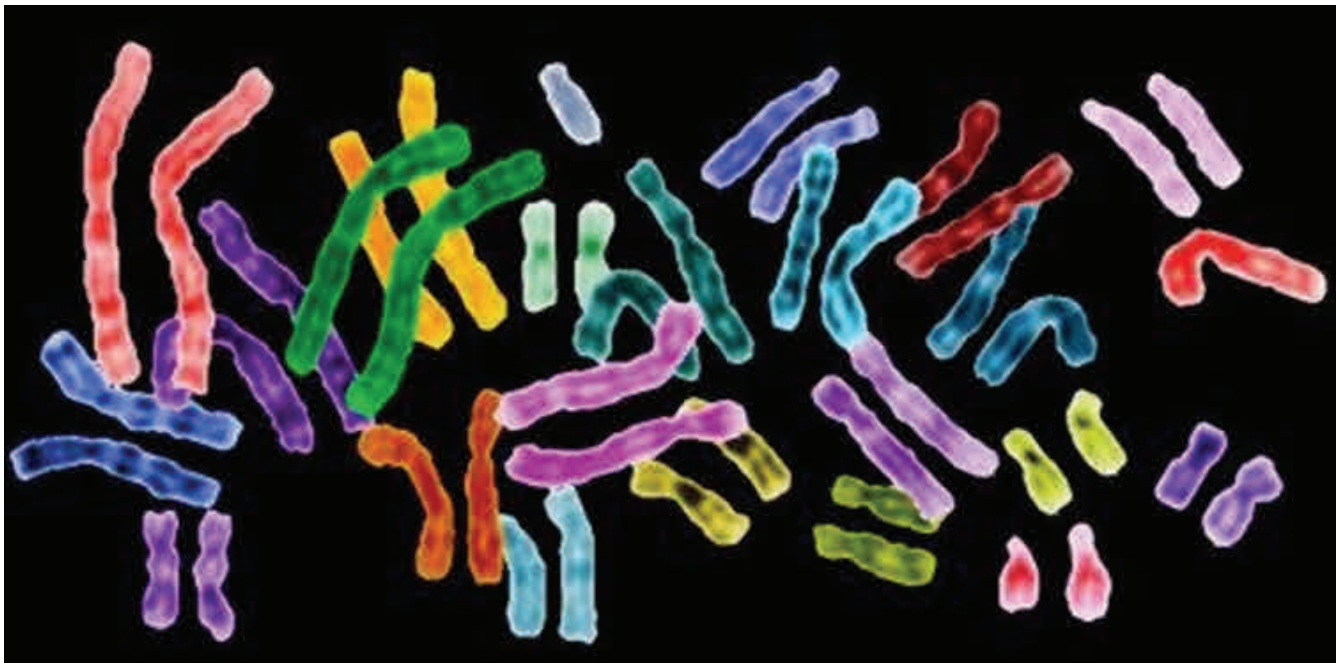
Science Research Day



ABSTRACT BOOK

Sponsored by

NIH RISE, MARC, CSTEP & STEP PROGRAMS

DIVISION OF STUDENT AFFAIRS

Brooklyn College The City University of New York

MAY 8, 2015

25TH ANNUAL BROOKLYN COLLEGE SCIENCE DAY

Brooklyn College

PROGRAM

9:30 AM	**POSTER SETUP (Student Center)**
10:00—12:00	**STUDENT PRESENTATIONS AND JUDGING (2nd floor)**
12:15 PM	**LUNCH IN THE GOLD & MAROON ROOMS (6th floor)**
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 THE MOOD ALTERING POTENTIAL OF MUSIC DOCUMENTED THROUGH CARDIO RESPONSE

Eli Romano and **David Rahmey** (HS) with Steven Kaye, Magen David Yeshivah HS

The question whether music affects mood has been explored by several researchers who looked at subject responses to questionnaires, self-reporting of mood and some physical responses.
A review of the literature revealed studies linking the effect of music to heart rate variability or variations in the EKG as measures of mood response.
The materials used for this investigation consist of four music selections: classical, metallic rock, techno, and Middle Eastern traditional music played on headphones to the test subject. Physical responses will be recorded using a Vernier data logger with Logger Pro software and the EKG and pulse sensors. The test subjects will also be asked to self-identify their mood and feelings on a short questionnaire illustrated with mood-reflecting cartoons. It has been hypothesized that music will affect mood and could be documented by increased variability in the heart rate.
Due to the length of this protocol, a limited number of test subjects all from a private school with a Middle Eastern student population. The test subjects were recruited and tested individually. The order in which the music selections were played was varied.
The data showed some variability which appeared to correspond to music genre. The data on heart rate/EKG was evaluated by measuring the distance between the P-wave events and calculating the mean and standard deviation of the time.

PSY – 2 DIFFERENCES IN COGNITIVE REHABILITATION BETWEEN PARANOID AND DISORGANIZED SUB-TYPES IN SCHIZOPHRENIA.

Irena Pergjika (GRAD), Daniel D. Kurylo (Brooklyn College), Richard Waxman (Touro College)

Prior research investigating performance among subgroups of schizophrenia have produced conflicting results. Uhlhass, et al. (2005) reported that patients with disorganized symptoms performed worse on all three conditions of a contour integration test, visual size perception task and visual closure task, compared to a non-disorganized group. In contrast, Abbruzzese, Stefano, & Silvio (1996) found that patients in a paranoid subgroup performed more poorly than those in a non-paranoid subgroup on the WCST. In order to examine the effects of diagnostic subtypes on cognitive rehabilitation of visual perception effects of cognitive rehabilitation were compared between patients diagnosed with paranoid and disorganized type of schizophrenia. symptoms. We hypothesized that patients from the paranoid subgroup would perform better than those in the disorganized subgroup, because paranoid patients tend to possess better cognitive abilities, such as focusing on, recording, and recalling information selectively (Citak, Cakici, Cakici & Samet, 2013). Training was performed three times a week for 36 sessions. Results indicated that overall participants benefited from visual rehabilitation. However, more complex interaction existed of diagnostic category and rehabilitation benefits than originally hypothesized. Specifically, patients with disorganized symptoms benefited from cognitive rehabilitation of perceptual abilities, despite impaired cognitive abilities. In addition, the relative improvement in perceptual ability did not consistently favor the paranoid subgroup. Results suggest differences in visual processing, in which abnormalities have

previously been shown to exist in cortical areas. Further investigation with larger sample size, as well as analyses of covariate factors, such as medication, may better identify distinctions in cognitive rehabilitation among subgroups in schizophrenia.

PSY – 3 STIMULUS SIMILARITY EFFECTS ON ASSOCIATIVE LEARNING

George Abadeer (UN) Chaim Heyes, and Stefano Ghirlanda, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

The goal of this study was to investigate the effect of stimulus similarity in a so-called "feature positive" design and compare empirical results with the predictions of three models of associative learning: Pearce 1987, Pearce 1994 and the replaced elements model of Brandon et al (2001). We trained human participants to discriminate between a compound of two stimuli, labeled AB, and stimulus A alone, then we tested responding to B. Three groups of participants experienced different levels of similarity between A and B, which were colored squares on a computer screen. We found no effect of this variable on responding to B, which was equally low in all three experimental groups. In a previous experiment (Landau 2014), feature-positive training had been preceded by training on A alone. In that experiment, responding to B was elevated in participants experiencing very similar A and B stimuli. These results appear hard to reconcile with the three models mentioned above, and a replication of the two experiments employing more similar A and B stimuli is planned to evaluate whether the results reported here and by Landau (2014) are robust.

PSY – 4 CHAMBER ANALYSIS IN MONK PARAKEET NESTS

Muhammad Abdulla (HS) Midwood High School and Frank W. Grasso, Brooklyn College, Department of Psychology, Brooklyn, NY,11210

This research was conducted in order to find out more about the habitat of the Monk parakeet. The research will be testing to see on average how long a chamber lasts and during which month cycle do they appear the most. The research will also be testing to see whether or not location plays a factor. With the help of an archive, I broke down the data. The project was conducted with the help of various pictures of nests that were taken on previous nest assessments. Nest assessments are taken on the summer solstice, fall equinox, fall solstice and spring equinox. The pictures range from 2008-2011 because the institution has a lot of data of this time period. I observe and label the chambers using letters of the alphabet. If a new chamber was observed since the previous photo, it gets a new a letter. If the same chamber was observed since the previous photo, the letter stays the same. This is an important step because the observations have to be very concise and accurate. After the observations I conducted something known as Inter observer reliability (IOR). In this procedure, I must have another person with knowledge on the project. That person was required to do his/her own observations without the assistance of me. Then, I compared the two observations, and if there are any discrepancies, it will be discussed amongst the two. Finally, the data is analyzed as a whole.

PSY – 5 THE RELATIONSHIP BETWEEN DEPRESSION, ANXIETY INCLUDING IBD-SPECIFIC ANXIETY ON IBD SUBTYPE AMONG YOUTHS.

Raisa Hasan (UN) & Laura C. Reigada, PhD, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Approximately 1.4 million Americans have Inflammatory Bowel Disease (IBD) a chronic autoimmune disorder that causes inflammation in the gastrointestinal tract, comprising of ulcerative colitis or Crohn's disease (i.e., UC/CD). One in ten patients (< age 18) are diagnosed with IBD. There are underlying biological and quality of life distinctions between UC and CD, yet a dearth of studies have examined psychological differences between these two phenotypes. Such differences in IBD subtypes play a vital role in treatment, and thus demands rigorous inquiry. Based on a dearth of literature, it is hypothesized that youths diagnosed with UC will display higher levels of anxiety and IBD-Specific anxiety but lower depression compared to youths with CD. In this study, 115 adolescents with CD (n=93) and UC (n=22), ages 12-17 (M=1.2, SD= .457), completed online self-report depression, anxiety, and IBD-specific questionnaires. A multivariate analysis of variance was performed to examine whether anxiety and depression symptoms where different based on IBD subtype controlling for gender, age, and disease activity. Results revealed IBD-specific-anxiety was significantly higher in UC patients (M= 17.5, SD= 14.7) compared to CD (M= 15.0, SD= 17.0) after controlling for disease activity, gender and age (p = .006). Additionally, general anxiety was significantly higher in UC compared to CD patients (p=.022). Depression did not significantly vary by IBD type. Results suggest that anxiety may be higher among adolescents with UC compared to adolescents with CD. Future studies should examine CD and UC separately when assessing anxiety and IBD-specific anxiety in youths with IBD.

PSY – 6 THE EFFECTS OF AMOUNT OF PAVLOVIAN TRAINING ON REPRESENTATION-MEDIATED FLAVOR AVERSION LEARNING: IMPLICATIONS FOR ANIMAL MODELS OF SCHIZOPHRENIA

Alexa S. Marshall (UN) and Andrew R. Delamater Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

The goal of this study was to extend a finding reported in the literature (Holland, 1998) in which rats were shown to develop an aversion to a sucrose solution after its internal representation was paired with gastrointestinal illness. In each of two groups of rats, one of two conditioned stimuli (tone or light) was paired with sucrose, while the other stimulus was presented without sucrose. One of these groups of rats received an extensive amount of Pavlovian training whereas the other received a more limited amount of training. Next,the rats were presented with one of the conditioned stimuli (either the sucrose-paired stimulus in experimental animals or the unpaired stimulus in control animals) followed by plain water, which was further followed by an injection of lithium chloride, a gastrointestinal illness inducing agent. In order to determine if the internal representation of sucrose was associated with illness, a series of consumption tests was conducted measuring the rats' preference for sucrose and another attractive solution Polycose. Preliminary findings do not support published results stating that representation-mediated aversion learning occurs, and solely occurs, in minimally trained rats (McDannald et al., 2011). This study could be improved by reducing the delay experienced

between light or tone presentation and gastrointestinal illness. If further research is done illustrating that flavor aversion learning is proven to be affected by the amount of Pavlovian training then rats that receive mediated learning can potentially be used as an animal model of hallucinations experienced in schizophrenia patients.

PSY – 7 DOES THE *NAUTILUS POMPILUS* HAVE AN ENDOGENOUS CIRCADIAN RHYTHM?

Jennifer Basil and **Lisa M. Caraballo** (UN), Department of Biology, Brooklyn College, Brooklyn, NY 11210

Daily rhythms of activity controlled by circadian clocks are present in many animals. The *Nautilus pompilius* is a shelled cephalopod that lives in the open sea, specifically the IndoPacific Ocean, in deep coral reef slopes. Chambered Nautilus makes daily vertical migrations up and down the coral reef slopes. These movements appear to be crepuscular in nature (dawn and dusk), but it could be these nocturnal animals are merely using its lens-less eyes to assess light levels and make navigational decisions. The internal clock may assist the Nautilus when it is deeper in the water and farther away from light, since the Nautilus has been known to withstand aphotic depths of 800m before implosion.

As these solitary, deep water, nocturnal animals are difficult to study in the wild, we initiated two studies of their circadian rhythms: 1) the feeding/radular rhythms that have been well established in another mollusk, *Aplysia*, and 2) a 2 week entrainment/free-running experiment. In experiment 1, animals were tested in the presence and absence of food and their mouth movements and rhythms were measured in each condition. In experiment 2 animals were entrained to a 12:12 light dark cycle for 4 days, then released into constant darkness to establish their natural free-running endogenous rhythm in the absence of external entrainment cues for 4 days. The animals were then re-entrained to 12:12 LD cycle to determine the speed of entrainment.

PSY – 8 ALL SUPPORT IS NOT EQUAL: SUPPORT FOR POSITIVE AND NEGATIVE EVENTS DIFFERENTIALLY BUFFERS THE NEGATIVE EFFECTS OF SOCIAL EXCLUSION

Agnes Wolowiec (GRAD) and Dr. Cheryl Carmichael, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Perceiving support availability for negative events has stress buffering benefits (Cohen, 1992). However, insecure attached people typically perceive received support as less helpful (Collins & Feeney, 2000). In the positive domain, capitalization refers to support seeking for positive events by sharing good news with close others. Receiving enthusiastic feedback to a capitalization attempt is associated with personal and relational benefits (Reis et al., 2010).

