-space per se, and in particular areas with a higher number of 10-30ft trees. The Brooklyn population of Monk Parakeets nest in man-made structures such as utility poles rather than in trees, suggesting that the medium sized trees serve a different purpose than providing nesting sites.

BIO – 29 TACTILE LEARNING ABILITIES OF FRESHWATER CRAYFISH IN A NOVEL TOPOGRAPHIC ENVIRONMENT (*PROCAMBARUS CLARKII*)

Sunil Ramachandi^{*1}(UN) Stephen Volz ² and Frank W. Grasso ^{1,2,31}The BioMimetic & Cognitive Robotics Lab, Dept of Psychology, Brooklyn College, CUNY ² The Cognition Brain and Behavior Program (Psychology) The Graduate Center, CUNY³Program in Ecology, Evolution, and Behavior, (Biology) The Graduate Center, CUNY

Previous studies of Australian crayfish, *Cherax destructor*, have provided evidence of habituation to a topographic environment based on tactile information obtained through their antennae. These studies have demonstrated dishabituation following an environmental configuration change, indicating the ability to recognize the distribution of spatial landmarks. We undertook parallel investigations of these

behaviors in the American crayfish, *Procambarus clarkii*, in an effort to substantiate and expand on these findings. Blindfolded subjects were placed in a rectangular arena for 40 minutes a day for 10 days. The arena's configuration contained a set of protruding obstacles, paired along the north and south or east and west walls which changed on the 5th and 9th trial. These configuration changes were implemented to observe dishabituation, an increase in exploratory behavior in response to a topographic change made to an environment to which the animal habituated. Habituation was evidenced by a decrease in exploratory behavior, resulting from repeated exposure to a static environment. The animals' motor activity was recorded by an overheard camera and the video was subsequently scored to measure the total distance traveled and velocity for each crayfish. Significant habituation and dishabituation effects were not found. We believe the lack of habituation and dishabituation may be attributed to a species difference, as preceding work done on tactile learning have investigated other species of freshwater crayfish. Furthermore, comparative studies of brain morphology amongst species of freshwater crayfish allude to *Procambarus clarkii* as a species which is heavily reliant on visual input to drive behavior.

BIO – 30 NUCLEOLIN DEPHOSPHORYLATION DIFFERENTIALLY REGULATES p14ARF AND HDM2

***Tabitha Julien**(UN), *Elif Caglar, Dibash Das, Ankuri Desai and Anjana D. Saxena, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210, * Equally contributed

Nucleolin is a major nucleolar phosphoprotein that is involved in ribosomal RNA processing, RNA polymerase I-catalyzed transcription, and the regulation of apoptosis. We previously demonstrated that human nucleolin binds to the p53-antagonist Hdm2 and inhibits Hdm2-mediated degradation of p53. Stabilization of p53-tumor suppressor protein is an important cell cycle check point that either arrests growth of a damaged cell or targets it to programmed cell-death, an effective natural cancer therapeutic.

Further, mobilization of certain nucleolar factors (e.g. nucleolin, nucleophosmin, p14ARF-Alternate Reading Frame) upon varied cellular stresses has been implicated in Hdm2 inhibition leading to p53-stabilization. We propose that nucleolar nucleolin and p14ARF proteins inhibit nucleoplasmic Hdm2, in two parallel pathways. Here we study the role of nucleolin-wild type (Nu-wt) and its various mutants in targeting p14ARF and Hdm2 by a dual approach of immunofluorescence microscopy and Western blotting.

Our preliminary data suggests that nucleolar nucleolin (Nu-wt) does not alter p14ARF localization although dose-dependent inhibition of p14ARF was revealed. On the other hand, nucleoplasmic nucleolin (as observed with dephosphorylated mutants and over-expressed wt protein) mobilizes p14ARF leading to its faster degradation. While Hdm2 localization largely remained unchanged, more decrease in expression was observed with increased nucleoplasmic nucleolin. Further inducible nucleolin-wt and -2TM expressing cell lines are under investigation for p53 expression.

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BIO – 31 BIOINFORMATICAL INVESTIGATION OF PROLYL AMINOPEPTIDASES IN C.ALBICANS GENOME

Darya Karabasheva (UN), Rafael Ovalle, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Candida albicans is an opportunistic pathogen which is the cause of many different infections in humans. Although no single factor accounts for *C. albicans* virulence, it is suspected that inhibiting activity of prolyl aminopeptidases (PAP) might interfere with its growth. Previous research has shown that prolyl proteases are essential for virulence in pathogenic bacteria; however, there is no evidence that this class of enzymes may be involved in enhancing the virulence of the pathogenic yeast. Based on the criteria imposed by specific structural components of PAPs we have used bioinformatics to detect four ORFs in *C.albicans* genome that show homology to prolyl proteases of *Serratia marcescens*, *Xanthomonas campestris*, *Thermoplasma acidophilum*, and *Saccharomyces cerevisiae*.

BIO – 32 AMYLOID FORMING PEPTIDES IN FUNGAL ADHESINS

Gregory Soybelman(UN)¹, Caleen B. Ramsook¹, Raymond G. Fung^{1,2}, and Peter N. Lipke¹.¹Department of Biology, Brooklyn College of CUNY, Brooklyn, NY, 11210 and² The Graduate School of CUNY, New York, NY 10016

Several adhesins in *Candida albicans* have been studied for their amyloid forming potential and their function in binding in both intercellular membranes and in biofilms. Of the 8 Als genes in *C. albicans*, Als5p, among other adhesins from different families are the focus in this amyloid study. Als5p consists of several regions that denote various functions for the peptide. These regions were studied for potential amyloids and identified using TANGO, which uses bond interactions and structure morphology to predict antiparallel beta-sheet formation and thus amyloid structure. We also searched for other fungal adhesins with β -aggregation forming sequences using TANGO and synthesized three more peptides. The *C. albicans* Als5 peptide, SNG (SNGIVVATTRTV), has a 90% β -aggregation potential and forms amyloids (Otoo, et al, Euk. Cell, 7(5): 776-782, 2008). The two additional peptides, from *C. albicans* Eap1 adhesin (HTAVTTGVTIITVTTND) and *Saccharomyces cerevisiae* Flo1 adhesin (TDETVIVIRTP), have aggregation potentials of 90% and 42% respectively, and were studied for amyloid formation. Soluble Als5 and Flo11 were also tested. Peptide interactions were analyzed by circular dichroism (CD), absorbance and fluorescence spectroscopy to monitor secondary structure and amyloid formation. CD spectra showed unstructured random coil for both Eap1 and Flo1 peptides in buffer, changing to β -aggregate, after stirring to induce amyloid formation. The stirred solutions of both Flo1 and Eap1 peptides, Als5 and Flo11 proteins showed an increase in Congo Red absorbance and had an enhanced thioflavin-T (Th-T) fluorescence. These results with Eap1, Flo1, Als5p and Flo11 suggest a conformational change from non-amyloid characteristics to amyloid formation after stirring and time in buffer. Therefore, sequences from multiple fungal adhesins show conformational changes leading to amyloid formation.

BIO – 33 ADJUSTING CONDITIONS TO YIELD REPRODUCIBLE RESULTS FOR M.A.L.D.I.MS-TOF

Deon Marecheau (HS), Barrington Harvey & Steven H. Kaye, James Madison High School

MALDI-TOF MS detection of biomarkers desorbed from whole cells is an emerging technique potentially applicable to the identification of biological processes, microorganisms, and behavior of proteins at different levels. In this experiment, the reproducibility of MALDI will be questioned and tested. Current approaches to improve the analytical performance of MALDI protein profiling include automated sample processing, prestructured target surfaces, standardized matrix crystallization, and algorithms for normalization and peak detection. In this experiment, standardized matrix crystallization, automated sample processing, and prestructured target surfaces will be experimented on. The objective here is to use MALDI as a quantitative tool rather than qualitative. During the course of this experiment were an Acetonitrile, and Tri-Fluoro-Acetic acid would be used in cahoots with CHCA Ethanol Matrix precipitate and Synthetic peptides. A MALDI MS-TOF machine will be used to analyze the peptide. The peaks produced by the spectrum will be compared by specific ratios of the gram molecular weight, peak to peak. What this shows us is how close the laser intensities are close to each other, and in turn, the reproducibility. During the course of the experiment, it was noticed that the peak intensity vary highly between individual peptide peaks, with a mean from 5% to 45% on some occasions. CONCLUSIONS: Further optimization and assessment of MALDI-TOF MS is required.

BIO – 34 THE EFFECT OF INFLAMMATION ON ELECTRICAL CONDUCTION IN THE ATRIUM

Nafi Shabnam (HS), Dr. Adam E. Saltman, Midwood High School, Brooklyn, NY

Records have shown that people who undergo heart surgery experience atrial fibrillation (abnormal heart beats). Spargue-Dawley rats are used as substitutes for humans. Their hearts are cannulated and placed into a Langendorff apparatus to obtain a clear view of the electric waves across the surface. Through this experiment, we are trying to replicate the inflammatory behavior in the heart without actually conducting a surgery. For such a procedure, the use of heptanol is beneficial because it decreases the heart's velocity allowing it to sustain arrhythmias (abnormal heart beats). Results

have come to show that electric waves following heptanol perfusion are weaker than those following Tyrode perfusion (a solution that is isotonic with interstitial fluid); thus suggesting that a blockage in gap junctions can be linked to atrial fibrillation.

BIO – 35 REGULATION OF B CELL DIFFERENTIATION IN BONE MARROW AND EMIGRATION OF BONE MARROW CELLS BY CERTAIN BACTERIA AND BACTERIAL PEPTIDOGLYCAN.

Laura Cheng (HS), Seto M. Chice and Helen G. Durkin. Center for Allergy and Asthma Research and Departments of Pathology and Medicine, State University of New York Downstate Medical Center, Brooklyn, NY, 11203

The exact mechanisms by which precursor lymphocyte subpopulations are induced to differentiate in and emigrate from bone marrow are unknown. In adult germfree rats, cell emigration from bone marrow appears to be greatly decreased because their peripheral lymphoid organs contain greatly reduced cell numbers, including far fewer B cells, than those of adult conventionally raised rats. We found that adult germfree rat bone marrow has decreased cellularity and contains many more large blast-like cells and IgE+ B lymphocytes, with reduced numbers of IgM+ B lymphocytes, compared with their conventionally raised counterparts. When germfree rats were fed once with either unautoclaved chow, certain heat killed bacteria (*C. difficile*, *C. pseudodiphtheriticum*, *M. tuberculosis*, *K. pneumoniae*), or bacterial cell wall components (BCWC) (peptidoglycan and its synthetic derivatives), total cell, and IgM+ B cell, numbers in bone marrow increased, and blast-like cell numbers and IgE+ B cell numbers decreased (to <1%), to resemble those of conventionally raised rats. Further, feeding (gavage) of germfree rats with "working" heat killed bacteria or peptidoglycan, under germfree conditions, resulted in increased cellularity of their peripheral lymphoid organs. In contrast, feeding of germfree rats with other heat killed bacteria (*L. acidophilus*, *S. faecalis*, *B. pertussis*) or other BCWC (LPS, core lipid A, lipoprotein) did not produce these effects. The results suggest that certain bacteria and bacterial cell wall components (peptidoglycan) regulate cell differentiation in and emigration from bone marrow.

HNS – 1 WHAT WILL IT TAKE TO MAKE A DIFFERENCE?

Ilesha Griffith (HS), Teachers Preparatory School 226 Bristol Street Brooklyn, NY 11212

Five experiments were conducted in order to analyze the standard of living in Brownsville, Brooklyn. In these experiments we analyzed the quality of air that we breathe, the water that we drink, the food we eat, as well as the crime rates and disease statistics. We found that the water in Brownsville is safe to drink, however, the air quality in Brownsville is poor and appears to be related to the amount of asthma, lung cancer and other respiratory illnesses. In addition, we found that healthy food is hardly available but the fast food restaurants are highly prevalent in the area. We found that while most people are aware of the risks associated with eating fast foods, they still consume it at least once a week. As a matter of fact, majority of illnesses that were reported to us are food related. Finally, we found that while the crime rates are decreasing over the years, most Brownsville residents still do not feel safe. In order to better educate our community we gave out multiple flyers with information on disease prevention, healthy eating habits and crime prevention. We are hoping that with these steps we will continuously be able to make a difference.

HNS – 2 ASTHMA RATES & TREES

Demetrious Williams (HS) and **Tricia Castillo**, Academy of Urban Planning, 400 Irving Avenue, Brooklyn, New York

Children who live in tree-lined streets have lower rates of asthma, a New York-based study suggests. The relationship between the density of street trees and the prevalence of childhood asthma in New York City suggest that street trees are associated with a lower prevalence, although no causality was inferred. Further, lung cancer patients treated with "friendly" bacteria normally found in the soil have anecdotally reported improvements in their quality of life. In a European study scientists stated that exposure to dirt may be a way to lift mood as well as boost the immune system. Therefore, if a tree-lined street encourages outside play, it might help reduce the risk of asthma by maximizing the odds that children will be exposed to microbes.

- 1) This research is important to the community of Brooklyn because there are many cases of asthma in Brooklyn and if there is a relationship between asthma rates and trees we can do something to decrease the rates.
 - 2) The asthma rates in Brooklyn are one of the worst in NYC. Some regions of Brooklyn are referred to as "asthma alley" due to the higher rates of asthma.
 - 3) If the trees help decrease the rates of asthma people can start to plant more trees so that we can also help out the people that already have asthma to improve air quality.
- After researching and making maps/graphs, we have come to the conclusion that trees do have an affect on asthma rates. Therefore, living in an environment where there are many trees can help reduce a person's risk of getting asthma.

HNS – 3 PROMOTING SUSTAINABLE AGRICULTURE IN BROWNSVILLE: METHODS AND BENEFITS

Cristian Arroyo (HS), Dillon Heera and Mariah Golphin, Teachers Preparatory School 226 Bristol Street, Brooklyn, NY 11212

Our class is looking for ways to make our community more sustainable, and less reliant on processed, commercialized foods. Home grown fruits and vegetables are healthier, and can provide greater nutrition than store bought foods. In addition, we have found that many residents of our community rely heavily on "fast food" and "corner stores" for their meals. These locations lack nutritional foods, or many healthy options. People who eat these foods regularly are likely more susceptible to illness, or disease. By studying the properties of the surrounding soils and light conditions, we can identify good locations for building community gardens where local residents can produce fresh foods, at low cost, and of high nutritional value.

HNS – 4 HOME HEATING OIL & ASTHMA RATES

Venise Morales (HS), Cesar Laureano, and Darlyn Salcedo, Academy of Urban Planning 400 Irving Avenue, Brooklyn, New York

Use of oil for home heating is prevalent throughout many New York City neighborhoods. Scientific research has shown that certain types of home heating oil, Oil 04 and Oil 06, are more detrimental to the health of residents. Manhattan Island, particularly the Upper Eastside, has some of the highest rates of lung illness' within the city of New York along with an increased usage of the afore mentioned oil types.

Our research looks into the use of such oils throughout New York City and seeks a potential correlation with asthma rates by combining datasets from the New York City Health Department and the Department of Environmental Protection. The shapefiles collected was uploaded into ArcGIS and visually analyzed to determine if there was a potential correlation in the areas where certain oils were used more often and the rates of asthma in those neighborhoods.

According to our results there appears to be a correlation between the neighborhoods using these specific types of home heating oils and asthma rates. In addition we also found a connection with asthma rates and highways. We can make asthma rates go down by, 1) using alternate fuel sources to heat homes, 2) utilizing hybrid vehicles and other modes of transportation that consume such bio fuels. If we change this it could potentially aid in the decrease asthma rates and improve the air quality in Manhattan.

HNS – 5 IS INSULIN RESISTANCE PRODUCED BY VITAMIN D DEFICIENCY?

Patrick Bastien (UN), Diana Faustin, Melissa Keanna, Mohammed Riad, Bao Chan Lin, Saleha Riaz, Sahrish Khokha, and Kathleen Axen, Ph. D, Department of Health & Nutrition. CUNY Brooklyn College, 2900 Bedford Avenue, Room 4108 *James Hall*, Brooklyn, New York 11210

BACKGROUND: A growing body of research on diabetes suggests that vitamin D influences glucose homeostasis and insulin sensitivity. Cross-sectional data from these studies indicate that circulating levels of vitamin D are inversely associated with insulin resistance. Vitamin D deficiency decreases biosynthesis and the release of insulin. **OBJECTIVE:** Our study investigated the aforementioned claim

by comparing levels of insulin and glucose in young rats fed obesity-promoting diets either deficient or replete in vitamin D. DESIGN: Female *Sprague-Dawley* rats (N=31), 5 weeks of age were divided into 4 groups, (1) high fat vitamin D supplemented group (HF+, 60% of kCal as fat), (2) high fat vitamin D-deficient (HF-), (3) low fat diet vitamin D supplemented (LF+, 15% of kCal as fat), and (4) low fat vitamin D-deficient (LF-). Blood sampled from these rats was used to measure glucose and insulin levels, and lipids were extracted from the liver to assess fat content. RESULTS: The average insulin (ng/ml) for each group were (mean \pm standard error **SE**): HF+ : 2.9675 ± 0.427 ng/ml, 250.25 ± 16.185 mg/dl, HF- : 2.57 ± 0.324 ng/ml, 237.25 ± 4.771 mg/dl, LF+ : 2.465 ± 0.371 ng/ml, 241.625 ± 6.658 mg/dl, and LF- : 2.93 ± 0.379 ng/ml, 243 ± 6.515 mg/dl. The glucose levels (mg/dl) were HF+ : 250.25 ± 16.185 mg/dl, HF- : 237.25 ± 4.771 mg/dl, LF+ : 241.625 ± 6.658 mg/dl, and LF- : 243 ± 6.515 mg/dl. The HOMA index, an indicator of insulin resistance and the product of insulin and glucose levels was as follows: HF+ 730.99 ± 94.21 , HF- 614.94 ± 85.72 , LF+ 588.66 ± 84.78 , and LF- 709.25 ± 90.36 . The total hepatic lipid content was HF+ 83.849 ± 8.39 mg, HF- 125.442 ± 13.3 mg, LF+ 69.980 ± 8.29 mg, and LF- 70.616 ± 9.70 mg. The vitamin D deficient HF group had significantly more fat in the liver than the vitamin D replete group ($p = 0.0039$). CONCLUSION: Plasma insulin, glucose values and the HOMA index, did not differ significantly among groups. The results further suggest that although the HF diets did produce fatty livers in young rats, other factors protected these young rats from developing the insulin resistance associated with fatty liver. The lack of consistency with previous studies may be due to the poorer responsiveness of weanling rats to dietary changes versus adult rats, or lower sensitivity in female vs. male rats to vitamin D deficiency.

HNS – 6 THE EFFECT OF ROUTINE HANDLING STRESS ON BLOOD GLUCOSE IN C57BL-6 MICE

Charles Sutton (HS), Magen David Yeshiva High School, Brooklyn, NY, 11214

The laboratory mouse is the standard organism for most experimental procedures. When used in the laboratory, the mice are often subjected to unintentional stressors that may have physiological impacts on these procedures. These physiological responses are often unanticipated and may not be identified as factors contributing to an experimental result. One reaction is a possible increase in blood glucose. When experimental mice are being used to investigate diabetes and other blood glucose related conditions, unanticipated stress has the potential to lead to spurious results. The goal of this study is to determine whether the rise in glucose observed in humans as a result of stress also occurs in the laboratory mouse, C57BL-6, which is frequently used for the investigation of diabetes and other blood glucose conditions.

HNS – 7 KNOWLEDGE OF AIR POLLUTION AND ITS EFFECTS ON BROOKLYN RESIDENTS

Mariam Barry (HS), **Julie Gilles**, **Carl Laguerre** and **Jean Maxi**, ITAVA (It Takes a Village Academy) High School, Brooklyn, NY 11203

In order to learn more about people's knowledge and attitudes toward air pollution and its possible adverse effects on the community, the Air Pollution and Knowledge Survey was designed and administered to 181 ITAVA high school students and 54 Brooklyn College students. Additionally, FEV1 values were obtained from the 181 ITAVA high school students using FEV1 meters. Survey results indicated that most of the people in our sample were unaware of the most common constituent in the air we breathe: nitrogen. However, and more positively, survey results also indicated that the ITAVA high school students were significantly more optimistic than the Brooklyn College sample with regard to feeling that they were able to help find solutions to the problem of air pollution. Obtained FEV1 values were compared with national standardized values and plotted using My World GIS software along with known asthma rates in Brooklyn obtained by the New York City Department of Health. Although not diagnostic, analysis of the FEV1 results indicated that 90% of those sampled had values lower than standards. It was concluded that people in Brooklyn communities are at risk from air pollution and efforts to educate people about risks associated with air pollutions and how to mitigate them should be pursued.

HNS – 8 CANCER RATES ALONG NEWTOWN CREEK

Raquel Nunez (HS), **Gerardo Santana**, Angelique Torres, Merquicedec Peralta, Aneury Collado, Tania Spina, Wilson Barbecho, Academy of Urban Planning, Brooklyn, NY, 11237

Our research question is: Are the cancer rates along Newtown Creek evenly distributed over the whole area, and are they higher than other statewide averages? This question is important to us because most of the students in AUP live around that area. While Newtown Creek has gotten cleaner over the past few years, the health risks associated with years of high pollution levels may contribute to cancer rates for local residents. It relates to environmental justice because people in this area are subject to an environment that's harming them. We used data from the New York State Department of Health's cancer registry, which is organized by zip code. We then plotted these rates on a map of areas surrounding Newtown Creek. Surprisingly, we found that cancer rates for breast and prostate cancer were average or lower for this area, but colorectal cancer rates were significantly higher. Further research needs to be done to determine if environmental factors in Newtown Creek contribute to these cancer patterns.