This experiment examined whether supportive feedback to a capitalization attempt could buffer stress in a similar manner to supportive feedback for a negative event, and whether stress-buffering effects were moderated by attachment security. Brooklyn College undergraduates (N=145) completed a measure of attachment; recalled and wrote about a previous capitalization event, supportive event, or the contents of their bedroom (control); were socially excluded via a computer game (Cyberball); completed measures of belonging, anxiety, self-esteem, and mood.

Recalling a social support transaction buffered the negative effects of social exclusion (e.g., reduced anxiety, increased belonging, self-esteem, and positive mood) for participants who were relatively higher in attachment anxiety, but recalling a capitalization event, or writing about the contents of one's bedroom did not. Attachment avoidance and the writing recall condition did not interact to predict reactions to social exclusion.
Although capitalization may produce benefits, support for positive and negative events appears to be associated with distinct outcomes, particularly stress-buffering ability. Moreover, contrary to other research, attachment anxiety was associated with enhanced stress buffering. Recalling support appears to have soothed abandonment concerns of anxious people prior to social exclusion.

PSY – 9 TRADEOFF OF STIMULUS STRENGTH AND REACTION TIME ON ACCURACY IN RATS

Cindy Lin (UN) and Daniel D. Kurylo, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Multiple neural processes mediate cognitive functions, including visual perception, decision-making, and choice behaviors. One experimental method used to study such abilities is to measure chronometric (time-related) functions. A second technique is to measure accuracy (typically percent correct responding) across levels of task difficulty. In previous studies, it has been found that lower task difficulty (higher accuracy) produces shorter reaction times (RT), while other studies report that longer RT yields higher accuracy. These apparent opposing effects of RT represent a speed/strength tradeoff on accuracy. To account for this apparent dichotomy, it is hypothesized here that higher accuracy results from (1) extended processing time, and (2) strong stimulus strength. To investigate these hypotheses, two Long Evans rats were trained on a simple visual discrimination task. Percent correct at each of the nine 100 ms bins were measured for each of seven stimulus durations. It was found that across RT, accuracy ramps up to a peak level near 250 ms, and then gradually declines with longer RT. The declining portion of the function is more evident with increased task difficulty. In addition, a window of performance enhancement existed about 300 ms following stimulus offset, which may be related to transient off-responses in visual processing. Together, these results indicate an interaction of RT and stimulus strength where performance peaks at a mid-level of processing. These results may have identified an optimal RT where the strength of neural representation and the extent of neural processing converge to produce optimal performance.
Supported by the National Science Foundation (Award # 1156870).

PSY – 10 ROLE OF SELF-ESTEEM, ACHIEVEMENT-ORIENTED PRIDE, AND HUBRISTIC PRIDE IN ONE'S INTERACTION WITH OTHERS

Ruthy Groner (UN), Carrie Pappas, and Elizabeth Chua, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

The objective of this study was to understand how achievement-oriented pride, hubristic pride, and self-esteem contribute to a person's self-involvement when interacting with others. Participants had their eyes tracked during a video chat with another student. Participants spoke about achievements they were proud of and something they really liked about themselves.

Self-esteem was measured using the Rosenberg self-esteem scale (1989). We used looking at the self as an index of self-focused attention and looking at the other as a measure of other-focused attention. All of the data were analyzed using linear mixed models that included factors of story, speaker, self-esteem, and the interactions of each. Results showed significant self-esteem x speaker interactions, with higher self-esteem predicting 1) greater average length of each fixation at the self ($p<0.05$) and 2) a greater percentage of time looking at the self ($p<0.05$) during one's own proud stories, regardless of the type of pride. Similarly, higher self-esteem predicted 1) shorter average length of each fixation at the other ($p<0.05$) and 2) a smaller percentage of time looking at the other ($p<0.05$) during one's own proud stories, regardless of the type of pride. These results suggest that someone with higher self-esteem is more inclined to think of the self and less inclined to think of the other when speaking about both types of proud stories. These results further illustrate an individual's self-involvement when interacting with others.

PSY – 11 WHAT ARE YOU LOOKING AT: DOES SELF-ESTEEM EFFECT EYE CONTACT?

Ikra Kafayat (UN), Carrie A. Pappas, Elizabeth F. Chua, Ph.D., Department of Psychology, Brooklyn College-CUNY,Brooklyn, NY 11210

Eye contact is an important social cue in conversation. This study's goal was to determine if self-esteem, conversation topic, and speaker play a role in the amount of eye contact during a conversation. Fifty-seven students participated in a video chat during which their eye movements were recorded. The independent variables were story content (proud vs. embarrassed), who was speaking (self vs. other), and self-esteem (SE). The dependent variables were the percent time looking at the eyes and the percent time looking at the rest of the face. Two hypotheses were: (1) people with high SE will make more eye contact during their proud stories than their embarrassed stories because they have greater confidence, and (2) people with low SE will make less eye contact during their embarrassed stories than their proud stories because they will feel less comfortable in these moments. A repeated-measures ANOVA revealed main effects of speaker and story on both looking at the eyes and the rest of the face ($p<0.05$), but no main effect of self-esteem or interactions with self-esteem. People looked more at the eyes and the rest of the face during the telling of proud stories compared to embarrassed stories and during other's stories compared to their own. These findings show that overall looking at the other's face, both at the eyes and the rest of the face, varies based on situational factors (e.g., story content and speaker) and not on individual differences (e.g., self-esteem).

PSY – 12 EFFECTIVENESS OF COGNITIVE REHABILITATION RELATIVE TO ONSET AGE IN SCHIZOPHRENIA

Sara Babad (UN) Brooklyn College, Daniel D. Kurylo (Brooklyn College), & Richard Waxman (Touro College)

Patients with earlier onset schizophrenia tend to display more severe cognitive symptoms than late-onset sub-types. It is unclear if functional differences across onset age reflect differences in efficacy of rehabilitative therapies in schizophrenia. In order to explore effects of onset age on

rehabilitation, we studied effects of cognitive rehabilitation on mid-level perceptual function. It was hypothesized that patients with early-onset schizophrenia would benefit less from treatment. Over a 12-week period, patients underwent training on a visual discrimination task. The task required patients to perceptually group visual patterns based upon the Gestalt principle of similarity. Grouping was established by either common luminance, color, orientation, or motion. These stimulus features represent fundamental components of early visual processing. Results indicated that patients improved in all four domains over the course of treatment. Age at onset was only found to significantly positively correlate with the color condition. No trend was observed for luminance, and movement and orientation showed a negative downward trend. These preliminary results suggest that some level of plasticity exists in the schizophrenia that allows response to visual cognitive rehabilitation. However, functional differences that may exist across age of onset do not consistently correlate with benefits from rehabilitation of perceptual organization.

PSY – 13 METAMEMORY ACCURACY DIFFERS BASED ON SIMILARITY BETWEEN STUDY AND TEST STIMULI

Alexandra M. Gaynor [1] (GRAD), Elizabeth F. Chua [1,2]
[1]The Graduate Center, CUNY; [2]Brooklyn College, CUNY

Previous research has shown that similarity between study and test conditions may contribute to accuracy of memory but not metamemory. Here we investigate how memory performance and immediate judgments of learning (JOLs) differ based on study/test similarity, and whether this changes with brain stimulation. Seventy-two participants received sham (n=24), frontal (n=24) or parietal (n=24) transcranial direct current stimulation (tDCS). During stimulation, subjects memorized 192 word pairs, and made immediate JOLs about their ability to later remember each pair. The next day, participants were shown word pairs, half studied together (intact) and half rearranged from different pairs (rearranged) and made an intact/rearranged decision. ANOVAs revealed no main effects of tDCS on memory or JOL accuracy, or interactions. There was a main effect of pair type on memory: performance for intact pairs was lower than for rearranged pairs across groups ($p<0.01$). Planned contrasts revealed poorer memory for intact pairs in frontal as compared to sham and parietal groups ($p<0.05$), suggesting prefrontal tDCS may have disrupted associative encoding. Overall JOL ratings did not differ between pair types, but there was a significant pair type by performance interaction in JOL ratings ($p<0.001$). Intact hits received higher JOLs (M=53.6) than misses (M=37.6, $p<0.001$), whereas ratings for rearranged hits (M=47.1) and misses (M=47.8) were similar. This resulted in higher JOL accuracy for intact (gamma=0.37) as compared to rearranged pairs (gamma=-0.02; $p<0.001$). Contrary to past findings, these results suggest judgments best predicted performance when study and test stimuli matched, but were significantly less accurate when conditions differed.

PSY – 14 SEASONAL VARIATION IN GROUP SIZE OF MONK PARAKEETS

Yukie Wong (HS) and Frank W. Grasso, BCR Lab, Department of Psychology, Brooklyn College-CUNY and Midwood High School, Brooklyn, NY 11210.

Monk parakeets (*Myiopsitta monachus)* are an invasive species of parrots that arrived in the United States from Argentina in the 1960s. These gregarious parakeets can now be found in the Brooklyn area of New York. Monk parakeets nest and travel in large group sizes, but they are assumed to be revolved around a pair bond, with breeding pairs functioning as the fundamental social unit. In this study, the group sizes of monk parakeets were observed around the Brooklyn College campus from March to August. It was hypothesized that the frequency of the group size of monk parakeets will vary with seasonal time because of their mating cycle and time of fledge. Five different nests were observed for ten minutes and the number of group sizes and the number of parakeets in each group were recorded. The results show that the group size varies with the mating season because during the mating season, there is a mean group size of two. After the mating season, many juveniles generally begin to fledge on their own, resulting in a mean group size of one. It can be concluded that monk parakeet group size does vary with the time of year and possibly the phase of mating cycle.

PSY – 15 DIRECTION OF GAZE AND MONK PARAKEET VOCALIZATION

Meghan Ng (HS) and Frank W. Grasso, BCR Lab, Department of Psychology, Brooklyn College-CUNY and Midwood High School Brooklyn, NY 11210

Eye contact also known as gaze is a very important part about attracting someone or something's attention. To stop and gaze at parrots in a nest is a way to attract their attention. The purpose of conducting this experiment is to see if whether facing towards or away from a parrot nest will influence the parrots in that they will produce a vocalization for an x amount of time when the recorder stays in one position. When the experiment was analyzed it showed how the parrots did make the 4 Buhrman's Calls and other calls. Out of all the parrot calls the most frequent vocalization they made was chatter. The parrots made less chatter calls when the recorder was facing towards the nest versus when the recorder was facing away. The difference in the seconds duration was approximately 7-8. This concludes the fact that parrots are used to/ prone to seeing local pedestrians going up and down the sidewalks, but when an observer is recording and is standing in the same spot at a fixed distance without moving, the parrots will begin to acknowledge the fact that someone is watching them, which will start to make them feel curious, or possibly threatened.

PSY – 16 PTSD SYMPTOMS, AGGRESSION, AND CRIME EXPOSURE IN A SAMPLE OF YOUNG ADULTS

Zainab Iqbal (HS) Midwood High School and Long Island University, Brooklyn, NY

This study examined the relationship between crime and PTSD, crime and aggression, and the impact of PTSD on the relationship between crime and aggression. Out of 566 young urban adults (ages 18-24) from a university in New York City, 82 endured exposure to crime. They completed questionnaires to assess their perceived severity of crime, PTSD symptoms, and aggression. Correlations were run to test for the significant effects and a hierarchical regression was conducted to test for the interaction effect of PTSD on the relationship between crime and aggression. As hypothesized, the interaction effect did have a significant relationship. The relationship between crime exposure and PTSD was also positively significant. These findings suggest getting help as soon as a person has endured a crime to prevent PTSD symptoms

and/or aggression. Sometimes people, who have been exposed to crime, will then *commit* crimes in the future. Furthermore, these findings can implicate how certain behaviors that can harm people (i.e., shootings) can be prevented.

PSY – 17 AUTONOMIC INFLUENCES ON THE DEVELOPMENT OF ANTISOCIAL BEHAVIOR IN THE FACE OF SOCIAL ADVERSITY

Shawn E Fagan [1], **Wei Zhang** [1] (GRAD) and Yu Gao [1,2]
[1]The Graduate Center, The City University of New York, [2]Psychology Department, Brooklyn College, The City University of New York.