HNS – 9 THE EFFECT OF A HIGH-FAT AND LOW-VITAMIN D DEFICIENT DIET ON BODY COMPOSITION IN YOUNG FEMALE RATS

Ashley F. Henry (UN), Steven A. Burroughs, Melissa McIntosh, Shemane Hanley, Josh Gothelf, Julie Roddy, Madhia Ayaz and Kathleen V. Axen, Dept. of Health & Nutrition Sciences, Brooklyn College-CUNY, Brooklyn, NY 11210

The increasing rates of obesity among children and adolescents in the U.S. indicate, new dietary approaches to obesity prevention are needed. A correlation between vitamin D deficiency and obesity has been reported. To test the influence of vitamin D on development of obesity, female Sprague-Dawley weanling rats were divided into four calorie-matched diet groups: high and low fat (HF, LF), with and without vitamin D. After six weeks, weights of fat pads, liver, skin and reproductive organs were measured.

Food intakes and body weights of the groups did not differ in general. The results of percent body fat did not differ significantly: 15.75% (HF + D), 15.29% (HF – D), 15.11% (LF + D), 14.85% (LF – D) ($p=0.93$). This outcome conflicts with past studies that showed Vitamin D deficiency increased percent body fat in male weanling rats. Vitamin D affected skin mass: supplementation Vitamin D reduced skin weight in the high fat diet groups, 30.53 ± 11.54 (HF + D), compared to 32.31 ± 12.21 (HF – D) ($p<0.03$). Vitamin D has been shown to decrease skin proliferation.

The lack effect of vitamin D deficiency on body fat growth in the weanling rats may be due to vitamin stores accumulated from their mother's milk. The failure of the high-fat diet to produce obesity in weanling rats, despite its effectiveness in older rats in our laboratory, could be due to the high energy needs of younger rats. Future studies should begin vitamin deficiency at a younger age.

HNS – 10 THE EFFICACY OF CHEMOTHERAPY ON BREAST CANCER PATIENTS

Bethany Springer (HS), James Madison High School, Brooklyn, NY, 11229

The goal of this study is to demonstrate that treatment of breast cancer might not be as effective as it should because of the cancer cells counter reaction to the treatment. Studies have shown that often times chemotherapy was not as successful as expected by medical practitioners. This is due to the fact that the cells mount their own resistance to the treatment. This resistance to chemotherapy is thought to be cell surface based. The failure of chemotherapy can be attributed at the cellular level by an acquired resistance of cell to apoptosis. The approach of many scientists is to study the process at the level of extra- cellular matrix (ECM) interaction mediated by the integrin family of cell surface receptors. It is also believed that the local ECM environment of breast cancer cells could provide a survival signal, or possibly block a death signal, which thereby accounts for the protection of breast cancer cells from chemotherapy apoptosis. Thus making the drug being used less effective or useless.

ENV SCI – 1 GREEN SPACE AND ENVIRONMENTAL APPRECIATION

Kevin Godley (HS), Claudia Sencion, Jerrel Charles, Zechariah Philippe, and **Brandon Graf**, Brooklyn Academy of Science and the Environment High School (BASE), Brooklyn, NY 11225

Some individuals appreciate the environment more than others. Yet, it is unclear why some care more for green spaces than others, or why some engage in more environmentally friendly behaviors than others. It was hypothesized that those who are exposed to green space frequently will care more about the environment than those who are not exposed to green space. The results show that after watching a video that presented a lot of green space, participants indicated more environmental appreciation than those who watched a technological, urban based video clip. However, those who watched the technological video indicated more environmentally friendly behaviors than those who watched the green space video. It is argued that motivation to help is key factor in these cases.

ENV SCI – 2 BIOGEOCHEMISTRY WITHIN A STORMWATER CAPTURE SYSTEM THE SIMS METAL RECYCLING SITE IN BRONX, NY

Daniel Slepitsky (UN), Zhongqi Cheng, Michael Grinshtein, Jacob Isleib, Richard Shaw, Paul S. Mankiewicz, Brooklyn College CUNY, Brooklyn NY 11210

The stormwater capture system at the SIMS Hugo Neu metal recycling site, designed and constructed by the Gaia Institute, intercepts annually about 6.4 million gallons of runoff containing metals, hydrocarbons, and suspended solids from the 6.4 acre site, a portion of which used to flow directly into the Bronx River. Post construction, stormwater is filtered through soil horizons, prior to entering a man-made aquifer consisting of an array of StormChambers and gravel sitting above the groundwater, which discharges into the Bronx River. Apart from water capture efficiency, nutrient cycles and fate of contaminants are critical issues. Study is being conducted to examine partitioning of nutrients and pollutants within the biogeochemical systems operative in developing soil horizons. Nutrients such as N, P and K are intercepted, utilized and recycled by growing plants, while the mobility of toxic metals could be controlled by many different processes in the system. Water chemistry changes in the StormChambers, as well as those for groundwater, will be closely monitored following a storm event. Long term trends of water and soil quality changes are equally important to understand. This study will provide the first such data about the structure and development of stormwater management systems that are rapidly becoming common in urban areas. Understanding of the biogeochemical systems within the soil horizon may help to identify parameters to maximize water infiltration, contaminant capture, and nutrient utilization. These will lead to better design of engineered soil horizons for stormwater capture systems.

ENV SCI – 3 GREEN JOBS

Theresa J. Dietrich (UN), **Oliver Lamb**, and **Bridiga A. Pirraglia**, Macaulay Honors College at Brooklyn-CUNY, Brooklyn NY 11210

The project explores the simultaneous possibilities of mitigating climate change and stimulating the economy as described by programs such as PlaNYC, addressing a deceptively simple question: why do New York City's economy and environment need green jobs? The project evaluates the progress of green economy initiatives such as "leveraging open space to create well paying green jobs" (PlaNYC), by first defining the often enigmatic term "green jobs" and by exploring the ways in which the current financial crisis can bring "both challenges and opportunities to...build an economy's productive capacity" (World Development Report 2010).

ENV SCI – 4 THE RELATIONSHIP BETWEEN GREEN SPACE AND IMMUNITY USING GIS MAPPING

Imara Howze (HS), Mellisa Forde, Gavin Young, **Juan Estrella**, and Ashley Colon, Brooklyn Academy of Science and the Environment High School (BASE), Brooklyn, NY 11225

How individuals relate to their environmental surroundings is a critical aspect of the human experience. However, people live in different types of environments. While some might live near parks

or open green spaces, others might live in more industrial and urban settings. It was hypothesized that those who live in or around green spaces will have better immune system health, as they will be exposed to fewer pollutants. Using GIS mapping, the data show that although this trend is present in some neighborhoods, it is not the case in all of them. Clearly, there are other factors that influence physical health.

ENV SCI – 5 SUSTAINABLE HOUSING IN NEW YORK CITY

Janice Shen (UN), Nora Curry, Justin Keslowitz and Aliza Sklar, Brooklyn College, Brooklyn, NY

Sustainable housing is crucial in developing a greener global society. In NYC, buildings account for almost half of the city's total energy consumption. Incentives offered from the top down and bottom up have galvanized the public and private sectors, respectively, to restore and renovate homes and infrastructure. PLANYC 2030 serves as a seed text that provides initiatives proposed by Mayor Bloomberg and explores other areas that can be improved in order to significantly reduce greenhouse gases. Scientific examination of the long-term benefits of green building, cost vs. energy efficiency, and practical applications facilitates the mitigation of carbon emissions and adaptation to a changing environment.

ENV SCI – 6 SAVE RIDGEWOOD RESEVIOR

Kiara Rodriguez (HS), **Daniel Gonzalez**, Stephanie Taylor, Denisha Fernandez, Yorklenie Cruz, Academy of Urban Planning, Brooklyn, NY, 11237

Ridgewood Reservoir is located in Highland park, Brooklyn. It's a big part of Highland Park, and although its been closed down there's still many ways it can be used. Unfortunately, there are talks of turning it into basketball courts. We investigated what the possible effects of this reduction of green space in Brooklyn would be on the health of local residents. We mapped three aspects of the area surrounding Highland Park that interact: major polluters in the area, tree density in the area, and asthma rates. All data was found using public data sets from nyc.gov. We concluded that cutting down trees near Ridgewood Reservoir would increase health issues because of the reservoirs location near multiple highways and major polluters. Though its been proposed to cut down trees to make basketball courts and baseball courts it would be more useful and beneficial to residents' health to create gardens and plant new trees. Since Highland Park has enough basketball courts why make more? Why not create gardens. Queens and Brooklyn needs trees!

ENV SCI – 7 Gas From Cows: Biomethane Production from Cellulose

Isaac Lati (HS), **Mark-David Hayfaz** and Steven H. Kaye, James Madison High School, Brooklyn, NY, 11229

Every day, waste gasses from multiple sources are emitted into the air. These gasses include combustion products and greenhouse gasses. Methane gas from cow belching, flatulence and manure is recognized in the science literature as an environmental hazard and a serious source of greenhouse gasses. Consequentially, methane from cows is reported to contribute significantly to climate change. By digesting vegetable matter in an artificial replication of a cow stomach, we determined that the digestive process is an efficient source of methane that could be utilized for the production of fuel. We investigated the digestive process in cows. In order to simulate cow digestion, in vitro, vegetable matter was macerated, mixed with distilled water. Cellulase was added. We will then extract the gas from the vessel by means of a 20 cc syringe. Now, as for what we already did. We took five kilograms of grass clippings and allowed them to compost in a sealed plastic garbage can. Following several weeks of decomposition during which the grass clipping became warm, we inserted the tube from a methane detector (gas sniffer) and observed the presence of methane mixed in the air. This successful trial showed that the breakdown of vegetable matter in a cow can produce fuel gas.

ENV SCI – 8 FISH HEALTH RESEARCH: WHERE ARE FISH LESS POLLUTED?

Brittney Williams (HS), **Stevenson Catul**, Miguel Melendez, Academy of Urban Planning, Brooklyn, NY, 11237

Jamaica Bay has had major impacts throughout the years by industrialization causing its waters to become very polluted. The dangers of these waters were such that swimming was banned in Jamaica Bay during the early 1920's. Apart from swimming, however, we were curious to know if fish were safe to eat from either Jamaica Bay or from Long Island Sound. For information on these bodies of water we used information from both the NYS Water Quality document and David E. Seidemann's journal entry on metal pollution in sediments. These two documents explain that not only is Jamaica Bay polluted by CSO's but there are also a number of chemical and sediment contaminants present in the water, such as Cl, K, Ca, and Ti, Cr, Mn, Zr, Ba, which are caused by waste water discharge. The fish that are bottom feeders are more likely to be contaminated with all those pollutants. Ultimately, we found that Jamaica Bay is more polluted than Long Island Sound. Unlike the Sound, it takes longer for the Bay to clean it's waters, making the fish caught in the Bay more harmful than the one's caught in the Sound. All fish that are bottom feeders are harmful to eat due to the amount of sediment contaminant tat the bottom of bought bodies of water it's best to eat the surface water fish.

ENV SCI – 9 AN EVEN GREENER CITY: COMPARING AND CONTRASTING PLANYC WITH THE SUSTAINABILITY PLANS OF OTHER WORLD CITIES

Yusuf Anwar (UN), Catherine Chan, Lashika Yogendran, Brooklyn College, Brooklyn, NY 11210

In 2030, it is projected that 80% of the world population will be located in urban settings. This prediction has major global implications for mitigation and sustainability initiatives in the world. While the world adapts to these new and emerging trends, New York City has become more involved in the movement to become more sustainable and environmentally friendly. New York City has managed to be an urban setting that can both sustain growth and maintain mitigation initiatives simultaneously. This poster will look at two global cities, Mexico City and Tokyo, and compare their sustainability efforts to those of New York City in terms of water, power, housing, industry, and transportation. From there, comparisons will be made between the two global cities and New York City in terms of their sustainability efforts. Through the PLANYC plan proposed by Mayor Bloomberg, New York City plans on improving sustainability and becoming more "green". All three cities can learn from each other in order to build and maintain a more sustainable world.

ENV SCI – 10 LIFE CYCLE ASSESSMENT OF SPORT RECREATIONAL HORSES

Weronika Ciechowska (UN), Environmental Studies, Brooklyn College-CUNY

This project's goal is to understand the impact of sport and recreational horses on the environment. Thanks to my experience with horses and four years of studying Environmental Management I decided to search for best solutions that can be used in stables, during shows and in private barns. I used Life Cycle Assessment as a tool that would help me to focus on horse's stages of life and their different impact on the environment. As an example of the facility where horses are kept, I used "Stanhope Stables" located in Huntington, NY.

ENV SCI – 11 DOES TROPOSPHERIC SMOG PROVIDE PROTECTION FROM ULTRAVIOLET-B RADIATION LINKED CANCERS?

Joseph S. Quacinella (HS) and Steven H. Kaye, James Madison High School, Brooklyn, NY 11229

Ultraviolet B radiation has been documented by researchers as a primary cause of melanoma and other skin cancers. This trend became most evident in the 1970's when ozone was discovered to be depleting due to halons and other chemical pollutants. The Clean Air Act and the National Ambient Air Quality Standard were established to improve atmospheric quality. However, the rates of melanoma and other cancers continued to increase. As far back as 1982, some researchers

have proposed a link between tropospheric ozone from anthropomorphic sources (air pollution) and the absorption, or reduction, of UV-B.

To understand the effect that tropospheric ozone had on UV absorption, a study was performed in Brooklyn NY. Measurements were performed at ground level using both UV-A and B sensors linked to a data logger following techniques originally suggested by Forest M. Mims III in 1990. Data was collected at mid-day to document maximum UV-B levels. Data study was performed using statistical analysis. The results demonstrated a small but consistent correlation between tropospheric ozone and UV penetration. This strongly suggests that ozone synthesized through anthropomorphic sources provides a shielding effect serving to reduce cancer causing radiation exposure.

ENV SCI – 12 IS THE EARTH'S WARMING TRULY GLOBAL?

David Mandil (HS) and Steven H. Kaye, Magen David Yeshivah High School, Brooklyn, NY

After reading "A State of Fear" by Michael Crichton questions were raised whether the Earth was actually warming as reported by many researchers supporting the global warming hypothesis or whether the skeptics have raised valid questions. The question was further enhanced by current news reports of hacked E-mails and statements by warming advocates that data was manipulated to support the global warming hypothesis.

Rural and urban atmospheric temperatures over extended times were obtained from the Goddard Institute for Space Studies. Graphs of the average annual temperature for several North American locations were examined. These comparisons between rural and urban locations revealed that most rural areas studied went down or stayed basically the same. However urban locations showed temperatures. This led to my hypothesis; do rural temperatures across North America show a pattern of global warming over an extended period of time? Preliminary data suggests that climate change is regional and not global.

ENV SCI – 13 PROSPECT PARK: RELATIONSHIPS BETWEEN SOILS AND TREES

Kamaaya Byers (HS), Shamsul Huda, Rehana Nipa, Juanita Williams, Ricardo Newball, Elijah Gordon, Jamilia Ferdinand, Natasha Persaud; Science, Technology, and Research Early College High School at Erasmus Hall (S.T.A.R.), Brooklyn, NY

Prospect Park is home to the last remaining natural forest in Brooklyn. Along with the watercourse, the diversity of trees hosts a wide range of animal species. However, not many of us take the time to consider the deterioration of these trees' health, in terms of the soil composition, and how they affect the overall surroundings. This project looks at types of nutrients (nitrogen, phosphorus, and potassium) and pH that have a great impact on the soil where the trees are located, as well as the soil in normal open areas, in order to clarify a solid comparison between the different locations and helps us to determine which conditions are the best for the improvement of the trees. The soil samples were collected by several groups of students from various locations in the southeast corner of Prospect Park and were brought to the lab for testing the nutrients.

ENV SCI – 14 THE GREENING OF BROOKLYN; REACHING FOR A GOAL OF 30% REDUCTION IN CO₂ –eq EMISSIONS BY 2030

Eric K. Berger (UN), Department of Environmental Studies, Brooklyn College-CUNY, Brooklyn, NY 11210

The purpose of this project is to find out if Brooklyn is on track toward a 30% reduction of 2005 levels of CO₂ –eq emissions by the year 2030, and to show what is being done to reach this goal. With global warming a major concern in the world, it is important to show how greenhouse gas emissions can be reduced in a real world setting.

Finding out if Brooklyn is on track toward the 30% reduction will be accomplished by gathering current emission data from official sources for Brooklyn, and by comparing it to emissions data from the

PlaNYC Report for 2005. A conversion will be made to the data in the PlaNYC Report to reflect Brooklyn's population specifically.

The second part will be accomplished by focusing on specific initiatives that are underway currently or will be underway in the near future. Areas of interest will include rezoning, public transportation vs. vehicular transportation, solar power and other clean energy sources vs. coal and nuclear power, and building efficiency. An attempt will be made to catalog the emission reductions of the efforts in these areas for Brooklyn.

ENV SCI – 15 CHINA'S MITIGATION ACTIONS RESPONSE TO UNITED NATIONS CLIMATE CHANGE CONFERENCE

Cathy M. Faria (UN) Prof. Micha Tomkiewicz, Department of Environmental Studies, Brooklyn College-CUNY, Brooklyn, NY 11210

In this paper China's mitigation action goals for 2020 based on 2005 levels are investigated. Data of their CO₂ emissions per unit of GDP, total energy consumption and of the Forestry Administration were analyzed. Results show that as the GDP per capita increases, the CO₂ emissions also increases but overall the carbon intensity of China is small. Goals set for non-fossil fuels in energy consumption and forestry are reachable with efforts implemented such as new policies, enforcement of those policies and new technology.

ENV SCI – 16 BUT NOT A DROP TO DRINK: ACCESSING WATER IN NEW YORK CITY

Aidah Gross (UN), **Esther Gutwirth**, and **Sunny Liu**, Macaulay Honors College at CUNY-Brooklyn College, Brooklyn, NY 11210

As the climate changes, New York City will face rising sea levels, intensified storms, and saline seepage into fresh water. How can we as a city prepare for these changes? What changes does PlaNYC (Mayor Bloomberg's city-wide sustainability initiative) anticipate and plan for?

Our team attempts to address these questions by researching possible solutions to these issues. We examine how we can adapt to strengthened storm patterns through green infrastructure, and how we can best mitigate the combined sewage overflow that results from excess storm water in our sewers. To address rising sea levels, we look to the Netherlands to see how they have reworked their drinking-water plants to cope with high sea levels. We investigate the feasibility of desalination of fresh water that has been contaminated by salt; we also study how our reservoirs can be moved to catch fresh water in new locations, as altering storm patterns change the locations of rain fall. And finally, we survey and critique PlaNYC's strategies for adapting to, and mitigating the effects of, climate change.

GEO – 1 ARSENIC MOBILIZATION BY PHOSPHATE AMENDMENTS AND FERTILIZERS

Syeda Akhtar(GRAD) and Zhongqi Cheng, Department of Geology and Environmental Sciences Analytical Center, Brooklyn College - CUNY, Brooklyn, NY 11210

Phosphate is an important nutrient for plant growth and has been widely used in agricultural practices. It has also often been used as an amendment to stabilize lead (Pb) in contaminated soils, due to the extremely low solubility of Pb-phosphate compounds. The application of phosphate in soils can potentially mobilize arsenic (As), a well known carcinogen. This is because phosphate and arsenate have very similar chemical structure; therefore they compete for adsorption sites on mineral surfaces. Numerous studies have shown that high dissolved phosphate can lead to elevated As levels in groundwater. In urban agriculture, uptake of As by vegetables and fruits could also be enhanced by higher levels of As in pore water as a result of phosphate application. In this study laboratory column experiments were set up to mimic periodic rainwater infiltration. Rainwater was used to leach a garden soil not contaminated with As (has ~10 ppm As), with or without rock phosphate amendments. Arsenic levels in time series elutes from the phosphate-amended soils far exceed the EPA drinking water limit of 10 ug/L, and were several times higher than those from the control soil column. In addition, phosphate application greatly reduced infiltration rates over time, thereby leading to longer residence time of infiltrating water which result in even higher levels of As in pore water. These preliminary

results confirm the risk of As mobilization by phosphate application. More laboratory and field experiments will be conducted to quantify As mobilization in different soils, phosphate fertilizers and field conditions.

GEO – 2 DETERMINATION OF TRACE ELEMENTS IN BLACK SHALE

Lys Joseph (HS), James Madison High School, Brooklyn, NY, 11229

Lead, Arsenic, and Rubidium are known to be trace metals. Trace metals are elements that usually make up a very small percentage of a rock composition. In this study, trace metals in Shale sedimentary rock will be closely examined. The aim of this study is to provide a reason why trace metals are found in high amounts in the composition of Shale stone rocks. The study consisted of compositions of two samples of sedimentary rocks; Cobleskill Rondout Limestone from Rosedale, New York, and Hudson River Shale. The Cobleskill Rondout Limestone was used as a basis for comparison to the Hudson Rive Shale. XRF or X-ray fluoresce was used in determining the amount of availability of one particular element in a rock sample. The XRF measures the amount of elements in PPM, or parts per million. Any trace metal above one hundred ppm is considered a hazard to biological life. High traces of lead, arsenic, and Rubidium were found in Hudson River. Data was graphed and compared to Cobleskill Rondout Limestone where the concentrations of trace metals were generally low, and average. Clay minerals are a part of every sedimentary rock. From this experiment, clay has an electrically charged surface which causes them to attract trace metal. This account for the high number of trace metals located in Hudson River Shale.

PHYSICS – 1 PRELIMINARY STUDIES OF THE DYNAMICS OF AN ELASTIN MIMETIC PEPTIDE, (VPG*VG*)₃ BY DEUTERIUM NMR SPECTROSCOPY

Xiang Ma (GRAD); Gregory S. Boutis *, Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

The polypeptide (VPGVG)_n serves as a useful model for characterizing structure and dynamics of elastin, a major protein constituent of connective tissues. In this poster we report on a preliminary experimental study of a deuterated (VPG*VG*)₃ peptide by deuterium NMR spectroscopy. For a powdered sample at room temperature, we have successfully measured the quadrupolar echo spectra. Using available simulation tools, we obtained the quadrupolar coupling coefficient $\delta \approx 120\text{kHz}$ as well as other parameters in the two-site rotational model. Experiments of this and other deuterated peptides are ongoing and will be used for providing an understanding of the dynamics occurring in this system.