The display of antisocial behaviors in children such as aggression, delinquency, and externalizing has been of interest to criminologists and developmental psychologists alike for a number of decades. Exposure to social adversity (poverty, community violence, marital conflict, etc.) has been shown to contribute to the development of antisocial behaviors. Additionally, specific profiles of autonomic nervous system (ANS) responding, such as heart rate variability (HRV), pre-ejection period (PEP), and heart rate, have also been associated with antisocial behavior. Social neuroscience perspectives have recently begun to look at how both neurobiological underpinnings and social adversity are integrated to predispose individuals to the aforementioned behavioral deficits and future criminal offending.
A large body of research has related low resting heart rate, a measure that reflects both parasympathetic (PNS) and sympathetic nervous system (SNS) activity in the ANS, to antisocial behavior. Our study investigates the potential mediating effects of separate measures of SNS (i.e. PEP) and PNS (i.e. HRV) on the relationship between social adversity and antisocial behaviors. We find that low resting heart rate, but not HRV or PEP, mediates the relationship between social adversity and antisocial behaviors. Furthermore, although HRV was associated with nonaggressive antisocial behavior, it did not mediate the social adversity-delinquency connection. This information has implications for understanding the neural mechanisms that underlie aggressive and nonaggressive antisocial behavior. Moreover, our results contribute to the growing body of knowledge concerning the mediating effects of biological predispositions on the link between early exposure to social adversity and future criminal behavior.
Supported by SC2HD076044

PSY – 18 CLASSICAL CONDITIONING TO MONETARY LOSS AND GAIN IN CHILDREN

Krystal Mendez (UN) & Yu Gao, Psychology Department, Brooklyn College, CUNY

Classical conditioning, also known as Pavlovian conditioning or associative learning, has been studied for decades in relation to behavioral problems and mental disorders. Poor skin conductance (SC) conditioning has been linked to deficits in the amygdala and antisocial behavior. It has been theorized that lack of anticipatory fear, as indexed by poor SC responses to cues that predict negative consequences, may predispose individuals to delayed development of conscience and more antisocial behavior. However, most conditioning studies have employed physical stimuli (e.g., electric shock or aversive tones) as reinforcers; little is known about whether more socially meaningful and ecologically valid reinforcers, such as losing or gaining money, can successfully elicit SC conditioned responses in children. In this study, SC

responding in a classical conditioning task involving both monetary gain and loss as reinforcers were assessed in 194 male and female schoolchildren from the Brooklyn area when they were 8- to 9- year-old and one year after. Pearson correlations and independent samples t-tests were conducted to test the stability of aversive and appetitive conditioning within one year period and the potential gender differences. Results showed that both aversive and appetitive conditioning were moderately stable across time. Furthermore, females showed better appetitive conditioning and males showed better aversive conditioning. This is the first study to investigate the development of two types of conditioning in one experimental design using a longitudinal approach. Findings may shed light on better treatment strategies for reinforcement-based mental disorders, such as anxiety disorders and conduct disorder.
Supported by SC2HD076044 and by NIH/NIGMS MARC GM008078

PSY – 19 RESOURCE DEMANDS OF A DUAL-TASK DISRUPTS SKILLED TYPING

Rebecca M. Colon (UN), Lawrence Behmer Jr., Matthew Crump, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

The goal of this study was to determine if a dual-task would either improve or hinder performance of skilled typing in the areas of speed and accuracy. Well-learned skills become almost “automated” and seemingly require less present attention. A computer experiment was coded in which participants typed words and nonsense words under dual-task and normal conditions. The dual-task condition involved maintaining digits in working memory while typing. The results of the current study showed that typing fluency was disrupted under dual-task conditions. Suggesting that splitting one's attention between two tasks, that there is some form of performance cost; in this case the speed of participants showed a decline in the dual-task condition.
Supported by NSF Award #1156870 & #1353360

PSY – 20 HYPERSCANNING IN SOCIAL ANXIETY: THE FEAR AND AVOIDANCE OF EYE CONTACT

Qutbia Shoukat (UN), Carrie A. Pappas, Elizabeth F. Chua, Ph.D., Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

The hypervigilance-avoidance hypothesis assumes that anxious individuals initially attend to and subsequently avoid threatening stimuli. The purpose of this study was to evaluate the relationship between social anxiety and hyperscanning (increased saccade length) ---which has been suggested to reflect a vigilant strategy. Twenty-four students participated in a video chat during which their eye movements were recorded. The two independent variables were story (proud vs disappointed) and speaker (self vs other) and the dependent variable was saccade length (the distance between fixations). The hypothesis was that mean saccade length at the other's face will be greater at the other’s face during one’s own story than the other’s story because telling a story may convey the potential threat of social evaluation to the individual. Results from the linear mixed model analysis revealed main effects of both speaker and story on the mean saccade length at the other's face. For story, mean saccade length at the other's face was greater for disappointed stories; and for speaker, it was greater at the other’s face during one’s own stories. There was a significant interaction between speaker and social

anxiety—as social anxiety increased, mean saccade length at the other's face was longer for one's own stories during the disappointed story. The findings indicate that hyperscanning may be a relevant feature for socially anxious individuals in a social interaction.

PSY – 21 EFFECTS OF BRAIN STIMULATION ON MEMORY RETRIEVAL

Rifat Ahmed (UN), Elizabeth F. Chua, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Previous research has shown that activity in the prefrontal and temporal cortices correlates with successful retrieval of semantic information. Furthermore, these regions have also been implicated in the "feeling-of-knowing" that currently inaccessible information can be retrieved later. The goal of this study was to use high definition transcranial direct stimulation (HD-tDCS), a non-invasive form of brain stimulation to determine if these regions had a causal role in memory and the feeling-of-knowing. Participants first attempted to recall the answer to a general knowledge question, then gave a feeling-of-knowing judgment, followed by a 4 alternative forced choice recognition task. Participants completed the same task with different questions under 3 different tDCS conditions: left frontal stimulation, left temporal stimulation, and sham stimulation. Preliminary analyses (n=12) using repeated measures ANOVAs showed worse recognition of non-recalled general knowledge answers with frontal and temporal HD-tDCS compare to sham stimulation, $F(2,22)=4.005$, $p<0.05$, but no difference in the feeling-of-knowing. These data show that manipulating brain activity in different regions can impact memory performance.

PSY – 22 LARGE ANTS AND SMALL MANSIONS: PERCEPTUAL INFORMATION DOES NOT GENERALLY AFFECT THE PROCESSING OF WORDS

Elliot Klein [1] (UN), Miriam Feintuch [1] & Natalie A. Kacinik [1,2]
[1]Brooklyn College and [2]Graduate Center, City University of New York

There is considerable evidence that representations of word meaning are "embodied" and grounded in our perceptual and motor experiences (Barsalou, 2008; Glenberg, 2010; Hauk et al., 2004; Zwaan et al., 2002). However, prior research in our lab has not supported this theory because perceptual information was not incorporated into existing representations of words sufficiently enough to alter their processing in recognition memory and property judgment tasks. In the current study participants performed lexical (word/nonword) and semantic (natural/artificial) judgments on the same stimuli to determine whether variation in a word's appearance (i.e., font size manipulated to be congruent or incongruent with an object's actual size) would affect the processing of that word in more immediate "online" tasks. For example, would presenting a word like "mansion" in a perceptually congruent (i.e., large) or incongruent (i.e., small) font, respectively, facilitate or hinder the speed and accuracy with which the word is processed. In accordance with our previous finding, the results showed that font size did not significantly the speed and accuracy of participants' judgments about the words in either the lexical or semantic decision tasks. This research therefore presents a challenge for embodied accounts of word meaning, particularly since most of the support is based on more immediate

priming and interference tasks. Some potential reasons for this discrepancy will be provided and discussed.

PSY – 23 WHAT IS IT LIKE TO GROW UP WITH DYSLEXIA?

Ariel Goldberg-Kay [1] (UN), Leah Samouha [1], Rita W. El-Haddad [1,2], and Natalie A. Kacinik [1,2]
[1]Brooklyn College and [2]The Graduate Center, City University of New York

In this study, 22 adults with dyslexia were interviewed about their academic and emotional experiences. In a 3-hour session, participants filled out demographic questionnaires and were then interviewed by the researcher. There were 8 male and 14 female participants who ranged in age from 18-56 years old. Twelve participants had a diagnosis of dyslexia only, while 10 had an additional learning disability and/or ADHD. The majority of participants (77%) reported receiving private tutoring and 32% attended a specialized school for people with learning disabilities. Ninety-one percent of participants developed personal coping strategies to deal with dyslexia that were separate from what they learned at school or from a tutor. In addition, 95% of participants felt that they had to study more to achieve the same results as people without dyslexia. Ninety-one percent of participants reported having strong negative feelings as a result of having dyslexia while growing up as well as feeling different than people without dyslexia at least some of the time. Despite the clear academic difficulties, our entire sample completed at least some college, with 41% having completed Master's degrees or are currently in graduate school. Future research should determine exactly which coping methods were the most effective in helping individuals with dyslexia overcome their difficulties. By bringing awareness to this issue, practitioners who service this community may be better be able to recommend specific interventions in order to help people with dyslexia succeed.
Supported by PSC-CUNY #66333-00 44 and Doctoral Student Research Grant Program Competition #9

PSY – 24 SECURITY BASED DIFFERENCES IN THE EFFECTS OF TOUCH ON LIKING AND PROSOCIAL BEHAVIOR

Amanda M. Baladi (UN), Hunter College-CUNY, New York, NY 10065
Cheryl L. Carmichael, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Touch is fundamental to survival, child rearing, sustenance, and social support. Physical contact produces physiological benefits such as decreased cortisol and increased oxytocin levels, and relational benefits, such as intimacy and closeness. Attachment theory describes how early relationships with caregivers give rise to mental models of self and other that guide relationship behavior and perception through adult life. The provision of soothing physical contact fosters attachment security, thus attachment orientation is expected to influence comfort with touch throughout life. The present research sought to determine whether physical contact would alter perceptions of, and prosocial behavior toward a stranger who provided touch during a conversation, and whether attachment insecurity moderated the effect of touch on liking and prosocial behavior. Participants (N=48) interacted with a confederate who either touched them twice or not at all during an interview-style discussion. Participants evaluated the confederate, who then casually asked for a favor as the participant was leaving the lab. Preliminary results

suggest that participants who had been touched liked the interviewer better than those who had not been touched. The effect was moderated by attachment style such that the effect of touch on liking was more pronounced for preoccupied and dismissing people. Our sample size is currently insufficient to evaluate the effects of touch and attachment on the prosocial behavior outcome, but data collection is ongoing. Understanding how attachment alters the social benefits of touch can inform interventions aimed at improving peoples' social lives.

PSY – 25 INTERPRETING MONK PARAKEET (MYIOPSITTA MONACHUS) BEHAVIOR AND CALLS

Mohammed Hasan (HS) Midwood High School and Frank Grasso, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Monk parakeets are an introduced species of parrot in Brooklyn New York and other places around the world that have a unique way of calling their fellow parakeets and responding to human behavior. Five nests around the Brooklyn College campus were all observed the same number of times. The behavior of monk parakeets were identified by looking "towards" or "away" depends on the direction of where the bird was looking. The behavior, the calls, the nests at location, and other required essentials were used to classify the daily lives of these birds. Changes in behavior are seen when observing each nest site.

It was expected to obtain a 50/50 split that each and every call would occur, towards half of the time and away during the other half. The contact, chatter, threat and other calls varied in proportion. The alarm call was the only call that happened to have a 50/50 percent chance occurrence. This was odd because the contact call, which was associated with direct eye contact between two monk parakeets, had a total of 16 calls away and 9 calls towards. Therefore, the results did not come out to have a 50/50 split as hypothesized. The alarm call tells us that the psychologically, throughout an eight-month cycle, monk parakeets were likely to call for help (alarm call) and still have a 50/50 split response from the birds looking towards and away.

PSY – 26 KINEMATICS OF THE MONK PARAKEET (MYIOPSITTA MONACHUS) DURING COURTSHIP RITUALS

Monique Powell (HS) Midwood High School, Alfie Supan and Dr. Frank Grasso, Biomimetic and Cognitive Robotics Lab, at Brooklyn College-CUNY, Brooklyn, NY 11210

The Eshkol Wachman Dance Notation, a notation initially used to record the angle of human body parts during dance, was applied to the monk parakeet, notably for the first time. This project examined the movement of the different body parts of monk parakeets (*Myiopsitta Monachus)* in respect to a standard position during the courtship dance. Identifying the patterns of movement of the monk parakeet gave insight into both the motor programs and cognitive abilities. It was hypothesized that there is a dance-like component to the courtship dance where one parakeet is identified as the lead while the other is distinguished as the follow. Furthermore, it was hypothesized that the components of the courtship dance would have some variation in it, proving it to be not to be as rigid as a ritualized behavior would be. With the use of a cross correlogram, and waterfall diagram that showed the patterns of the videos scored in color, it was found that indeed one bird had the tendency to lead over the

other. It was also found that the monk parakeets did display some variation while performing the courtship dance.

PSY – 27 EFFECTS OF ACUTE AND SUSTAINED THREAT ON IMPULSIVITY IN ADOLESCENTS

Camille A. Gregory [1] (UN), Ali Cohen [2], Frederico Lourenco [2], BJ Casey [2]
Brooklyn College, CUNY[1], Weill Cornell Medical College[2]

A 200% increase in mortality occurs during adolescence, not due to disease, but due to putting oneself in harm's way. This paradox may be partly due to diminished self-control - the inability to suppress one's feelings, desires, and actions. To test this, we examined decision making during adolescence relative to adulthood using emotionally charged manipulations that reflect real-life decisions. First, to capture the immediacy of decisions, often faced by teens in the heat of the moment, we measured impulsive decision making with an Emotional Go/No-Go task. This consists of negative and neutral emotional targets and non-targets (faces) to measure approach and avoidance decisions. Second, to capture the heightened arousal of emotionally charged situations, we manipulated the emotional context in which decisions are made to be negative (anticipating an aversive stimulus) or neutral. We used skin conductance to index heightened arousal during "threat" and "neutral" contexts. We found a main effect of age $F(1, 99) = 4.74$, $p=.032$ on errors of commission for the negative context, and an age by gender interaction $F(1,99) = 3.83$, $p=.05$ on errors of commission for negative cues. These results suggest that emotionally charged manipulations that reflect real-life decisions lead to more impulsive decisions in teens relative to adults. These results were more prominent in male teens than in females. These findings suggest that negative emotions lead to reactive as opposed to avoidant behavior in teens that may explain the increase in teens putting themselves in harm's way.
Funding: NICHD R01 HD069178 and NIH/NIGMS MARC GM008078

PSY – 28 THE RELATIONSHIP BETWEEN FLOW AND AFFECT DURING ART OBSERVATION

Michelle Peralta (UN) and Jennifer E. Drake, Department of Psychology, Brooklyn College, CUNY, Brooklyn, NY 11210

There have been many successful attempts in merging the disciplines of psychology and art and it is now known that viewing art can prove beneficial to one's mood, particularly in areas related to stress (Saito & Tada, 2007). In particular, creating a work of art is useful in reducing negative moods (Drake & Winner, 2012). This study advances this area of research by investigating if viewing art can yield similar results in negative mood reduction. The purpose of this study was to assess whether viewing art can increase affect and lead to states of flow. It was hypothesized that participants would show increased levels of positive affect after viewing art with significantly increase in positive affect when observing art for shorter periods of time. The study included 39 undergraduate students from Brooklyn College. Participants were randomly assigned to view an Indian miniature artwork for five minutes or 30 minutes. In both conditions, participants answered questions about the artwork to help guide their focus. Positive and negative affect were measured before and after the activity. Finally, participants completed a flow and enjoyment questionnaire. Positive affect did not significantly increase for either condition. However, negative affect decreased in both conditions with significant

decreases found for the five minute condition. While there were no differences between the conditions for flow experienced, those in the five-minute condition reported greater enjoyment. These results demonstrate the possibility of viewing art as a treatment options for individuals suffering from mood disorders, as well as stress and anxiety.