PHYSICS – 2 THE USE OF OPEN STAR CLUSTERS TO ESTIMATE THE AGE OF THE MILKY WAY GALAXY

Olivia C. James (HS), Brooklyn Academy of Science and the Environment (BASE), David Zurek American & Michael Shara American Museum of Natural History (AMNH)

A large and homogeneous survey of the Galactic plane was completed by the Astrophysics Department at the American Museum of Natural History led by Curator Michael Shara and administered by Data Collections Manager, David Zurek. This survey taken for the discovery of Wolf Rayet stars is also useful for the detection, discovery and measurement of open star clusters in the Galactic plane. We have identified suspected and known open stellar clusters in the survey as well as a number of newly discovered clusters. The properties of these clusters until now are unknown because of the large amount of obscuration between Earth and the cluster. The impact of the obscuration is lessened because the survey has been conducted in the infrared where photons have an easier time passing through the gas and dust of the Galaxy. We present here for the first time the properties of a sample of open star clusters located in the Galactic disk. The distances to these clusters and their ages have been found which allows us to determine the distribution of these clusters and the distribution of ages as a function of position in the galaxy. Finally, some of the clusters have been found to be near the center of the galaxy and even on the other side of the galaxy. This allows us for the first time to probe the structure of the galaxy near the center and even among the spiral arms on the other side of the galaxy.

PHYSICS – 3 EXAMINING THE COMPOSITION OF WATER FROM THE GOWANUS CANAL BY MEASURING ITS T_2 TIME

Jon Mimbberg (UN) and Jiaxin Huang, Gregory S. Boutis, Sophia S. Suraz, Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

The goal of this study is to see how we can use the theory of Nuclear Magnetic Resonance (NMR) to gain knowledge about unknown substances. This technique uses magnetic nuclei as probes of their environments. Experiment and theory state all atoms have their own unique "magnetic moment" that determines how they will behave in a magnetic field (Another synonymous, frequently used term is "magnetization"). Atoms placed in a magnetic field will consequently experience a force dependent on the orientation of this moment with respect to the field. This magnetic moment points in one constant direction and will attempt to position itself in a way parallel to the direction of the field. Simultaneously, every atom is subject to spin. The result is a rotating atom that precesses about the axis of the field. The NMR spectrometer allows us to measure how quickly magnetic moments change in time and the rate at which the net magnetic moment returns to its equilibrium state after being disturbed. This seemingly esoteric detail is surprisingly useful. This rate, known as T_2 , is unique to every substance. As such, it is a useful indicator that can be harnessed to distinguish the sample type as well as concentration of unknown substances within a sample. This technique was used to identify the sample type for various unknown samples.

PHYSICS – 4 THERMODYNAMIC AND DYNAMICAL PROPERTIES OF SYSTEMS WITH MORE THAN ONE LIQUID PHASE

Joel Abraham (UN), and Nicolas Giovambattista, Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

We perform molecular dynamics simulations of systems consisting of particles interacting via spherically symmetric two-scale pair potentials (TSPP). These systems, defined with appropriate TSPP, can show polyamorphism, i.e., the presence of two or more liquid or glassy states. However, the TSPP introduced so far involve forces between particles that are discontinuous functions of the particle separations and thus, make such TSPP non-suitable for studies that require smooth pair interactions (e.g., for studies based on the potential energy approach). In this work, we introduce a family of TSPP that are smooth and still possess two liquid phases. We study the thermodynamic and dynamical properties of these systems. The pressure-temperature phase diagram of these systems show a liquid-liquid first order transition line separating both liquid phases and ending in a critical point; such a critical point being accessible in equilibrium simulations. This liquid-liquid phase transition is analogous to, but independent of, the well-known liquid-vapor phase transitions. Our TSPP can also reproduce many anomalous properties, such as isobaric expansion and increase of diffusivity upon cooling, that are found, e.g., in water and silica.

PHYSICS – 5 PREPARATION OF SEED LAYER FOR ZNO NANOWIRE GROWTH ON SILICON SUBSTRATE

Christian Beynis (UN), **RunTing Li**, Mim Lal Nakarmi. Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210.

Our goal was to lay a path for Au-assisted ZnO (Zinc Oxide) nanowires growth. In this work, we optimized the conditions to prepare the seed layer on silicon substrate. Using the Hummer sputter, a thick layer of gold was deposited on clean silicon substrates. Subsequently, the samples were inserted into a furnace and annealed for different time in argon gas at the temperatures ranging from 700 °C to 850 °C. Atomic Force Microscopy (AFM) and scanning electron microscopy (SEM) were used to image the morphology of the gold particles on silicon substrates. The optimized conditions were found to be 3 nm thickness of gold layer annealed at 750°C for 45 minutes. The conditions will be reiterated to grow ZnO nanowires using Chemical Vapor Deposition technique.

PHYSICS – 6 WATER PHASE BEHAVIOR AND STRUCTURE UNDER NANOSCALE CONFINEMENT

Janet Chiu (UN), and Nicolas Giovambattista, Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

We perform molecular dynamics simulations of water confined by hydrophobic and hydrophilic nanoscale plates separated by $0.5 \leq d \leq 1.6$ nm, at $T=300$ K and $-0.1 \leq P \leq 0.2$ GPa. We focus on the effects of surface chemistry, pressure, and confinement on water phase behavior and structure at the interface. We also study the effects of altering water's hydrogen bond strength and network structure on our results by performing simulations using a family of modified water models. We find that all the models considered in this work show qualitatively the same results. At $T=300$ K and $0 \leq P \leq 0.2$ GPa, bulk water is in the liquid phase. Instead, under hydrophobic confinement, we find that water can be found in the vapor, liquid, or crystal phase, depending on the plate-plate separation and pressure. Under hydrophilic confinement, water remains in the liquid phase at all P and d studied, even at very low pressures where bulk water evaporates. In order to characterize water structure, we focus on water coordination number, tetrahedral order, density profile, and molecular orientation at the interface. All these properties are very sensitive to the surface chemistry. In particular, it is found that molecules next to hydrophobic plates prefer to have one hydrogen bond pointing into the surface while next to hydrophilic plates, molecules prefer to have one hydrogen bond direction pointing away from the surface, into the confined volume.

PHYSICS – 7 SIMULATION STUDIES OF ELASTIN MIMETIC PEPTIDES (VPGVG)₃ AND (LGGVG)₃

Jiaxin Huang (UN), Odingo Mitchell, Xiang Ma, Amy Reichel, Nicole Ng, Zhaona Wang and Gregory S. Boutis*, Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

Elastin is an extracellular, insoluble macromolecule that is responsible for the elasticity of vertebrate tissues such as the skin, ligament, and lung. One of the salient characteristics of elastin is that it undergoes an inverse temperature transition. The focus of this work is to characterize the structure and dynamics of two commonly repeating motifs in the hydrophobic domains. By simulation, we study dynamics and structure of (VPGVG)₃ and (LGGVG)₃ at different temperatures. Our simulation findings suggest hydrophobic collapse in both systems. To study these effects, the peptides were simulated using GROMACS.

PHYSICS – 8 DISLOCATIONS IN ALUMINUM NITRIDE EPILAYERS REVEALED BY CHEMICAL ETCHING

Henry Kleiner (UN) and Mim Lal Nakarmi, Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

Aluminum Nitride (AlN) has a wide band gap (~ 6.1 eV), which allows for promising applications in the development of deep ultraviolet photonic devices. The goal of this experiment is to investigate possible dislocations in an AlN epilayer grown on a sapphire substrate. The sample was chemically etched with a 15% concentration solution of Potassium Hydroxide (KOH) at 60 °C in order to reveal the dislocations; these etchings were done for intervals of ten minutes and twenty minutes. After each etching, topographical analysis of the sample was conducted using Atomic Force Microscopy (AFM). Hexagonal pits of different sizes were observed on the surface of the sample after the first ten minutes of etching. After twenty minutes of etching, more pits were observed, and some pits were seen to be merging together. The maximum density of pits recorded for a 10 x 10 μm² area was 5.8 x 10⁷ cm⁻². The etched pits are due to the presence of threading dislocations. It is believed that the large pits are associated with screw type threading dislocations and small pits are associated with edge type threading dislocations. In order to verify the correlation of the etched pits with the type of the threading dislocation, Transmission Electron Microscopy (TEM) will be used to examine threading dislocations in the etched sample. Once the results using TEM corroborate with the results using AFM, it will be possible to use an easier and faster method to characterize dislocations.

PHYSICS – 9 HOW SOURCE POSITION AND MODERATOR THICKNESS AFFECT NEUTRON BOMBARDMENT OF ²⁷Al

Khary Richardson (UN), Serge Wexler, Joel Abraham, and Peter Lesser. Department of Physics Brooklyn College-CUNY, Brooklyn, NY 11210

The goal of this study is to observe the effects of irradiation of ²⁷Al by a neutron source. An americium-beryllium neutron source was used to irradiate ²⁷Al samples. We investigated the influence of sample position relative to source position, as well as the influence of moderating material (paraffin), on the flux of slow and fast neutrons on the sample. Gamma-ray emission spectroscopy with a germanium gamma-ray detector was used to obtain the spectra of the irradiated sample. There are two gamma rays with 1779 keV and 843 keV associated with the production of ²⁷Mg. The 1779 keV gamma ray is resulted from the decay of ²⁸Al produced by the capture of slow neutrons by ²⁷Al, and the gamma ray with 843 keV is resulted from the decay of ²⁷Mg produced by an n-p reaction involving ²⁷Al. We determined the optimal configuration (source position and amount of paraffin and irradiation time) for producing the maximum activation of pure aluminum via slow neutrons (producing ²⁸Al) while keeping the flux of fast neutrons (producing ²⁷Mg) to a minimum. We also investigated activation of other isotopes using both slow and fast neutrons.

PHYSICS – 10 STAR DETECTION THROUGH DATA INTEGRATION

Julian Yuen (HS), David W. Hogg, Department of Physics, New York University, New York, NY 10003

Python is a computer programming language that is used for many purposes. The night sky will be the core subject of this research and the pictures will be acquired using a computer program that I have created. The goal is to take conspicuous pictures of the nighttime sky using a built-in laptop camera. The program currently takes a hundred images with the intervals being as short as possible. After the program takes the pictures, it will automatically co-add them into one final image. This process uses the logarithm of the images' pixel data added together and then divides that number by the logarithm of the highest pixel value. This ensures that the photons of each individual celestial object are included in the final image because the photons will be placed on top of each other to exemplify them. In my experiments, the stars appeared distinct and visible. No matter what kind of camera is used, the program will undoubtedly be able to take pictures of the night sky without any auxiliary help.

ENG – 1 DAMAGES OF GEO-SYNTHETIC REINFORCEMENTS DUE TO CYCLING SHEARING BETWEEN SOIL AND GEO-SYNTHETIC MATERIALS

Cristina Aculova (HS), Dr. Huabei Liu (City College of New York), Barrington Harvey (James Madison High School)

Engineering and construction are main building blocks in a society. Everyone wants to be safe at his/her place of employment and everyone wants to know that the chances of someone getting hurt in case of a natural disaster are minimal. But, nature is something that no one can avoid, it can strike hard some times, and all people can do it be prepared for anything. In a case of an earthquake the soil moves in a cycling path, which means that the soil does not shift in just one direction, but moves back and forth.