PSY – 29 PERCEPTUAL GROUPING BY ORIENTATION COHERENCE

Aytac Karabay (GRAD) and Daniel D. Kurylo, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Perceptual grouping allows the unification of elements within complex visual scenes. Perceptual grouping can be based upon several relationships among stimulus elements, including common orientation. Grouping can be disrupted by introducing noise elements, which disengage binding among target elements. We investigated parameters that limit grouping by interferencefrom noise. Specifically, we determined (1) the level of deviation of noise elements and (2) proportion of noise-target elements required to break perceptual grouping.It was hypothesized that 45° deviation of noise elements is required before disruption is apparent, since 45°borders the level of rotation oriented towards an opposing grouping pattern. It was further hypothesized that stimuli exceeding 50% noise elements will disrupt perceptual grouping, since the dominant grouping pattern will be carried by noise elements. In order to test these hypotheses, we measured visual discrimination of visual patterns. Four subjects indicated the dominant grouping pattern (horizontal or vertical) of an array of Gabor patches (oriented gratings). Measurements were made at five levels of orientation coherence and six levels deviation of noise elements. Backward masking was used to limit processing time of the stimulus.Results showed that perceptual grouping decreased significantly (from 95% to 67%) in the 45° of deviation condition. With 60% noise elements,discrimination was reduced to chance (52%). These results indicate that noise serves to reverse perceived grouping when presented at magnitudes or proportions that dominate constituents of stimulus patterns.

PSY – 30 THE EFFECTS OF WEIGHT BIASES ON MEMORY

Nadrienne A. Pinnock (UN), Elizabeth Chua, Department of Psychology, Brooklyn College, Brooklyn, NY 11210

Obesity is a growing problem in the United States and as a result, the stigma attached to it is growing as well. It has previously been shown that cognitive resources are depleted when an individual feels threatened by a stereotype. This study aimed at seeing if stereotype threat is applicable to weight biases in terms of memory performance. Participants were asked to provide their Body Mass Index (BMI) and complete a memory task. At study they were shown images of men and women and were told to remember them as best they can and to pay attention to their weight. At test there were two types of trials: one where they were presented with the image they saw before and altered versions, either heavier or lighter, based on weight (target present) and the other where they just saw altered versions of previously studied stimuli (target absent). Each test trial presented three options. Analysis were run to look at performance and see if participants were more likely to choose the heavier or lighter stimuli of the three options. Pearson Correlations show that individuals falling into the

overweight and obese categories, in terms of BMI, are more likely to pick the lighter option more than the heavier option at test for target absent trials ($r=-.486$, $p<.05$) and for hits ($r=-.598$, $p<.01$) and misses ($r=-.49$, $p<.05$) for target present trials. This suggests that weight biases may have an affect on memory performance.

Supported by NIH/NIGMS MARC GM008078

PSY – 31 METAPHORICAL COLOR REPRESENTATIONS OF EMOTIONAL CONCEPTS IN ENGLISH, CHINESE AND CHINESE-ENGLISH SPEAKERS: EVIDENCE FROM BEHAVIORAL DATA

Junqing Chen [1, 2] (GRAD), Natalie A. Kacinik [1, 2], Yingjun Chen [3], and Nianyang Wu [3]

[1] Psychology Department, Brooklyn College, City University of New York, NY, USA

[2] Psychology Program, The Graduate Center, City University of New York, NY, USA

[3] Psychology Department, School of Education, Shanghai Normal University, Shanghai, PR of China

This project was designed to examine whether the linguistic experience of individuals from English or Chinese language backgrounds can result in different metaphorical representations in those speakers. In study1, we used the Brief Implicit Association Test to measure how strongly primary colors are associated with anger, sadness and happiness. The data from native English and Chinese speakers collected to date support our hypothesis that red is associated with anger and blue with sadness in English speakers' representations; whereas red is associated with both anger and happiness in Chinese speakers. Our findings therefore collectively show that metaphorical color-emotion representations differ between English and Chinese speakers. In study2,English and Chinese monolingual speakers and Chinese-English bilinguals rated the strength of 132 color-emotion pairs on a 7-point scale range. The current data shows that the metaphorical color-emotion associations we expected to find based on our knowledge of English and Chinese cultures, were generally confirmed. As we expected, Chinese-English bilinguals generally gave ratings in between English and Chinese monolingual speakers, and closer to the language in which they performed the study. Hence, bilingual speakers can possess different, and even inconsistent, metaphorical representations from both cultures in their mind, and these culturally-specific representations can be differentially activated by the corresponding language context.

PSY – 32 THE EFFECTS OF BODY POSITION AND OBSERVER POSITION ON VERBALIZATIONS

Giuseppe Cannova [1,4] (UN), Susan Chi [1,3,5], Jessica Fischetti [5], Rebecca Colon [5], Laura Rabin [1,3,5], & Joel Sneed [2,5], [1]Brooklyn College–CUNY, [2]Columbia University and the New York State Psychiatric Institute, [3]The Graduate Center–CUNY, [4] Queensborough Community College–CUNY, [5] Queens College–CUNY

The current study investigates the effects of body position and camera position on the total number of verbalizations and emotionally valence words. Recent studies show that a supine versus upright sitting position increases the feeling of relaxation. Additionally, research indicates that when people are aware of being observed, behavioral inhibition increases. Both body posture and where the therapist is sitting, in relation to the patient (e.g., forward or behind) may influence the observer effect, as well as predispose the outcomes of the

therapeutic intervention. In this study, participants (n=85) are randomized to one of the four conditions: upright sitting position with camera filming in front or from behind; supine body position with camera filming in front or from behind. Participants are asked to openly describe the important relationships in their lives (e.g., friends, family, etc.) while being videotaped in the laboratory room alone. The camera serves as a proxy for the therapist. We hypothesize that the groups who are in the supine vs. upright position, as well as the groups who are filmed from behind vs. in front, will show a greater degree of total verbalization and emotional content. We further hypothesize that there will be a body position and observer position interaction where participants will express a greater degree of total verbalization and emotional content when supine while being observed from behind. Findings from this study will shed light on the importance (or lack thereof) of using the couch in psychoanalysis and psychoanalytic psychotherapy.

Supported by the National Science Foundation (Award # 1156870)

PSY – 33 THE RELATIONSHIP BETWEEN OPIOID REPLACEMENT THERAPY ATTENDANCE AND DRUG USE

Nicole Belgrave [1] (UN), Aprille Mangalonzo, BSN [2], Julia Arnsten, MD, MPH [2]
[1]Department of Psychology Brooklyn College-CUNY, Brooklyn, NY 11210
[2]Department of General and Internal Medicine, Montefiore Medical Center, Albert Einstein College of Medicine Bronx, NY 10467

Heroin addiction and opioid abuse are major public health concerns. Approximately a quarter of people who try heroin will become dependent on it. Treatment programs and facilities do exist, but successful opioid treatment may be dependent on retention and consistent attendance. The goal of this experiment is to investigate whether a relationship exists between participants' attendance in opioid replacement therapies and drug use (i.e. heroin and other opioids). We hypothesize that a decrease in drug use will be positively associated with treatment attendance. Over the course of 4-months, 50 participants enrolled in drug treatment facilities in the Bronx, NY were required to attend opioid replacement therapies (i.e. methadone or suboxone) daily, attend mandatory weekly visits as well as individual and group counseling sessions. Bivariate analyses will be used to compare clinic attendance to urine toxicology reports. We hope that implications from this study can help improve current methods of treatment and emphasize factors linked to treatment success in difficult-to-treat opioid-dependent populations.

Supported by the NSF (Award #REU 40C28-0001) and NIH/NIGMS RISE GM062981

PSY – 34 PATTERN OF IMPROVEMENT FOR COGNITIVE REHABILITATION IN SCHIZOPHRENIA

Batya Weinstein (GRAD) (Brooklyn College), Daniel D. Kurylo (Brooklyn College), and Richard Waxman (Touro College).

Patients with schizophrenia display a variety of cognitive abnormalities that interfere with activities of daily living, social interactions, and independence. Cognitive Rehabilitation Therapy (CRT) is a treatment approach that employs cognitive tasks to reduce symptoms and improve functions. In the present study, a detailed analysis of the effects of CRT was assessed in

patients with schizophrenia and healthy control subjects in order to evaluate efficacy of treatment parameters. Specifically, the pattern of performance was analyzed within seven minute blocks of trials, as well as across 36 sessions. For both subject groups, performance progressively increased across trial blocks, which either formed an asymptote or declined near the end of a block. Across sessions, the rate of improvement varied across subjects, regardless of subject group assignment. Change across sessions displayed either robust improvement within the first 7 - 10 sessions, followed by a more gradual increase, or displayed more stable performance until late in training, where improvement was evident. These results confirm that parameters used here for training, including block duration, training period, and rate of difficulty increase, are suitable for rehabilitation. In addition, it was found that trial block length could be reduced from 7 to 5 minutes without reducing peak performance. Reducing block length would further allow reduction in the length of daily rehabilitation sessions while maintaining benefits of training.

PSY – 35 EXPLAINING THE LIST WIDE PROPORTION CONGRUENT EFFECT

Matthew J. Crump and **Elena N. Dominguez** (UN), Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

The goal of the present study is to explain a phenomena called the list wide proportion effect found in Ericksen's Flanker task (1974), using a resource demand theory. A Flanker tasks gauges participant's attention by asking them to selectively attend to a target letter while ignoring distracting letters. This task creates a flanker effect, where participants have significantly slower reaction time in incongruent trials (target letters match distractor letters) versus congruent trials (target letters differ from distractor letters). When the proportion of trial type in this task (congruent or incongruent) is manipulated, it creates changes in the Flanker effect, which is also known as the *list wide proportion effect*. It is believed that participants strategically attend to the stimulus depending on the proportion of trials, a theory that can be described as resource demand. This is tested in the present study with the manipulation of a dual task. According to the resource demand theory, the list wide proportion effect should disappear in the dual task. Twenty participants completed trials containing 4 blocks. They were asked to focus solely on the middle letter stimulus and type the corresponding key (S,D,H,J). In blocks 3 and 4, subjects underwent an additional task of determining if a specific number (0-9) was odd or even, with a key press of F for even and G for odd. Results showed that the list wide proportion effect was shown in the first two block, but no longer present in the second pair of blocks, the dual task, suggesting that participants modulate attention strategically.
Supported by NIH/NIGMS MARC GM008078

PSY – 36 USE THE FORCE: REMOTE TOOL USE AND PERIPERSONAL SPACE EXTENSION

Kevin Shockley, Julie Weast, Patrick Nalepka, and **Darwin Romulus** (UN), Department of Psychology, University of Cincinnati, Cincinnati, OH 45220

Research in tool-use and the impact of tools on the expansion of peripersonal space (the immediate area surrounding one's body i.e., area within one's arm reach) has led to the concept that mental representations of the body can be extended to include a tool and that, as

a result, the perception of one's peripersonal space may be extended throughout a tool. However, recent studies have shown that typical effects of tool use on peripersonal space appeared only at the tool's functional components i.e., tines at the end of a fork. The purpose of the study was to determine if the perception of one's peripersonal space extends from an individual's body to the end of a tool or if space extends discontinuously in areas in the environment where the tool is functional. Using a three dimensional simulation and virtual reality technology, participants were asked to use a remote tool in a virtual environment to complete two task. In the first task, participants were prompted with virtual mugs presented at three different distances and were instructed to "grab" these mugs when the stimuli occurred. Motion sensors attached to participants' index fingers recorded reaction times to the mugs. In the second task, participants were instructed to "catch" falling virtual marbles with the virtual mug. Faster RTs were expected to be present at the closest distance. However, most participants expressed slow RTs throughout the experiment especially when reacting to mugs at closer distances, which suggests that methodological issues are present in the study.
Supported by NIH/NIGMS MARC GM008078

PSY – 37 A STUDY OF THE EFFECTS OF LEARNING RATE IN A SIMULATED ARTIFICIAL NEURAL NETWORK WITH NON-LINEAR UNITS

David Chu (UN) and Frank W. Grasso BCR Lab, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Artificial neural networks (ANN's) provide an experimental methodology to study the performance of biological neural networks as idealized models. Simulation studies with ANNs clarify the possible functionality of biological systems adapt (learn) and are known to be non-linear in their properties where analytic solutions do not exist. We studied the application of Hebbian connection strength (weight) modification in ANNs with non-linear output functions. The modification was subjected to sum constraint and the weights to each unit were normalized to this value every learning cycle. The network had 6 neurons 3 inputs and 3 outputs with sparse connectivity. Testing and validation of this neural network would be done with reference data. Holding the network architecture, initial weights and input-set constant we systematically varied the learning rate for a given network 0, 0.01, 0.10 and 1.0. All four of the ANNs were given 100 time steps to adapt to the training set. The testing of the neural network shows that weights in the neural network accurately update to expected values. The updated weights matched the expected values and showed that there was the weights were stabilized after the 100 time steps. The results show that the total and average amount of weight modification varied with learning rate. The relationship was non-linear with lower learning rates showing less than expected average learning even when corrected for the learning rate. This result indicates that learning rate must be taken into account when designing ANN studies in order to provide an adequate sample time for a network to completely adapt to (learn) the information in a training set.

PSY – 38 PARAMETRIC SPEED CONTROL OF ALTERNATING TRIPOD GAIT IN A HEXAPOD ROBOT

Timothy M. Condon (UN) and Frank W. Grasso BCR Lab, Department of Psychology, and Department of Computer Science Brooklyn College, Brooklyn, NY

Arthropods like crustaceans and insects have evolved efficient and stable modes of locomotion on rough terrain that human wheeled technologies cannot easily emulate. Hexapod robots provide us with the opportunity to test computational models of arthropod brain and behavioral control embodied in a physical system with kinematics similar to biological arthropods. Previously our lab had implemented an arthropod-inspired alternating tripod walking gait in our LynxMotion Hexapod™ (A-Pod model). We sought to extend this control system by implementing varying speed in the robot by varying a single gait duration parameter. We studied the relationship between the commanded speed and the distance the robot traveled. We ran 36 trials, of 20 seconds each, with 3 different commanded stride durations. We found that the speed of the robot was controlled by the value of the duration parameter ($F(2,33) = 89.87$ $p < 0.001$). However, the relationship was non-linear, with only the shortest commanded duration producing a significantly different locomotion speed in the robot. We suspect that the interaction of the different phases of the leg motion cycle interacted with the speed control parameter to produce this non-linear relationship.

PSY – 39 OBSTACLES IN CLOSE PROXIMITY SUPPORT BETTER SPATIAL EXPLORATION IN A MOBILE ROBOT

Brian Guo [1,2] (HS) and Frank W. Grasso [1] BCR lab, Department of Psychology, [1]Brooklyn College and [2]Stuyvesant High School

Exploration of unknown territory is a major application of mobile robots. We hypothesized that a simple negative taxis control mechanism (Braitenberg Machine, obstacle avoidance) would be sensitive to the geometry of the space explored and that that geometry would determine the completeness of exploration by a mobile robot. We implemented a Braitenberg obstacle avoidance control scheme in a Khepera robot and tested its performance in a rectangular arena containing a single moveable obstacle. We varied the starting position and starting orientation of the robot and the location (3) of the obstacle in the arena. We ran 108 trials testing each permutation of the 3 variables 6 times. We scored the paths of the robot in the trials using Metamorph imaging software and analyzed the degree of spatial coverage in 10 minute trials. We found that the robot avoided the center when the obstacle was positioned towards the exterior or the maze. We conclude that a thigmotatic animal like strategy might protect the robot from damage during long exploration but would not be effective at complete exploration of a search area unless the obstacles were densely packed.

PSY – 40 VARIATIONS OF INTERLATERAL CONNECTION STRENGTH IN BIOLOGICALLY FEASIBLE NEURAL NETWORKS

Frank W. Grasso and **Shawn W. Lauzon** (UN), BioMimetic and Cognitive Robotics Lab, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11230

Bilaterality is a ubiquitous architectural feature of the brains of arthropods, cephalopods, and vertebrates. The computational properties of this design have been an implicit and explicit focus of much neuroscience research. We hypothesized that small connection asymmetries in an otherwise symmetric brain would have behavioral consequences. We used a biologically plausible artificial neural network (ANN) with paired symmetric sub-networks on the left and

right. This ANN was designed to control a negative taxis behavior in a mobile robot. With it we studied the implications of bilateral connectivity for overt (robot or animal) behavior. The ANN had 23 units and 527 fixed connections. Two bilateral connections between the left and right side (one in each direction) were varied in magnitude in separate simulation runs. The magnitudes were set 3 values: "low" (0.01), "medium" (0.1), and "high" (0.5). This produced 9 conditions: 3 symmetric and 6 asymmetric. Our simulation results show that taxis performance was reliable at every combination of bilateral connection strengths, independent of connection symmetry. Performance, although reliable at all levels, was best at low connection weights, $r(127) = -0.946$, $p < .00001$, and worst at high connection weights, $r(127) = -0.934$, $p < .00001$. Performance was strongly inversely correlated with total bilateral connection weight, $r(9) = -0.984$, $p < .0001$. We conclude that connection asymmetry may not have a deleterious effect on network performance and consequent behavior. Further studies in a richer environment may demonstrate performance benefits of connection asymmetry.

PSY – 41 DOES NEST LOCATION AFFECT MATERIALS CHOSEN BY MONK PARAKEETS (*MYIOPSITTA MONACHUS*) FOR NEST CONSTRUCTION?

Victor Lee (HS) and Frank W. Grasso BCR Lab, Dept of Psychology, Brooklyn College and Midwood High School. Brooklyn, NY

Monk parakeets (*Myiopsitta monachus*) are an introduced species from Argentina that can be found in Brooklyn, New York, and their adaptation to their new environment is of interest to behavioral ecologists. There are multiple nesting sites located around the Brooklyn College campus and we hypothesized that nest location would affect the materials the parrots choose to construct their nests. A difference in nest composition between nests could indicate different choices by different groups of parrots. Three opportunistic samples of fallen Monk Parrot nests were collected (Nest 3 in 2013, Nest 27A in 2013, and Nest 27B in 2014). We analyzed random sub-samples of sticks and measured their length, weight and diameter and as well as the species of plant or tree from which the stick came. The three samples collected showed significant differences between the length, and weight but not diameter as judged by a 95% confidence interval estimate. These data are consistent with the hypothesis that monk parakeets differentiate between stick attributes for nest construction and that these vary with specific nest sites.

PSY – 42 CRAYFISH *PROCAMBARUS CLARKII* SHOW SHELTER FIDELITY UNDER LABORATORY CONDITIONS

Anastasia Pluish (UN) and Frank W. Grasso BCR Lab, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

Spatial navigation is an essential ability for foraging animals. Demonstrations of spatial memory in arthropods such as eusocial insects abound, but there is little clear evidence in crustaceans. Burrow fidelity is a reflection of spatial memory that we expected the Crayfish *Procambarus clarkii* to possess because it is a burrowing species. Previous field studies of *P. clarkii* burrowing patterns have been limited in their ability to identify individual subjects. And there are no experiments demonstrating shelter or burrow fidelity. We examined the consistency of shelter

use by individually housed *P. clarkii* in the laboratory in order to obtain evidence indicative of burrow fidelity. For 26 consecutive days, five daily observations collected each (of 11) animal's location in its home tank and shelter occupancy pattern. Baseline of space use was obtained during the no-shelter phase, followed by the introduction of one shelter during phase one, and finally a second shelter per tank during phase three. We found that across conditions our crayfish showed strong and marked fidelity for one shelter when given a choice ($\mathbf{c}^2(1) = 88.89$ $p << 0.001$). We conclude that P. Clarkii have a strong capacity for distinguishing shelter locations and speculate that they have much stronger capacities for spatial memory, including homing, than previously asserted (Barbares (2004), Barbaresi & Gherardi (2006)).

PSY – 43 SELF-REGULATED LEARNING AMONG ORGANIC CHEMISTRY I STUDENTS WITH VARIOUS ACADEMIC OUTCOMES

Angie Cuervo (UN), Milushka Elbulok-Charcape, Laura Rabin, Gail Horowitz
Brooklyn College, Departments of Psychology and Chemistry

High attrition rates in Organic Chemistry I are common among undergraduate students (Cook, Kennedy, & McGuire, 2013; Kurbanoglu, 2013; Micari & Pazos, 2012; Horowitz, Rabin, & Brodale, 2013; Zeineddin & Abd-El-Khalick, 2013). Self-Regulated Learning (SRL) is a learning approach guided by metacognition (thinking about thinking) that involves setting goals, deploying strategies, and monitoring their effectiveness on outcomes (Zimmerman, 2008). Research suggests that science students who are self-regulated learners tend to outperform their peers (Lopez, 2013). The current study sought to elucidate factors that contribute to success in Organic Chemistry I, an essential course for chemistry majors and those pursuing premedical and related studies. Specifically, we investigated how students with different academic/course outcomes in Organic Chemistry I differed in SRL strategies. Participants were 20 Brooklyn College students (45% had previously failed/withdrawn from Organic Chemistry I and eventually received a passing grade). In Fall 2014, we conducted semi-structured interviews that inquired about students' personal, behavioral, and environmental factors while they were enrolled in the course. Interviews were transcribed and detailed coding themes were established prior to the review of transcripts. In the current study we assess the association between SRL strategies (in students with differing course outcomes) and success in Organic Chemistry I. Learning about changes in SRL strategies and their potential impact will enable us to design interventions for at risk students to enhance their success in this challenging course.
Supported by NIH/NIGMS MARC GM008078

SCAS – 1 MATERNAL IMITATION OF CHILDREN UTTERANCES PREDICTS VOCABULARY GROWTH IN LATE-TALKING CHILDREN

Maria F. Alarcon [1] (UN), Francis Yannaco [2], Elizabeth Che [3], and Patricia J. Brooks [2, 3],
[1] Brooklyn College, CUNY, New York, USA [2] The Graduate Center, CUNY, New York, USA
[3] College of Staten Island, CUNY, New York, USA

We examine the role of maternal imitation as a critical form of feedback in language development using a longitudinal corpus (Weismer corpus: 33 late-talkers) of transcribed adult-child conversations from the CHILDES database (MacWhinney, 2000). Late-talkers had fewer

than 50 words in their productive vocabularies at 18mo, and no word combinations at 24mo. Whereas late-talkers often achieve typical milestones by age 3, some show persistent language impairments (Rescorla & Dale, 2013). Prior research suggests that parents of language-delayed children may respond to their children less often and change the subject of conversation more often than parents of typical children (Vigil, Hodges & Klee, 2005). We sought to examine whether differences in the responsiveness of mothers, as assessed using a measure of maternal imitation, would predict individual differences in language outcomes. Analyses focused on VOCD as an index of the diversity of children's vocabulary (McKee, Malvern, and Richards, 2000). Within and across ages, language measures were moderately correlated, indicating stability in language development. After controlling for child VOCD and MLU at 30mo, regression analyses found maternal imitation of child utterances at 30mo to predict VOCD at 54mo. This suggests that contingent feedback in the form of maternal imitation of child speech may facilitate vocabulary development. In contrast, child imitation of maternal speech was unrelated to language outcomes. Child self-repetition negatively correlated with language outcomes at 54mo (i.e., greater repetition predicted lesser vocabulary diversity), but effects were not significant after controlling for child language at 30mo.

SCAS – 2 HOW DO EDUCATORS PERCEIVE STUDENTS WHO STUTTER

Kristen A. Brezi (UN), Amira Nassar, Alexandra Rodriguez, Department of Speech Communication Arts and Science, Brooklyn College-CUNY, Brooklyn, NY 11210

The main goal of this research project was to observe how educators perceive students who stutter. This was done by collecting surveys from a variety of educators. There were four different schools in which the surveys were done. The four schools included the elementary school P.S. 44, junior high school Roy H. Mann, Fort Hamilton High School, and Brooklyn College. There were 52 surveys collected in total. One hypothesis was that educators would have negative perceptions of students that happen to stutter. Another hypothesis was that educators in the speech and education fields would have more knowledge about stuttering as well as be more sympathetic towards students who stutter. Our results showed that the teachers ended up not having any negative perceptions towards students who stutter however teachers that work in the speech and education fields understand stuttering more than the teachers in math and science. In the future there should be more workshops available that will teach educators new teaching strategies to handle a student that stutters.

BIO – 1 DOES METFORMIN EXTEND THE LIFESPAN OF AQUATIC INVERTEBRATES?

Maurice Elbaz and **Jack Nasar** (HS) with Steven Kaye, Magen David Yeshivah HS

Previous research has documented that a number of pharmaceuticals have passed through the human body into sewer water, through treatment plants and are found in low doses in freshwater streams ponds and lakes. The risk of these pharmaceuticals is not fully understood, but they have the potential to do harm to a great number of organisms. AMPk is an enzyme in humans that has been recognized to cause many positive effects including extended life and the reversal of certain aging processes. Previous research has shown that the diabetes drug Metformin has the ability to raise APMk levels in humans and other mammals. According to the literature it should have life and health extending effects.

As Metformin has been detected in natural water bodies inhabited by Daphnia and other invertebrates, the question arose whether the Metformin in these water bodies can extended the life of these invertebrates. An experiment was designed in which Metformin tablets were dissolved in distilled water to prepare a test solution. This solution was further dissolved in spring water at various ratios. The LD50 of the Metformin solution was determined.

Daphnia magna were obtained from Carolina Biological company. Initial experiments were conducted by placing various dilutions of the solution into 25mL beakers and introducing five Daphnia into each beaker. A control was established consisting of a 25mL beaker consisting of pond water, no Metformin. Nutrients were provided by adding several elodea leaves which are covered with algae and microorganisms. Observations were performed on the life functions of the Daphnia using the microscope and video recording. Initial results suggest that the metabolic rate of the Daphnia increased and the Daphnia survive in the solution. The goal of this research is to determine whether the Metformin extends the lifespan of Daphnia as has previously been shown in C. elegans by other researchers.

BIO – 2 STARCH METABOLISM IN GREEN ALGAE

Katherine Chiu (UN) and Jürgen E. W. Polle, Department of Biology, 2900 Bedford Ave 200NE, Brooklyn College-CUNY, Brooklyn, NY 11210, USA

This study's goal was to enhance our understanding of growth and stress metabolism in green algae. Since starch is a major intermediate in the cell's life, we created a map on starch metabolism. In algal cells, starch is made and stored as an outcome of photosynthesis. Starch can then be mobilized for the biosynthesis of proteins, nucleic acids and other compounds. Little is known about green algal starch metabolism, but this project aims to elucidate such gaps.

Applying a comparative approach, we analyzed genomic sequences from our target green alga *Scenedesmus obliquus* for the presence of genes endcoding enzymes identified in the model green alga *Chlamydomonas reinhardtii.* Enzyme information was taken from online databases like the Kyoto Encyclopedia of Genes and Genomes (KEGG), Phytozome v10, PicoPlaza v2, and the National Center for Biotechnology Information. Results from each database were compared and used to generate a new map for starch metabolism based on KEGG's model.

Information is available on *C. reinhardtii* metabolism, but it is distributed among different sources, some of which, like KEGG, are less updated than others. Other information is less

reliable, requiring confirmation with multiple databases literature. The starch pathway map is part of the Laboratory of Experimental and Applied Phycology lab's ongoing project to map green algal carbon core metabolism. With the current issues surrounding renewable energy, understanding algal metabolism is more important than ever. Finer study of how organic molecule processing can allow biotechnology to progress and address some of the concerns regarding alternative energy.