This research focuses on the damages done by a cycling form of stress, similar to that of an earthquake, on the widely used material PVC. The PVC was applied different loads, ranges from 20 kg to 200 kg, and different shear stress. There were also used two types of soil to observe the damages done by different sand shapes.

The results showed, as predicted, that the most damages were done by the second Type of sand, which is angular and compared to the first type of sand is bigger and sharper. PVC was relatively resistant to the damages done to it and recuperated almost completely after the loads were removed, which is a beneficial quality in a material that is successfully used in many areas.

CIS – 1 MACHINE LEARNING FOR ROBOT VISION

Sam Anzaroot²(UN), Simon Parsons¹ and Elizabeth Sklar¹ ¹Department of Computer and Information Science Brooklyn College, City University of New York Brooklyn NY 11210 ²Department of Computer Science Queens College, City University of New York Flushing NY 11367

Using computer vision to classify and/or detect objects is an important aspect of artificial intelligence for robotics. There have been many implementations of various algorithms including Machine Learning classifiers to perform such operations. Machine Learning algorithms have been shown to be effective in real-time detection and classification of objects using vision. This goal of this research is to study the effectiveness and speed performance of such systems compared to the creation of a unique Machine Learning model. This study is also testing the effectiveness of using one model compared to individual models for each robotic camera source, as well as the effectiveness of using the same classifier to determine the presence of an object and the classification compared to separate classifiers for each task.

CIS – 2 IMPLEMENTING A DRIVER FOR CONTROLLING AN AIBO ROBOT THROUGH THE MULTI-AGENT PLATFORM PLAYER

Jesse López(UN)¹, **Joel González**³, **J. Pablo Muñoz**², Simon Parsons¹ and Elizabeth Sklar¹ ¹Department of Computer and Information Science ²Department of Philosophy Brooklyn College, City University of New York Brooklyn NY 11210 ³Department of Computer Science City College, City University of New York New York NY 10031

The goal of this project is to implement a driver that uses a client program to allow communication and interaction between a software framework, called *Player*, and a Sony Aibo robot. There are several

advantages to using Player to control the Aibo, including the possibility of interacting with other robots, either of the same or different types. Another advantage is the capability of using several utility libraries that are written in Player, for common tasks such as keeping track of each robot's position in its environment or to process images received by a robot's camera. For each robot platform, a Player "driver" must be developed. Once the driver has been thoroughly tested, it could be used for other types of research. This project has been developed using the *Tekkotsu* framework, along with Player, to provide for easier communication and avoid direct interaction with the complex Aibo operating system. The knowledge acquired by the participants of this project could be easily used in the creation of other drivers for robots that currently are not supported by Player.

CIS – 3 SUPERIOR ROBOT DESIGN

Mitchell Lustig(UN), Simon Parsons and Elizabeth Sklar Department of Computer and Information Science Brooklyn College, City University of New York Brooklyn NY 11210

The Lego Mindstorms NXT robot platform provides a versatile set of robotics hardware. It offers basic building blocks for any number of creations by including a large range of sensors and parts. The Player/Stage software package is a multi-robot client/server framework. It can be used to abstract a large population away from their diverse low-level hardware. Using this software it is possible to test a large range of robots in a range of environments using a uniform set of controls. Utilizing the advantages of Player/Stage, many diverse NXT robots can be controlled simultaneously, enabling them to collaborate and combine the advantageous features of each individual to increase their combined potential. Developing the proper driver in order to run the NXT robots on the Player/Stage software opens a large window of opportunity for many applications. This research involves using these tools to design, build and test new robot body designs. Different robots are better suited for different tasks. Birds are the best in the air and fish are the best in the water but reversing their roles can end in disaster. By properly designing testing robots, a superior design can be found for any task.

CIS – 4 ADOPTING AND ADHERING TO A COMMON ROBOTICS INTERFACE

Mark Manashirov(UN)¹, Sam Anzaroot², **Saul Salazar**³, **Carlos Jaramillo**³, Simon Parsons¹ and Elizabeth Sklar¹ ¹Department of Computer and Information Science Brooklyn College, City University of New York Brooklyn NY 11210 ²Department of Computer Science Queens College, City University of New York Flushing NY 11367 ³Department of Computer Science City College, City University of New York New York NY 10031

Like humans, robots are diverse creatures; they come in all shapes and sizes, and their individual behavior and capabilities reflect their diversity. However, unlike humans, robots do not all share the same physiology, which means that their diversity may be amplified to a point at which they can no longer be classified as a single species. This divergence between robotic species makes it difficult, or even impossible, to coordinate multiple, distinct robots in accomplishing even the simplest of tasks. Thus, it becomes necessary to adopt a common robotics interface to which all robotic species must adhere in order to bridge both human-to-robot and robot-to-robot communication and coordination. There already exist numerous such interfaces, so it is the goal of this research to adopt one such interface, namely the *Player* framework. This interface was implemented on two distinct robotic species, the Parallax Scribbler and the Surveyor SRV-1 platforms, and experiments were conducted to compare and contrast the capabilities and reliability of each.

CIS – 5 DESIGNING A HUMAN ROBOT INTERFACE

Miriam Schwartz (UN), Simon Parsons and Elizabeth Sklar Department of Computer and Information Science Brooklyn College, City University of New York Brooklyn, NY 11210

The goal of this project was to create an interface for Human Robot Interaction (HRI) that could be useful in controlling a team of robots. Research was conducted in two areas: theories underlying interface design for how robot teams should be controlled and practical results showing how these controllers have been implemented. Information from these sources as well as information from the Brooklyn College MetroBotics project team was combined and assimilated in order to design a plan for the human-robot interface. A preliminary controller has been implemented to connect a human user to

a computer-based robot simulator and to manipulate various aspects of a robot team, including image identification and selection.

CIS – 6 INTRODUCTION TO C/C++ PROGRAMMING WITH NXT ROBOTS

Adiba Ishak (UN), **Amy Delman**, Lawrence Goetz, Mikhail Kunin, Prof. Langsam, and Prof. Raphan, Department of Computer and Information Science, Brooklyn College-CUNY, Brooklyn, NY, 11210

This project involved developing a system for teaching C/C++ working with a Lego™ NXT robot in an introductory computer-programming course. The programming of the NXT robot was implemented using a C/C++ cross-compiler, which generates code that runs on an Open Source firmware platform, nxtOSEK. The system has built-in commands and objects, which run the robot's motors and receive information from the robot's sensors. The cross-compiler has been embedded in an Open Source Integrated Development Environment (IDE) Code::Blocks. The programming environment for the NXT has evolved from a previous development using the Lego™ RCX. The NXT is more reliable and can be programmed to pair a specific interface with a particular robot, so that there is no cross-talk when different robots are utilized in a classroom setting. The IDE and robotic software execute on a virtual machine running under the freely available software, Sun™ VirtualBox. This allows for a uniform programming platform for Windows, MacOS, and Unix/Linux. Programs were written to control the robot more precisely and a simulator was created to ease and enhance development. The use of robots in CS1 affords science and engineering students the opportunity to learn sensory-motor based control, to work with an IDE early in their careers, and to gain experience with development and debugging tools that can be utilized throughout the students' academic and professional careers.

CIS – 7 OBJECT DETECTION WITH NXT ROBOT SONAR SENSORS

Linda Ma (UN), Simon Parsons and Elizabeth Sklar Department of Computer and Information Science Brooklyn College, City University of New York Brooklyn NY 11210

The purpose of this project is to utilize the Lego Mindstorms NXT's sonar sensors for detection of brightly colored blocks shaped like 3D pieces from the popular Tetris game. The program will communicate with the robot through Player/Stage driver that was developed by the team. Sonar sensors are placed on the side of the robot one above the other to measure separate levels of the block. When the robot detects an object in range, it will drive by the object, and stops when an empty space is encountered. Timers will be used to track the time it takes the robot to pass the object and images of the shape is to be rendered based on sonar and timer data. In finishing this part of the program, code can be written to have the robot search for a specific Tetris shape. The success of this algorithm could lead us to further investigation of objects of other shapes.

CHEM – 1 INTERACTIONS OF ARENE-RU(II)-CHLOROQUINE COMPLEXES WITH HUMAN SERUM ALBUMIN (HSA) AND APOTRANSFERRIN

Tiffany T. Shand (UN), Alberto Martinez, Javier Suarez and Dr. Roberto Sanchez-Delgado, Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY 11210

Cisplatin and related platinum-based drugs are widely used anticancer agents but they are limited by their toxicity. Ruthenium is an attractive alternative to platinum for medical applications due to the low toxicity displayed by the compounds of this metal, which has been attributed to the ability of ruthenium to bind to albumin and transferrin. Our research group recently discovered a series of five ruthenium complexes of general formula Arene-Ru-Chloroquine that display good antimalarial and antitumor properties. Due to the major significance of issues such as selectivity, toxicity, drug delivery and, in general, the pharmacologic behavior of new drugs, we have now studied the interaction of our complexes with albumin and transferrin, two of the most relevant proteins present in blood. We used Circular Dichroism (CD) spectroscopy to investigate the conformational changes in both proteins induced by the metallic drugs and measured the drug-protein binding affinities by Isothermal Titration Calorimetry (ITC). The CD spectra of albumin after incubation with the new compounds show a significant impact on the protein structure with loss of alpha helical stability. In addition, the results suggest a covalent mode of interaction, most likely between the metal ion and the histidines of the hydrophobic sub-domains of the protein. The CD spectra of transferrin treated with the ruthenium complexes indicate that the covalent interactions take place through the iron-specific binding sites as well as non-specific ones. Interestingly, the binding of the drugs with both proteins is reversible either in presence of chelating agents or after lowering the pH, making both proteins good carriers for selective drug delivery. In summary, our results indicate that the newly synthesized ruthenium complexes might display good pharmacologic behavior when used in the chemotherapy of malaria and cancer, which makes them excellent candidates for further drug development. Supported by NIH/NIGMS MARC GM008078

CHEM – 2 INTERACTION OF RU(II) AND RU(III)-CLOTRIMAZOLE COMPLEXES WITH ALBUMIN AND TRANSFERRIN

Avri Bohm (UN), Alberto Martinez and Roberto Sanchez-Delgado, Department of Chemistry, Brooklyn College, CUNY, Brooklyn, NY 11210

Cancer is a disease noted by the uncontrollable growth of abnormal cells and afflicts over seven million people a year. Cisplatin is one of the most widely used cancer-fighting agents, but despite its many benefits has many detrimental side effects. Our research is focused on discovering new metallodrugs active against cancer, but with nominal side effects. In this sense, we have synthesized a series of Ru-Clotrimazole complexes that might be good as antitumor agents, given the known anticancer activity and low toxicity of ruthenium compounds and Clotrimazole. One of the specific goals of our research is to study the interactions of these potential ruthenium antitumor drugs with two major proteins in the blood, albumin and transferrin, in order to gain some insights into the pharmacological and transport properties of the new compounds. The experiments were performed by means of Fluorescence Spectroscopy, UV Spectroscopy, and Circular Dichroism and the results suggest that the Ru(II) compounds have a higher binding affinity to the proteins than the Ru(III) compounds, likely because of the relative inertness of Ru(III) compounds. The results indicate that these potential drugs will display good transport properties.