BIO – 3 COMPARATIVE ANAYSIS OF *AGROBACTERIUM TUMEFACIENS* ADHESION TO *ARABIDOPSIS THALIANA* MUTANTS USING qPCR.

Anna Petrovicheva (GRAD), Chuck Odukwu, Salisa Hudoson, Theodore R. Muth.
Brooklyn College and CUNY Graduate Center

Agrobacterium tumefaciens is able to infect a diverse array of plants and causes crown gall disease. Typically these bacteria attach to plant roots and transform the plant cells to induce tumors. The mechanism of this attachment in the infection process is not yet fully understood. Using wild type *Arabidopsis thaliana*, Columbia-0, and several *Arabidopsis* mutant lines as a binding target, we screened for *A. thaliana* mutants with altered adhesion.
The *A. thaliana* mutant lines were selected in The *Arabidopsis* Information Resource (TAIR) according to possible location of the resulting protein and similarity to known transformation mutants. Of these mutants nine showed a variation in attachment from the wild type, of which two were known transformation mutants *rat1* and *rat3*. Of these, two were higher and seven were lower.
In addition to the microscopy a novel quantitative method using qPCR created during this study was utilized. This showed measurable differences between the mutant lines and the wildtype, suggesting some effect of the mutation on the interaction between *A. thaliana* and *A. tumefaciens*. Using this assay the level of bacterial attachment to the root surface can be indirectly measured. From these phenotypes, we can analyze mutant plant lines that exhibit enhanced or inhibited attachment. The combination of these methods may yield insight on the attachment mechanism as well as the infection process as a whole.

BIO – 4 ANALYSIS OF ARABIDOPSIS THALIANA KNOCKOUT MUTANTS FOR AGROBACTERIUM TUMEFACIENS TRANSFORMATION

Angela Sarkisyan [1], **Luiza Czerniawski** [1] (UN), Martin Czerwczak [1], Lauren Nurse [1], Vladislav Rabiner [1], Anna Petrovicheva [1&2], Theodore R. Muth [1]. Brooklyn College[1] and CUNY Graduate Center[2]

Agrobacterium tumefaciens is the causal agent of crown gall disease that affects over 140 different species of plants. It exhibits the trans-kingdom DNA transfer in transferring the T-DNA segment of it's Ti-plasmid into the plant host. The T-DNA of the *A. tumefaciens* C58 wild type strain contains tumor-causing genes, that cause a rapid replication of the transformed plant cells. *Arabidopsis thaliana, a* model plant system for dicots, has been fully sequenced and has mutants seed lines available from the Arabidopsis Information Resource (TAIR), a resource of genetic and molecular reagents for *A. thaliana*. In this experiment, we attempted to find possible locations of genes that might directly or indirectly influence the transformation

process. The seed lines were selected based on gene product location to the cell wall, cell membrane or suspected involvement with other proteins in the transformation process, based on the information in the TAIR database. The *A. thaliana* mutant plant line root segments were infected with *A. tumefecians* and analyzed using the tumor assay. Some plant lines showed the resistant *Agrobacterium* transformation (RAT) phenotype while others exhibited high *Agrobacterium* transformation (HAT) phenotype. Analysis of mutant lines of the plant *Arabidopsis thaliana* with the tumor assay can determine which genes may play a vital role in the transformation process of the bacteria's T-DNA. By looking at the phenotypes and comparing them to the information available in TAIR, it is possible to determine which genes could have affect on the transformation process.

BIO – 5 ANALYSIS OF THE GUT MICROBIOME FROM MIDSHIPMAN FISH

Pranitha Prabhu, **Allen Yevtukhov** (UN), Joseph Kabariti, David Zilberman, and Theodore Muth, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Our research is focused on determining the gut microbial diversity of midshipman fish. We determined the gut bacterial composition for thirteen fish (females, type I males, and type II males) by analysis of 16S rRNA gene sequence. The midshipman fish have dimorphic males, each with specific reproductive behaviors. The differences in their behavior are in part due to the variations in the size of vocal organs. It is possible, however, that other factors also contribute directly, or indirectly through the regulation of hormonal levels, to these two behavioral types of midshipman males. The gut microbiota were examined to see if differences in the community composition of these bacteria could have an effect on the differing behavior of type I and type II males.

The profile of the gut bacteria from the midshipman fish will be compared to the sequenced gut microbiomes of other types of fish, in order to determine whether or not a common core gut microbiota exists for fish. Principal component analysis (PCA) revealed no real difference between the gut bacteria based on gender, which is shown by the lack of clustering in the graph. The next steps are to conduct similar studies on the tilapia from AREAC and see if this species has a core microbiome. Obtaining samples from different parts of the Recirculating Aquaculture System will also allow us to examine whether the different microenvironments are able to retain a distinct microbiome or if the fact that the water travels throughout ensures a uniform composition of microorganisms throughout the system.

BIO – 6 SAMPLING OF SUBWAY SURFACES TO FIND AND DETERMINE EXTREMOPHILES BY SEQUENCING

Adriana Cushnie, **Thomas Saw Aung** and **Daniel Slepitsky** (UN), Theodore Muth. Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Recent advances in technology have allowed for the sequencing of bacteria directly from the environment. One territorial biome that has yet to be extensively sampled is the urban environment. Considering that more than 50% of the world's population now resides in cities, studies of urban microbes could shed light on the diversity and interaction of microbial communities with high density areas such as NYC. Over the last two years, samples from urban

microbial communities around Brooklyn have been collected and sequenced, providing over 2.5 million Illumina 16S rDNA sequence reads. Further analysis of the bacterial community composition and relative abundance of these samples has revealed a number of bacterial genera that are not typically associated with an urban environment. Our objective is to identify these novel species of bacteria by isolating them under conditions that were previously reported. Four genera were targeted in this portion of the study: *Aresenicoccus, Alkalibacterium, Jeotgalicoccus, and Idiomarina*. After consecutive isolations on selective and nutrient media, colony PCR was performed to acquire 16S amplicons. The resulting amplicons were sequenced using Sanger sequencing. The sequence data is compared to the BLAST database to determine the classification and novelty of the species.
Supported by NIH/NIGMS RISE GM062981

BIO – 7 A SHARK HOMOLOG OF REV3, A DNA TRANSLESION POLYMERASE

Charlynn Trish Ben (HS) Midwood High School and Dr. Ellen Hsu, Department of Physiology and Pharmacology, SUNY Downstate Medical Center, Brooklyn 11203

DNA polymerase zeta (pol ζ) is a member of the B-family polymerases, consisting of two subunits REV3 and REV7. It is responsible for mismatch and double strand break repair in the case of DNA damage and one unusual feature is the ability of pol ζ to incorporate two mismatches in tandem. Somatic hypermutation of immunoglobulin genes is performed in part by such translesion polymerases and in sharks the most primitive vertebrate with an immune system similar to humans, the hypermutation pattern consists of tandem substitutions. In order to test if pol ζ is the primary enzyme responsible for mutation in the shark gene cloning was attempted. Through various PCR and cloning methods 1,531 bp of combined 5' and 3' DNA sequence of shark REV3 gene was isolated. These regions isolated are well conserved among other vertebrates. The 3' sequence so far isolated contains the catalytic domain enabling nucleotide polymerization. With the successful cloning of partial sequences at the beginning and end of the shark REV3 gene the intervening region can be eventually cloned by long-extend PCR. With the complete REV3 sequence in hand experiments testing its polymerase activity can be attempted.

BIO – 8 ANNOTATION, MODELING, AND CLASSIFICATION OF THE BAR DOMAINS IN *ARABIDOPSIS THALIANA* USING COMPUTATIONAL BIOLOGY

Zaina Naeem, **Dameeka Lambert**, **Jessica James**, **Andrew Botrous**, **Jessen Thomas** (UN) and Shaneen Singh, Department of Biology, Brooklyn College—CUNY, Brooklyn, NY 11210

The BAR (Bin/amphiphysin/Rvs) domain superfamily of proteins is the most conserved feature in amphiphysins and is responsible for a wide variety of functions, including the remodeling of cellular membranes, cell morphology, and membrane trafficking. BAR domains consist of "banana-shaped" dimerization modules which can be used to induce membrane curvature. In this study, we used computational tools to comprehensively annotate and model the BAR domains in *Arabidopsis thaliana,* a model organism in plant biology. We identified all known and potential BAR domain-containing proteins in *Arabidopsis thaliana* by extensively querying the NCBI database. We refined the results using multiple sequence alignments and generated a

list of 39 unique proteins, which we classified into protein families in accordance with their domain architectures. We then modeled the BAR domain in each protein using both automated and homology modeling approaches, and analyzed the generated models in the context of the domain architecture in order to extrapolate plant-specific domain architectures and motifs. Ultimately, the study aims to utilize the aforementioned computational methods to characterize novel functions of BAR domains and identify new sequences that have the template of this domain.

BIO – 9 CHARACTERIZATION OF LEUKEMIA INHIBITORY FACTOR (LIF) PRODUCTION, SECRETION, AND TARGET CELLS FOR LIF WITHIN THE CANCER STEM CELL (CSC) NICHE

Syeda S. Hillary (HS) Midwood High School and Department of Radiation-Oncology, SUNY Downstate Medical Center, Brooklyn, N.Y. 11203

The niche, a microenvironment that maintains stem cells through signal transduction pathways and cell-to-cell interactions has become a fundamental structure necessary to understand cancer stem cells (CSCs) and the mechanisms behind cancer growth. Leukemia Inhibitory Factor (LIF) acts via the JAnus Kinase Signal Transducer and Activator of Transcription (JAK/STAT) pathway to promote self-renewal. This study used endometrial cancer as a model to understand LIF expression within the CSC niche. Through the use of the Hybrid Spheroid Assay and immunostaining it was shown that the endometrial epithelial cancer stem cells (EnECSCs) are responsible for maintaining themselves and possibly the niche via LIF signaling. LIF was found both internally and on the surface of the EnECSCs, suggesting that EnECSCs sustain themselves without the help of any other cell. Additionally, LIF was not found on the endometrial mesenchymal cancer stem cells (EnMCSCs) and preliminary data suggests that LIFR was found only on its surface demonstrating that EnMCSCs may be dependent on EnECSCs for the LIF signaling molecule needed for self-renewal via paracrine signaling. EnECSCs maintain themselves and possibly the surrounding EnMCSCs, in which case EnECSCs would be responsible for maintaining the niche. This study showed that endometrial cancer proliferation and metastasis are caused by EnECSCs and has enhanced understanding of the architecture of the niche. Additionally, this study has located a possible new therapeutic target which is the EnECSCs. Eliminating the EnECSCs will discontinue self renewal of the EnECSCs and possibly the surrounding cells thus preventing the growth and spread of the tumor.

BIO – 10 DETERMINING THE EFFECTIVENESS OF THE BIOMARKER SSEA5 IN THE ENRICHMENT OF ENDOMETRIAL CANCER STEM CELL POPULATIONS USING THE HYBRID SPHEROID ASSAY

Dina Deng (HS) Midwood High School at Brooklyn College and Department of Radiation Oncology, SUNY Downstate Medical Center, Brooklyn, NY 11203

Cancer is the second leading cause of death in the United States. Endometrial cancer is the fourth most common gynecological cancer and the eighth most fatal. Recent paradigm shift in cancer treatment has changed the target of treatment from differentiated tumor cells comprising the bulk of the tumor mass, to cancer stem cells (CSCs) with the advent of targeted CSC therapy. Current research is shifting focus towards identifying potential mechanisms, such as cell surface biomarkers, by which these CSCs can be targeted via radio and chemotherapy. The purpose of this study is to test the effectiveness of Stage Specific Antigen 5 (SSEA5) as a

CSC biomarker and to determine its potential as a target for future anti-CSC therapies. Biomarkers are protein markers that have proven to be effective in targeting CSC populations. SSEA5 is a cell-type specific glycosphigolipid (GSL). The effectiveness of SSEA5 as a CSC biomarker was determined using the Hybrid Spheroid Assay (HSA), a novel functional assay that identifies cells as CSCs based on growth kinetics analysis of individual cells grown in 3D spheroid biomatrices. Endometrial cancer cells derived from patients were enriched using SSEA5 and were then assayed using the HSA. Endometrial cancer cells enriched using SSEA5 were 6.125 times more clonogenic (the CSC fraction was 6.125 times greater) than endometrial cancer cells that were not enriched using SSEA5. From these results it was concluded that SSEA5 is an effective marker suitable for CSC enrichment and is a potential focus for future therapeutic treatments targeting CSCs.

BIO – 11 MONITORING THE EFFECT OF GUANIDINE HYDROCHLORIDE ON THE FOLDING OF A SOLUBLE AGGLUTININ-LIKE SEQUENCE PROTEIN

Taulant Kastrati (HS), Midwood High School at Brooklyn College, Brooklyn, NY 11210

Candida albicans is a pathogenic fungus whose uncontrolled growth causes diseases in both healthy and immunocompromised individuals. Usually found in the human esophagus and urinary tract, C. albicans is the main cause of oral thrush in infants' mouths and vaginal candidiasis in women. The agglutinin-like sequence (Als) family of glycoproteins found in C. albicans mediates cell-to-cell and cell-to-surface aggregation by forming amyloids. Each ALS gene shows similar characteristics that affect the formation of amyloids, but encodes large cell surface proteins differently. This study's objective is to examine the effect of Guanidine Hydrochloride (GuHCl) on the folding of the soluble Als5-pAL1 protein. GuHCl is a denaturant that may unfold the Als5-pAL1 and affect its ability to aggregate into protein amyloids. This Als5-pAL1 construct contains the full-length sequence without a GPI anchor. Concentrated Als5-pAL1 proteins were first collected by purification. Using the absorbance at A280, the most concentrated fraction was determined and was confirmed by the presence of Als5-pAL1 by immunoblotting. This sample was then examined using CD spectroscopy, to investigate the presence of amyloids by the characteristic beta-sheet confirmation. We determined the total protein concentration of our sample by running a bicinchronic acid (BCA) assay, in which color change is measured by finding the absorbance. Based on the concentration, the sample was incubated with varying GuHCl concentrations, all of which were loaded on an electrophoresis gel and ran against standards. Since no bands formed beneath the loaded samples, GuHCl was shown not to be effective in causing oligomerization of the samples.

BIO – 12 AT THE CROSSROADS OF GREEN ALGAL METABOLISM- THE TRIOSEPHOSPHATE ISOMERASE

Michelle Badri (UN), Andy Huang, Peter Neofotis and Juergen Polle, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

In eukaryotic photosynthesis the triosephosphate isomerase [EC:5.3.1.1] enzyme is part of the interconnected carbon core metabolic network including the glycolysis/gluconeogenesis pathway and the Calvin-Benson cycle, thus providing precursors for carbohydrate, lipid, and

isoprenoid metabolism. The results of a comparative genomic analysis of green algal genomes revealed that some green algae of the order of the Chlamydomonadales such as the unicellular flagellate model alga *Chlamydomonas reinhardtii* and the related commercially exploited *Dunaliella salina* have only one gene coding for the triosephosphate isomerase, predicted to be localized to the chloroplast. In contrast, other species within the green algae have two or more genes coding for the triosephosphate isomerase, with isoform localization predicted to the chloroplast and to the cytosol. In addition, fusion genes of the triosephosphate isomerase with the gluconolactonase were identified in some species of the class of the Prasinophyceae. Discussed is the distinctive cellular distribution of triosephosphate isomerase in the context of major differences regarding regulation of carbon partitioning in the different lineages of green algae.

BIO – 13 ETHANOL-BASED *COFFEA ARABICA* EXTRACT POSSESSES ANTIOXIDANT CAPACITY

Rua Maisra Hamid (HS), Orlando Pazol Mendoza, Brandon K.D. Regis, Muhammad S. Rehman, Gurtej Singh *, PhD, Grace Bennett, PhD, Brooklyn Academy Of Science and the Environment, *Stony Brook University

Background and Objective: Studies have shown that increased antioxidant levels in the human body can help it protect itself from free radical damage. Scientists today are currently trying to use fruits, and other natural sources to provide us with these essential levels of antioxidants. In this study the antioxidant activity of green coffee beans (*Coffea arabica*) was recorded using an Ethanol extraction method and then compared to the standard Vitamin C (Ascorbic acid).
Materials and Methods: Antioxidants were extracted from coffee beans using ethanol. Extracts were then tested for antioxidant level by using Efferdent, saline and a commercially available green coffee ethanol extract. This was done three times. Changes in color were recorded and compared to ascorbic acid.
Results: The experimental extract kept its dark greenish bluish color for 48 hours. Indicating that the green coffee ethanol extraction possessed a large amount of antioxidants relative to the control groups.
Conclusion: The results indicate that ethanol is able to extract antioxidants from green coffee beans. Before creating an antioxidant therapy using this method, we would like to quantify the activity and classify the types of the antioxidants we have extracted.
Parts of this project were paid for by the NYC DOE SIR project

BIO – 14 ETHANOL-BASED GREEN COFFEE BEAN EXTRACT IS AN EFFECTIVE INSECTICIDE

Brandon K.D. Regis (HS), Samantha Gonzalez ,Rua M. Hamid, Gurtej Singh *, PhD, Grace Bennett, PhD, Brooklyn Academy Of Science and the Environment, Brooklyn, NY
Stony Brook University*, Stonybrook, NY

Background: Farmers are always looking for a way to kill the bugs that are destroying their crops without killing the crops or harming the surrounding environment.
Objective: The purpose of this project is to determine the usefulness of green coffee bean (*Coffea arabica)* extract as an insecticide. The goal is to make an insecticide that is effective at killing pests harming the surrounding plants or environment.

Methods: Extracts were created using a solution of ethanol and ground green coffee beans. THe target insect were locally collected Aphids (*Aphis spp.*). 60 aphids were split into 4 groups (Ethanol, glycerin, oil & ethanol). Ethanol extracted coffee beans were compared to a commercial coffee bean extract as well as soapy water. Each group was set on a radish leaf that was soaked in the previously described liquid and insect viability was determined.
Results: The extracts worked, killing 90% of the aphids. The 10% that were alive were sluggish in their movement.
Conclusion: Ethanol-based green coffee bean extract is an effective, natural insecticide that could be used in place of more toxic insecticides.
Parts of this project were funded by the NYC DOE SIR Project

BIO – 15 OIL AND ALCOHOL BASED COFFEE (*Coffea arabica*) EXTRACT CONTAINS ANTIOXIDANTS

Muhammad S Rehman [1] (HS), Rua M Hamid [1], Orlando Pazol [1], Chad H.H. Chandler [1], Imani K Dixon [1], Gurtej Singh PhD [2], Grace Bennett PhD [1], [1]Brooklyn Academy of Science and Environment 11225, [2]Stonybrook University, Stonybrook, NY 11794

Background: Male, Female, Youngsters, Adults and Teens people of different gender, age group and in different comparison use skin products. These skin products help them make their skin look younger, mature and help them hide their marks that they do not want anyone else to see. Objective: The purpose of this project was to determine if unroasted green coffee (*Coffea arabica*) extract had antioxidant activity that may be useful in skin products. Methods: Green coffee bean extract was created by using the vegetable oil and ethyl alcohol as solvents. Extracts were then tested for antioxidant level by using Efferdent, saline with ascorbic acid (vitamin C) as a standard. Changes in color were recorded and this was repeated three times. Results: The color change of green to blue indicates that coffee beans have antioxidant activity relative to the vitamin C group. These results indicate that antioxidants can easily be extracted at home which can help a lot of people make easy remedies by using antioxidant for skin care products.
Parts of this project were supported by NYC DOE SIR PROJECT

BIO – 16 OIL-BASED COFFEE (*Coffea arabica*) EXTRACT HAS ANTIOXIDANT ACTIVITY

Orlando Pazol Mendoza (HS), Tamera Jacobs, Kamrun Tamana, Rua M. Hamid, Muhammad S. Rehman, Gurtej Singh, PhD, Grace Bennett, PhD, Brooklyn Academy of Science and Environment Brooklyn, NY, Stonybrook University, Stonybrook, NY

Background: Many scientists are trying to find the next cure for disease, others are trying to find the next product using science and technology. Antioxidants are essential to prevent disease and prohibit the oxidation of molecules in our body. They block free radicals, molecules that are highly reactive chemicals that damage cells leading to disease.
Objective: The focus of this project was to determine the antioxidant levels of an oil -based green coffee bean extract.
Methods: Oil-based green coffee bean extracts were produced and antioxidant content was measured using a previously determined method called the “efferdent test”. Antioxidant

content of the oil extract was compared to saline, vitamin C and a commercially prepared green coffee bean extract.
Results: Relative to the vitamin C group, the extract made in oil showed blue coloration, indicating that it had antioxidant activity. Results of the antioxidant test on oil alone have not yet been analyzed.
Conclusion: Due to the incomplete test of the control group, the experiment is limited. While it is clear antioxidants are present in our extract, it is still unclear if they are in the oil or the coffee itself. Once this control experiment is complete, this result would imply that we have established an affordable antioxidant extraction method anyone could use.
Parts of this project were paid for by the NYC DOE SIR project

BIO – 17 GLYCEROL AND WATER BASED *COFFEA* EXTRACT CONTAINS PESTICIDE PROPERTIES

Samantha Tamara Gonzalez (HS), Rheana Galloway, Chad Chandler, Brandon K.D. Regis, Kamrun Tamana, Gurtej Singh *, PhD, Grace Bennett, PhD, Brooklyn Academy Of Science and the Environment, *Stony Brook University

Background and Objective: Caffeine has been shown to be a natural pesticide. In this study,caffeine from green coffee beans (*Coffea*) was extracted by glycerol and distilled water and then pesticide activity was tested using aphids (*Aphidoidea*).
Materials and Methods: Green coffee beans, 2 oz spray bottles, glycerol, distilled water, a shoebox, a hot plate, mesh/cheesecloth, and beakers were used to create the extract and solvent. To create the coffee bean extract, water was brought to a boil with coffee beans. Then, glycerol was slowly added and mixed. The extraction was set for 2 days before filtering out the beans.To test the extract as a pescticide, the shoebox was designed to be able to see the aphids react to the extract, without them being able to fly out of the box. The extract and solvent was sprayed on the aphids host which was a radish plant (*Raphanus sativus*).
Results: After exposure to the extract, the tips of the leaves turned purple. The aphids on the leaves dried out and turned completely white. The 20 aphids that were alive stayed on the stem and were sluggish in their movement.
Conclusion: The extract and solvent were successful insecticides against aphids. However, the testing should be repeated for more reliable results.
Parts of this project were paid for by the NYC DOE SIR project

BIO – 18 SEASONAL CHANGES TO THE CHEMICAL PARAMETERS IN A NATIVE POND IN BROOKLYN

Jamie M. Cox [1] (HS), Barbara Kurland, MS [2], Uli Lorimer [2], Grace Bennett, PhD [1]
[1]Brooklyn Academy of Science and the Environment, [2]Brooklyn Botanic Garden

Background: Water quality is important to test for when it comes to water sources. Water for us humans is an important part of our lives. We use it for drinking, cooking, to shower, and water our plants.
Objective: The purpose of this study was to measure seasonal changes in the chemical parameters of the pond.

Methods: The following chemical parameters of the pond in the Pine Barrens of the Brooklyn Botanic Garden were tested: pH, nitrate, phosphorus, dissolved O_2 and temperature using the LaMotte testing kit. Data was taken at two time points (January; T1 and March; T2).
Result: There is a huge increase with the dissolved O_2 and temperature. With (T1) the dissolved O_2 was 4 ppm, but in (T2) it went up to 10 ppm. Temperature at T1 was 2 degrees C and at T2 it went up to 10 degrees C.
Conclusion: Climate affects the chemical parameters of this pond. As the climate gets warmer it increases the chemicals in the pond.
Funding: Parts of this research was funded by the Brooklyn Botanic Garden

BIO – 19 USE OF DNA BARCODING TO EXAMINE THE ORIGIN OF EASTERN OYSTERS USED IN A NEW YORK RESTORATION PROJECT

Michelle Kelmansky (UN), Gary Sarinsky, Craig Hinkley. Kingsborough Community College, Brooklyn, NY. USA

Crassostrea virginica, the eastern oyster, is native to North America. There were many oyster beds in NY bays, including Jamaica Bay (JB); however, there are no longer any known natural oyster beds. This large decline in oysters has raised interest in restoration and management of oyster populations. One example is the Oyster Restoration Research Project in NY in which oysters grown by students from NY Harbor School (NYHS) were seeded into NY Harbor. Our overall goal is to examine the genetic background of these oysters since this will help determine how they spread within the NY harbors. In 2001, our lab showed that oysters were able to survive and reproduce in JB. Since the oysters from our study and the NYHS were obtained from local oyster farms, we wanted to know whether they were from the same farm. Our hypothesis is that the oysters from NYHS are from the same farm as the 2001 study. To test our hypothesis, we first amplified a 700 bp region of the cytochrome c oxidase I (COI) gene using PCR. The size of the PCR products were confirmed by agarose gel electrophoresis and the PCR products were sequenced by Elim Biopharmaceuticals. A BLAST search showed the PCR products were from COI gene of *Crassostrea virginica.* The COI genes from 69% of oysters in the 2001 study contain a polymorphism that distinguishes them from eastern oysters of other regions. An alignment using the sequences of the NYHS oysters and sequences from our 2001 study showed the NYHS oysters did not have this polymorphism. These results suggest the NYHS oysters are not from the same oyster farm as those used for our 2001 study and we therefore reject our hypothesis.
This work was supported by grant 0537121091 of the CSTEP Program of NYS Department of Education.

BIO – 20 DOES TESTOSTERONE TREATMENT MIMIC SEASONAL DIFFERENCES IN DOPAMINERGIC INNERVATION OF THE INNER EAR IN FEMALE MIDSHIPMAN FISH?

Spencer D. Kim [1] (UN), Robert Mohr [2], Joseph Sisneros [2] and Paul Forlano [1,3,4]
[1]Department of Biology, CUNY Brooklyn College; [2]Department of Psychology, University of Washington, [3]CUNY Graduate Center, [4]Aquatic Research and Environmental Assessment Center, Brooklyn College

The production and perception of sound is dynamic and an essential component of reproductive behavior in the plainfin midshipman fish, *Porichthys notatus*. Previous experiments showed that the inner ear of female midshipman can encode higher frequencies in the summer reproductive periods compared to the winter non-reproductive period and this change can be induced in non-reproductive females by increasing circulating estrogen or testosterone over 3-4 weeks. Recently, our lab discovered an auditory efferent system of dopaminergic projections from the diencephalic posterior tuberculum (TPp) to the saccule, the main hearing endorgan, and this innervation varies seasonally with female reproductive state. Previously, we tested whether estrogen could mimic the seasonal change in dopamine innervation and demonstrated subtle differences in dopaminergic and cholinergic innervation of the saccule in animals with elevated estrogen levels. Since testosterone was also shown to fluctuate seasonally and induce changes in frequency encoding of male calls in female midshipman, we tested the hypothesis that androgenic mechanisms may underlie robust natural seasonal changes of dopamine projections to the inner ear. Female midshipman were captured in the winter non-reproductive season, ovariectomized, treated with testosterone or control implants and sacrificed after four weeks. Tyrosine-hydroxylase immunoreactivity (TH-ir) and choline acetyltransferase immunoreactivity (ChAT-ir) were used to label for dopaminergic and cholinergic terminals, respectively, in the saccule and were imaged by confocal microscopy, quantified using Metamorph software and compared between groups. These results will further elucidate if steroid hormones affect seasonal plasticity of peripheral auditory frequency sensitivity by regulation of neurotransmitter systems in the inner ear.