CHEM – 3 ANALYSIS OF CATALASE AND PEROXIDASE ACTIVITIES OF MYCOBACTERIUM TUBERCULOSIS AND AGROBACTERIUM TUMEFACIENS CATALASE-PEROXIDASE (KATG AND KATA).

Margarita Vasserman (UN), Javier Suarez and Richard S. Magliozzo
Department of Chemistry, Brooklyn College CUNY, 2900 Bedford Avenue, Brooklyn, NY 11210

Mycobacterium tuberculosis (Mtb) is responsible for the disease that infects millions of people and causes 2 million deaths each year worldwide. The virulence of this organism involves its catalase-peroxidase (KatG) enzyme. This enzyme, known as a class I peroxidase, enables the bacterium to survive in environments of high oxidative stress such as the human macrophage. While the wild-type

bacterium is susceptible to antibiotic agents such as Isoniazid and Rifampin, Mtb with mutations in KatG are known to be resistant to isoniazid. Analogous to KatG as a bi-functional catalase-peroxidase enzyme, KatA is found in *Agrobacterium tumefaciens*, the pathogen responsible for tumors in dicotyledonous plant. KatG and KatA in bacteria are functioning in different environments and the work done here is aimed at finding the similarities and differences between these two enzymes in order to better understand catalytic mechanisms. In this comparative study, pH profiles were constructed by measuring catalase and peroxidase activities of purified overexpressed KatG and KatA under constant ionic strength conditions. The optimal pH values for catalase function of KatG and KatA is found to be 7.0 and 5.5, respectively. The optimal pH value for peroxidase function of KatG and KatA is found to be 4.0 and 5.5, respectively. These findings coincide with the hypothesis that the function of each enzyme should be maximal for its physiological environment.

CHEM – 4 SYNTHESIS AND EVALUATION OF SMALL MOLECULE INHIBITORS OF AMYLOID BETA 42 OLIGOMERIZATION

Chananya Goldman (UN), Laura Juszczak and, Chemistry Dept., Brooklyn College-CUNY, Brooklyn, NY 11210

The primary agent responsible for Alzheimer's disease is the amyloid beta 42 peptide. Current research has implicated small, soluble oligomers as the neurotoxic agent. It is also well-known that metal ions – Fe^{3+} , Cu^{2+} and Zn^{+2} – ligate to the amyloid beta peptide. Thus, metal ion chelators have been administered in mouse studies of amyloid plaque dissolution.

The goal of our work is to design a metal-chelator complex drug that inhibits the oligomerization of amyloid beta. Early work in this lab showed that a small molecule metal-chelator complex is capable of dissolving amyloid beta 42 plaques. A more recent cation-chelator construct has been shown via *in vitro* fluorescence spectroscopy to inhibit the formation of amyloid beta 42 oligomers. The work presented here builds on this preliminary data. Eight candidate molecules of two general moieties were prepared. Structural confirmation was obtained via infrared spectroscopy. A discussion of the preparation methods for the metal-complexes is given here. Dose-dependent inhibition of amyloid beta oligomerization was determined by a published fluorescence assay where the complex foils the assembly of the oligomers necessary for the binding of the fluorescent molecule, Bis-ANS. The results of the fluorescence assay for the eight candidate molecules are presented. Future studies will define the minimally effective dosage for inhibition of oligomerization and determine the cellular toxicity of the complexes. These are necessary steps in the drug-lead optimization process. Studies on animal models of Alzheimer's disease will follow. These molecules have demonstrated potential, and should thus be vigorously investigated in further studies.

CHEM – 5 A STUDY OF UNFOLDING AND THE BETA SHEET-TO-ALPHA HELIX CONFORMATIONAL SWITCH IN BETA-LACTOGLOBULIN

Tania V. Marin (UN), Laura Juszczak and Chemistry Dept., Brooklyn College-CUNY, Brooklyn, NY 11210

The goal of this study is to use Fourier transform infrared (FTIR) spectroscopy to analyze the unfolding and beta sheet-to-alpha helical structure changes of beta-lactoglobulin induced by hexafluoroisopropanol (HFIP), trifluoroethanol (TFE) or heat. Heating of beta-lactoglobulin is anticipated to induce aggregation and unfolding while the alcohols are expected to increase the content of alpha-helical structure. This study has a specific emphasis on the transitional domains that lead to the final unfolding or refolding states. Through FTIR, a widely utilized technique for the unfolding and refolding process of proteins, we analyzed the Amide I band (frequency - $1600\text{--}1700\text{ cm}^{-1}$), which shows the changes in the secondary structure of beta-lactoglobulin. Transitional domains are indicated by transient absorption bands in the amide I region of the spectrum. Examination of these transitional bands will allow us to determine if there are correlated structural changes in HFIP, TFE, and the gelation via heating.

Supported by Brooklyn College Startup Funds and PSC CUNY Award # 60087-37-38

CHEM – 6 LEAD IN URBAN SOILS: ANALYTICAL METHOD CONSIDERATIONS

Leda Lee (GRAD), Win Wai, Michael Grinshtein, Sara Dayan and Zhongqi Cheng, Brooklyn College, Brooklyn NY 11210

Urban soils can contain high levels of lead resulting from historical deposition of leaded gasoline, paint and particulates from incineration. The renewed focus on redevelopment and urban agriculture has led to a growing interest in soil testing.

Soil labs can use several different methods when testing for heavy metals. This paper compares five methods to see if there is any correlation between them.

Three different leaching solutions - 10% HCl leach, 1-M ammonium acetate and 1-M Na-acetate (adjusted to pH 4.8) - and an X-Ray Fluorescence instrument (XRF) were used to determine lead (Pb) values in 8 soil samples of varying lead content. These 4 methods were compared to the values obtained using a total digestion method. The leachate and digested solutions were analyzed by a Perkin Elmer DRCe ICP-MS.

Compared to the values obtained with the total digestion method, 10% HCl leached 60-94% of Pb, 1-M ammonium-acetate leached 10-29% and pH-adjusted Na-acetate leached only 1-7% Pb.

59 soil samples were scanned with the XRF instrument. Overall, XRF instrument readings correlated well with those from the total digestion method; 3% had XRF values lower than total digestion values. Grain size affected XRF readings. Pb content generally decreased as grain size increased.

The 3 leaching solutions used showed a wide range of values for Pb and only 10% HCl came close to total digestion method values. This method comparison helps explain the variability of results from different labs and showed there was no apparent correlation to total lead content in soil.

CHEM – 7 MENTOS- AND DIET COKE

Joseph Mandil (HS), **Morris Jaradeh**, **Joey Kabariti** and Steven H. Kaye, Magen David Yeshivah High School, Brooklyn, NY

The Mentos- Coke Fountain, featured in media ranging from You-Tube to the American Journal of Physics is a physical reaction resulting from the depressurization of carbon dioxide at hydration points on the candy. Tests comparing the reactions of diet coke and seltzer, showed a 12X taller reaction with the diet coke. This suggested that the reaction was more complex than CO₂ release and suggested that ingredients in the soda contributed to the fountain effect.

A review of cola formulae indicated that they contained materials including phosphoric acid that may serve as surfactants, electrolytes and solutes which affect the characteristics of the soda and bubble coalescence. Tests of specific gravity in sweetener solutions and seltzer documented that liquid density increased rapidly as sugar or other solutes were added. Surface tension, specific gravity and viscosity may play a role in the size and duration of the reaction. It is hypothesized that rapid depressurization and dissolution of the candy within the soda creates a density "plug" when a low density rapidly rising swarm of CO₂ bubbles encounters a liquid layer of greater density at the surface. The tapered top of the bottle delays the escape of the gas for a few microseconds, which causes a rapid increase in pressure.

Data was collected by measuring height and duration of the fountains using a meter stick and digital recordings. Specific gravity was measured using a hydrometer and temperature comparisons with laboratory thermometers. The data appears to confirm our hypothesis.

CHEM – 8 LOCAL DYNAMIC STUDIES OF GUANINE RESIDUES WITHIN THE HUMAN TELOMERIC DNA G-QUADRUPLEXED CONFORMATION

Xiuyi Liu (GRAD)^{1,2}, Yasemin Kopkalli¹, Aleksandr V. Smirnov³, Tilman Rosales³, Mary E. Hawkins⁴, Jay R. Knutson³, Lesley Davenport^{1,21} Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY 11210²Department of Biochemistry, The Graduate Center-CUNY, New York, NY³Heart, Lung and Blood Institute, NIH, Bethesda, MD⁴National Cancer Institute, NIH, Bethesda, MD

Formation and stabilization of G-quadruplexed DNA conformations can inhibit the abnormal activity of the enzyme telomerase in tumor cells, making it a target for potential cancer therapeutics. To study the effect individual guanine residues have on the folding process of the G-quadruplex conformations, the fluorescence of human telomeric (HT₄) oligonucleotides incorporating the fluorescent guanine analog

6-methyl-8-(2-deoxy-D-ribofuranosyl) isoxanthopterin (6MI) into different tetrads of the quadruplex (G1, G4, G5, G9 and G11) were investigated. This guanine probe exhibits changes in fluorescence intensity sensitive to base-stacking. Fluorescence intensities quench for G4, G5, G9 and G11, and de-quench for G1 when each 6MI-labelled oligonucleotide folds to the G-quadruplex conformation with addition of K^+ -ion. This suggests stronger base-stacking interactions with neighboring bases for G4, G5, G9 and G11, compared with G1 located on the 5'-end. Fluorescence intensity peaks observed for G1 and G11 also show significant red wavelength shifts with folding. This suggests these guanine positions may be more exposed to a polar environment within the folded state. Fluorescence lifetime studies of the labeled quadruplex sequences reveal that the observed intensity quenching arises predominantly from fast quasi-static self-quenching. This self-static quenching apparently arises from the proximity of 6MI to neighboring bases. The "dark" component (A_{dark}) dominates the decay behavior for both the folded and unfolded conformations of each 6MI-labeled sequence. With folding, the contribution of A_{dark} increases for all labeled oligonucleotide sequences as the conformation is now more compact. Overall these studies suggest individual guanines play different roles in the stabilization of G-quadruplex structures. Supported by NIH SCORE Grant S06 GM 076168.

CHEM – 9 STUDIES OF QUADRUPLEX FOLDING USING A NEW FLUORESCENT PORPHYRIN DERIVATIVE.

Amy Herskovits (UN), Yasemin Kopkalli, Matibur Zamadar, David Aebisher, Alexander Greer and Lesley Davenport, Department of Chemistry, Brooklyn College of CUNY, New York 11210

Small molecules that can bind selectively to guanine-rich telomeric DNA sequences, causing them to fold into a four-stranded quadruplex conformation, are promising targets for development of potential cancer drugs. Folding of the quadruplex has been shown to deactivate telomerase, a key activating enzyme in many cancers. In the current study, we have examined the effects of a new porphyrin derivative on the folding of guanine rich model human telomeric DNA sequences (HT4). Porphyrins-based drugs offer several desirable properties as they are non-toxic and found in many oxidation-reduction proteins of the cell. The new porphyrin derivative under investigation (a pyropheophorbide derivative; PPP-D) has a hydrophobic-aldehydic side arm which enhances lipid solubility and can facilitate cellular delivery through the cell membrane ($\log P = 6.80 \pm 1.62$) over other quadruplexed-DNA binding porphyrins, including the well-studied cationic *meso*-tetrakis(4-(*N*-methylpyridiumyl))porphyrin (TMPyP4) and anionic *N*-methyl mesoporphyrin IX (NMM). In contrast to TMPyP4 and NMM, PPP-D is non fluorescent in buffer solutions and highly fluorescent in organic solvents and lipid bilayer environments. Using circular-dichroism (CD) spectroscopy, we have shown that PPP-D can successfully aid in the folding of HT4 sequences in addition to stabilizing the quadruplexed DNA conformation. Furthermore, fluorescence and CD data show that PPP-D has selectivity for the quadruplexed DNA (q-DNA) over duplexed DNA (d-DNA). The significance of these results for anti-tumorigenesis will be discussed. Supported by NIH-SCORE grant S06-GM076168.

CHEM – 10 A FIBER OPTIC DEVICE FOR TARGETED SINGLET OXYGEN DELIVERY FOR APPLICATION IN HUMAN DISEASES SUCH AS BRAIN TUMORS.

Mohammad Alqaim (UN), Matibur Zamadar, Goutham Ghosh, David Aebisher, Lesley Davenport, Yasemin Kopkalli, and Alexander Greer, Department of Chemistry, Brooklyn College of the City University of New York, Brooklyn, NY 11210

Because clinical photodynamic therapy relies on the use of intravenously injected sensitizers our work sought to address limitations by developing a novel heterogeneous photodynamic therapy method. We have focused on 1O_2 generation *in vivo* introducing the sensitizer into diseased tissue via a fiber optic probe. The preliminary results suggest the release of pheophorbide photosensitizer molecules **2** from porous silica "caps" fixed to the end of hollow optical fibers (see Figure). The porous ends on the hollow optical fibers also flow O_2 , a needed reagent. The hypothesis is that sensitizer molecules will be triggered for release on-site by visible light irradiation, via dioxetane decomposition to give two carbonyl fragments. Further work is needed, but the fiber optic device may eventually provide an improved method to site-specifically generate 1O_2 *in vivo* in sites that are often inaccessible or unsafe for treatment by traditional surgical and medical methods such as major blood vessels (carotid arteries), critical areas of the brain, and portions of the eye.

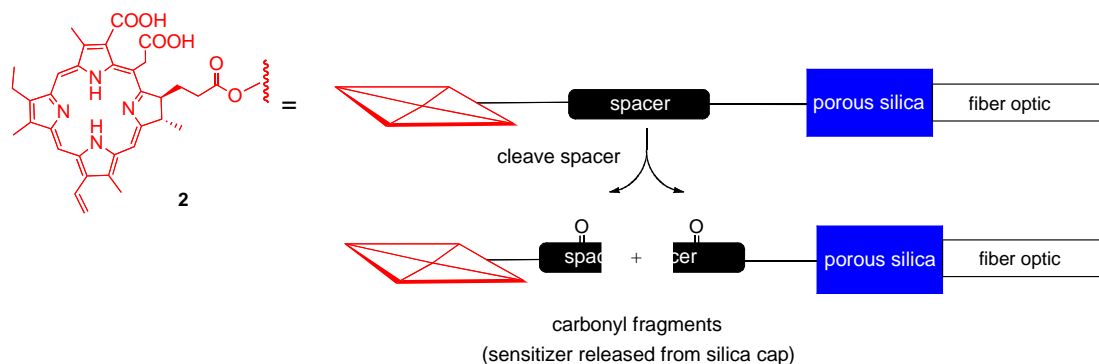


Figure. Fiber Cap Modified to Release Sensitizer Molecules Upon Excitation.

CHEM – 11 THE EFFECT OF LEAD ON BONE MINERAL PROPERTIES OF BABY MICE' FEMURS

Marie Christine Bastien (UN)₁ W.C. Budell, O. Berezovska, A. Ul Monir and T. Dowd, Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY 11210

Lead exposure and direct exposure from food to toys, from indoor to outdoor, is a major concern in every child's health. Elevated blood lead levels had been observed in children from 1-5 years of age. It has been reported that lead can be transferred from the mother's milk to the child during infancy, but the effect of lead on detailed mineral properties in developing bones has not been investigated. In this study, we tested effect of 250 ppm lead intake on condition of bone of mice during the first 6 weeks from birth. Detailed mineral and matrix properties were measured with Fourier Transform-Infrared Imaging. From 1 to 6 week of postnatal development, mineral to amide ratio in cortical part of femur was consistently increasing in both control and lead treated mice in accordance with previously reported data on progression of skeleton mineralization at this age. Significant reduction in this parameter ($p < 0.001$) induced by lead was detected in 3 week mice, the time when baby mice usually switch for independent feeding. Dynamics of nonreducible and reducible collagen crosslink formation during collagen maturation, as shown by 1660:1690 intensity ratio, was slowed down significantly ($p < 0.05$) in lead treated 3week- and 6 week-old mice in comparison with untreated age matched controls. Crystallinity, estimated as 1030:1020 ratio and reflecting the size and perfection of the structure of apatite crystals, was also reduced in cortical bone of lead treated mice in all age groups; in 3 week- and 6 week-old mice the difference was significant ($p < 0.001$). Observed here under controlled lead exposure deviations in collagen maturation and crystallinity in baby mice had similar tendency as the effect of lead in adult mice previously reported from our laboratory, and can result in reducing mechanical properties of developing bone. Taken together, our data suggest that in the tested concentration, lead disturbs normal bone development and mineralization in early postnatal period.

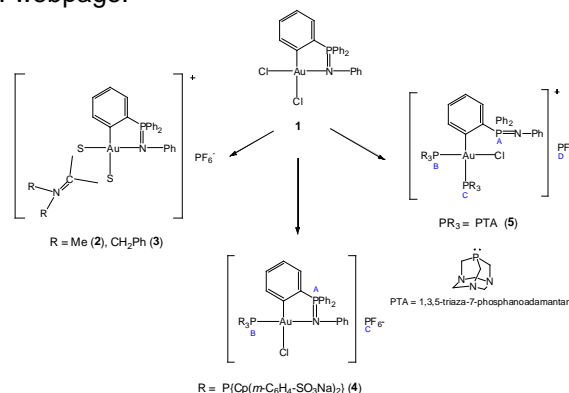
CHEM – 12 Iminophosphorane ligands derived from bis(diphenylphosphino)-ferrocene (DDPF). Synthesis of Au(III) and Pt(II) derivatives as potential anticancer agents

Claribel Nuñez (UN), Monica Carreira and María Contel Chemistry Department, Brooklyn College and The Graduate Center, CUNY, Brooklyn, NY, 11210, US. webpage:

<http://userhome.brooklyn.cuny.edu/mariacontel/>

Gold compounds are emerging as an alternative to platinum anticancer agents. It is expected that their different mode of action could overcome some of the drawbacks of currently used platinum drugs.

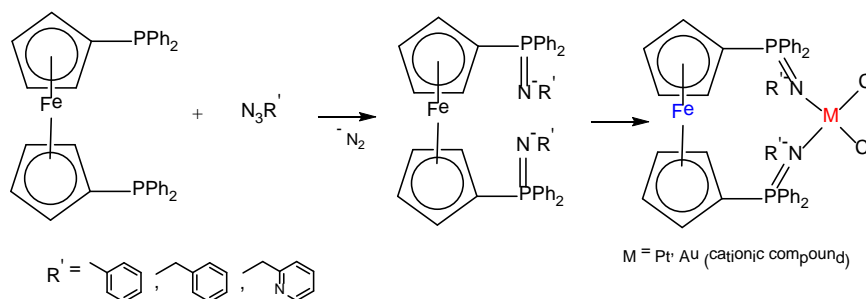
Recently, we have prepared a series of stable cationic gold (III) complexes¹ (Scheme 1) with the 'pincer' iminophosphorane ligand (2-C₆H₄-PPh₂=NPh) (with a C-N backbone containing a P atom susceptible to be studied by ³¹P NMR *in vitro*). These cationic compounds are soluble in DMSO and/or H₂O. These complexes were tested as



Scheme 1

potential anticancer agents and their cytotoxicity and apoptotic properties were evaluated *in vitro* against HeLa-GFP human cervical carcinoma and immortalized leukemia Jurkat-GFP cells. **2** and **3** resulted more cytotoxic than cis-platin while **4** and **5** were not so efficient most plausibly due to their lesser stability in biological relevant solvents. Thermal denaturation methods showed that all these complexes have no or little (electrostatic) interaction with DNA while **2** manifested a high reactivity toward mitochondrial proteins. These preliminary results confirmed the hypothesis that gold(III) compounds display a mode of action different to that of platinum(II) complexes and that they may target mitochondria.

We report here on the synthesis of new iminophosphorane ligands from a bis(phosphine) ligand derived from ferrocene (bis{diphenylphosphino}-ferrocene DPPF) (scheme 1). By the Staudinger reaction (scheme 2) we have prepared new iminophosphorane ligands of the type $R'N=PP=NR'$. These IM ligands have been used to prepare Pt(II) and Au(III) complexes by coordination of the metallic center to the nitrogen atom of the ligand. Some ferrocenyl derivatives² have displayed antiproliferative effect *in vitro* against melanoma cells and *the goal of this research project* is to explore in the near future the cytotoxicity of these new mixed Fe-M (M = Pt, Au) complexes.



Scheme 2

1. Shaik, N.; Martinez, A.; Augustin, I.; Varela, A.; Aguilera, R.; Sanau, M.; Contel, M. *Inorg. Chem.* **2009**, *48*, 1577.
- Q. Michard, G. Jaouen, A. Vessieres, B.A. Bernard. *J. Inorg. Biochem.* **2008**, *102*, 1980

CHEM – 13 A MOLECULAR DYNAMICS STUDY OF THE INFLUENCE OF IONIC CHARGE DISTRIBUTION ON THE DYNAMICS OF A MOLTEN SALT

Hualin Li (GRAD), Mark N. Kobrak Department of Chemistry Brooklyn College and The Graduate Center of the City University of New York, 2900 Bedford Ave., Brooklyn, NY 11210

The distribution of charge in an ion of a fused salt is known to be an important determinant of liquid dynamics. We present the results of molecular dynamics (MD) simulations on a model molten salt system and show that changes in the distribution of ionic charge can have a profound effect on liquid dynamics. In particular, we observe complex relationships between the distribution of charge, the rate of ionic rotation, and the translational diffusion of ions in the liquid.

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LEGEND:

BIO – Biology
CHEM – Chemistry
CIS – Computer Science
ENG – Engineering
ENV SCI – Environmental Sciences
GEO – Geology
HNS – Health and Nutrition Science
PHYSICS
PSY – Psychology
SCAS – Psychology
SOC – Sociology

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