BIO – 21 CATECHOLAMINERGIC NEURONS AND THE SOCIAL BEHAVIOR NETWORK ARE POTENTIAL TARGETS OF RAPID ESTROGEN SIGNALING IN A VOCAL FISH

Alena Chernenko [1,2], **Dmitriy Milkis** [1] (UN), Paul M. Forlano [1,3,4]

[1]Department of Biology, CUNY Brooklyn College; [2]CUNY REU program; [3]CUNY Graduate Center; [4]Aquatic Research and Environmental Assessment Center, Brooklyn College

Catecholamines (CA), which include norepinephrine (NE) and dopamine, act as neurotransmitters in the brains of all vertebrates and are found within auditory and vocal circuitry in midshipman fish. It has been also shown that phosphorylated cyclic AMP response element binding protein (pCREB) in CA neurons is activated by estrogen (E2) signaling in the brain and acute E2 injections show rapid effects on vocal physiology. Here we tested the hypothesis that CA neurons and vocal-acoustic circuitry within the social-behavior nuclei (SBN) in a vocal fish, *Porichthys notatus* are targets of rapid estrogen (E2) signaling. Female midshipman were injected intraperitonially with either E2 or vehicle. Then, blood samples collection was performed, followed by brain tissue collection, histology and immunohistochemistry. Immunofluorescent staining was used to stain tyrosine hydroxylase (TH) and pCREB. Finally, nine vocal-acoustic and two social behavior nuclei in each brain were photomicrographed with immunoflourescent microscopy, and the image analysis software was used to quantify the percentage of TH-ir cells colocalized with pCREB-ir. Hormonal assay resulted in significantly higher E2 levels in injected females (within the natural physiological range) than in control animals. Higher co-localization levels in control versus E2 group in the locus coeruleus (LC) and the further correlation let us suggesting the inverse relationship

between hormonal levels and % colocalization in LC. This could be interpreted as an inhibitory role of E2 in NE neurons. Further detailed data analyses will bring more light into the role of rapid E2 signaling mechanisms in midshipman and implications on vocal-acoustic social behavior.

Supported by NIH Grant SC2DA034996 (PMF).

BIO – 22 MUTANT CREATION AND FUNCTIONAL ANALYSIS USING CRISPR

Saad Alghamdi (GRAD), Sebastian Giordano and Qi He, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY 11210

Creating null mutations for a specific target gene in Drosophila has always been a time consuming and labor intensive process with a very low overall yield. We report here our ongoing effort of creating gene knockouts utilizing the newly available high efficiency mutagenesis strategy involving CRISPR. Our ultimate goal is to generate multiple genetic mutations within the same animal and analyzing functional implications including modeling human diseases such as Parkinson's. Our first target gene is Dunc-115 that we had previously sequenced and analyzed. By creating a double mutation of Dunc-115 and Netrin in selected cell populations, we will be able to analyze the role of Dunc-115 in Netrin signaling. Additionally, we will create double mutations for LRRK and Vps35, which are fly homologs of Parkinson's causing genes in humans. We expect to obtain insights that cannot be gained by traditional single mutant analysis.

BIO – 23 THE ROLE OF AMYLOID IN YEAST INVASION

Rolens Ambroise (HS) Midwood High School and Peter Lipke

S. cerevicae, when plated on agar plates after using all the nutrients on the surface, in search of more nutrients penetrate the agar. This process is known as yeast invasion. *C. albicans* make pseudohyphae which are long chains of cells that stick together and branch out in search of nutrients. This experiment was set up to find the reason behind yeast's ability to invade and pseudohyphae formation on nutritious surfaces.

We hypothesized that amyloids are also the culprits behind yeast invasion and pseudohyphae formation. To test this we plated the *S. cerevicae* ALS5, which forms amyloids, V326N which has its amyloid region reduced to 4% and EV which does not form amyloids. Flo1, Flo11, and Δflo11 were also plated. We allowed the yeast to incubate for 14 days taking pictures of the plates every 3 days. We also plated the *C. albican* SC5314 yeast.

At the end of 14 days, the plates that had most amyloids in their gene sequence had the most inclusions, invaded the most. Inclusions of ALS5 > V326N > EV. Flo1 > Flo11 > Δflo11.

We added amyloid dyes to the agar to see which amyloid dye works the best against yeast invasion. 200 μM THS worked the best against all other dyes that were used. This aspect of the experiment can be used in the medical field with patients with catheters which leave them susceptible to yeast infections. By cloaking the catheter with the best working dye we can reduce that risk.

HNS – 1 CHOLINE AND BETAINE SUPPLEMENTATION AFFECTS BIOMARKERS IN MICE WITH GESTATIONAL DIABETES

Juha Nam (GRAD) and Xinyin Jiang, Department of Health and Nutrition Sciences, Brooklyn College of CUNY, Brooklyn, NY 11210

This study examined the effect of maternal supplementation of choline and its oxidative metabolite betaine, which participate in energy metabolism and the one carbon cycle, on GDM outcomes in a diet-induced GDM mouse model. C57 BL6/J mice were fed either low fat (LF) or high fat (HF) diet 4 weeks prior to and during pregnancy to induce hyperglycemia. HF-fed mice were provided with regular drinking water, or supplemented with 25mM choline or 1% betaine in drinking water. Maternal glucose tolerance was tested on embryonic day E11.5. Placenta and fetal samples were obtained on embryonic day E12.5. Maternal HF diet led to impaired glucose tolerance and higher fetal weight than LF controls ($P < 0.05$). Choline supplementation improved maternal glucose tolerance on E11.5 and reduced fetal weight gain (0.087±0.005 vs. 0.115±0.004 g, $P < 0.01$). Betaine supplementation did not improve maternal glucose tolerance but reduced both placental (0.071±0.003 vs. 0.082±0.003 g, $P < 0.05$) and fetal sizes (0.099±0.005 vs. 0.115±0.004 g, $P< 0.05$) compared to HF controls. Fetal gene transcript abundance of the lipid catabolic gene peroxisomal acyl-coenzyme A oxidase 1 (*Acox1*) was higher ($P < 0.01$) in the HF control than the LF control group, which may be a compensatory mechanism to reduce fetal fat accumulation. Choline supplementation of HF moms normalized *Acox1* expression to the level of LF controls. Taken together, maternal choline or betaine supplementation may improve indices of maternal and fetal glycemic control and lipid metabolism of HF diet-induced GDM mice.

HNS – 2 COMPARISON OF FOOD INTAKE AND WEIGHT GAIN IN PREGNANT AND NON-PREGNANT FEMALE MICE ON HIGH-FAT DIET WITH OR WITHOUT CHOLINE SUPPLEMENTATION

Tamara Ajeeb (GRAD), Esther Greenwald, Juha Nam, Kathleen Axen, Xinyin Jiang, Department of Health and Nutrition Sciences, Brooklyn College-CUNY, Brooklyn, NY 11210

Pregnancy is a physiological state where over-nutrition has an exacerbated effect on disturbing blood glucose control and leads to excessive adiposity of both the mothers and fetuses. Choline is an essential micronutrient that affects energy and fat metabolism by serving as a component of lipoproteins and regulating lipid synthesis and catabolism. The demand for choline increases substantially during pregnancy for both maternal and fetal tissue expansion. In this project, we examined the effect of choline in alleviating weight gain and adiposity among mice fed with a high-fat diet in both pregnant and non-pregnant states. C57BL/6J female mice were fed a high-fat diet for 6 weeks with or without timed-mating at week 5. They received either 25 mM of choline in drinking water or plain water during high-fat feeding. Our preliminary results show that choline supplementation did not affect food intake or weight gain in either the pregnant or non-pregnant groups. Liver weight and abdominal fat weight were not altered by choline supplementation either. Improved glucose tolerance was only seen in pregnant animals supplemented with choline versus controls. In sum, 6 weeks of choline supplementation did not alleviate markers of adiposity of pregnant or nonpregnant mice receiving a high-fat diet. The

beneficial effect of choline supplementation on blood glucose control seems to be specific to pregnant animals.

HNS – 3 EFFECTS OF HIGH FAT OLIVE OIL AND SAFFLOWER OIL VS LOW FAT DIETS ON BODY COMPOSITION AND INSULIN RESISTANCE

Keerteshwrya Mishra, **Farah Haider**, **Sara Furer**, **Julia Buczynski-Kos** (UN) and Kathleen Axen, Department of Health and Nutrition, Brooklyn College-CUNY, Brooklyn, NY 11210

It is generally believed that diets high in olive oil and safflower oil promote health, but the validity of this belief has recently been questioned. This study compares the effects of isocaloric high fat olive vs. safflower oil diets on body composition and glycemic control in rats. The long-term effects of these diets (55% kcal from fat) were compared to that of a low fat diet (15% kcal from fat).

Thirty male Sprague-Dawley rats were divided into 3 diet groups: low fat (LF), high fat olive oil (OHF), and high fat safflower oil (SHF). During week 7, insulin tolerance tests (ITT) and glucose tolerance tests (GTT) were performed. Blood glucose levels were measured with a glucometer. After 8 weeks, fat pads were dissected and blood and liver samples were collected.

Retroperitoneal and subcutaneous fat pad mass in OHF and SHF were higher compared to LF ($p<0.05$); body weights did not differ significantly among groups until week 8. SHF and OHF showed higher blood glucose levels than LF after insulin injection. OHF had a poorer response than SHF ($P<0.02$). There was no overall difference among groups in glucose responses to the GTT.

The ITT results indicate that intake of both olive and safflower oil diets produced obesity and whole body insulin resistance. Our findings suggest that when intakes of these “healthful” fats are high enough to produce obesity, they promote insulin resistance as well, which is a cause of metabolic disease.

HNS – 4 ELECTRONIC STETHOSCOPE RECORDING OF KOROTKOFF SOUNDS: FEASIBITIY AND POTENTIAL UTILITY

Shanna Huang (HS) Midwood High School and Department of Cardiology, SUNY Downstate, Brooklyn, 11203

The measurement of blood pressure (BP) provides an important biomarker for the evaluation and management of patients with cardiovascular disease. BP is commonly determined by applying and releasing extrinsic pressure via an inflatable cuff placed around an arterial site while listening for Korotkoff sounds (KS). The objectives of this study were to determine: the feasibility of recording KS from the upper and lower extremities using a commercially available electronic stethoscope, to determine the optimal level of cuff inflation pressure for KS recording and to determine the effects of provocative maneuvers known to induce arterial vasodilation on KS timing. We prospectively recorded KS in 44 healthy subjects without cardiovascular disease or risk factors; 35 males and 9 females. An electronic stethoscope was positioned over the arterial site simultaneously with single lead electrocardiographic recordings for 30 seconds. Sound and ECG data were also recorded from the brachial and pedal arteries at diastolic BP, and at 10mmHg, 20mmHg, and 30mmHg above diastolic BP. Mean QKDv was

greater at the pedal than the brachial artery at each for each of the cuff occlusion pressures. For both arterial sites, there was a progressive increase in QKD and a progressive decrease in QKDv as the cuff inflation pressure increased from DP to DP+30mmHg. Hyperemia elicited a decrease in QKDv. Our preliminary data suggest that QKD may reflect arterial stiffness and may represent an easy and cost effective method by which to assess arterial stiffness while determining BP by KS.

HNS – 5 EFFECT OF TRANS-MONOUNSATURATED VERSUS CIS-MONOUNSATURATED HIGH FAT DIETS ON BODY COMPOSITION AND GLYCEMIC CONTROL.

Kate Russell (GRAD), Jo Ann Brown, Kadeem Thomas, Marianna Harper, Kenneth Axen, and Kathleen Axen. Department of Health and Nutrition Sciences, Brooklyn College-CUNY, Brooklyn, NY 11210.

The ability of a high fat diet to produce insulin resistance and changes in body composition is dependent upon its fatty acid profile. Trans fatty acids have been associated with increased risk for cardiovascular disease, but less is known about their effects on insulin resistance and body composition. Dietary trans fats are comprised primarily of monounsaturated fatty acids (MUFA). The short-term effect of a trans-MUFA diet (vegetable shortening and safflower oil) was compared to that of a cis-MUFA diet (olive oil) and a low fat diet on glucose and insulin tolerance, body fat mass, and body weight in rats. Thirty male Sprague-Dawley rats were divided into three diet groups: high fat trans-MUFA, high fat cis-MUFA (both 55% of kcal as fat), or low fat for eight weeks. At week 7 of feeding, glucose and insulin tolerance tests were performed. After 8 weeks of feeding, body composition (body weight, fat pads, and percent body fat) was the same between the two high fat groups, but was higher than the low fat group ($P<0.026$, <0.003, and <0.047 respectively). The cis-MUFA group had the lowest decrease in plasma glucose in response to insulin injection when compared to the trans-MUFA or low fat groups ($P<0.0170$). Contrary to our expectations, the cis-MUFA diet, not the trans-MUFA diet, had the greater effect on producing insulin resistance in rodents. Our findings suggest that intake of high fat trans-MUFA and high fat cis-MUFA diets result in increased body fat percentage and body weight, and an impaired response to insulin.
Grant Support: SC3GM086298 (NIH SCORE), PSC CUNY 67833-00-45

HNS – 6 KNOWLEDGE ABOUT MOSQUITO HABITAT AND ILLNESS BASED ON A SURVEY DONE IN RURAL HAITI

Jean Grassman and **Phuonise Saint Fleur** (UN), Department of Health and Nutrition Sciences, Brooklyn College-CUNY, Brooklyn,NY 11210

This study used an interview-based questionnaire to survey residents of Fonfrede, Haiti about their experiences with mosquitoes and mosquito borne illness. Mosquitoes reproduce in freshwater such as ponds, wells, and puddles so people living nearby are at risk of contracting mosquito-borne illnesses such as malaria and chikungunya. In this study we asked 111 people about factors such as house type and proximity of water that may be associated with contact with mosquitoes: The result showed that approximately 65.8% of people use public wells as their primary source of water; 70.3% reported having puddles or pond near their house; 56%

reported using only curtains as barriers in their windows while just 2% had screens for their windows. 45% of those responding said they were bitten by mosquitoes every day and 87% said they were very concerned about mosquito borne illness. These results indicate the need for improved interventions to reduce the community exposure to mosquitoes. The findings from this survey will be used to develop a mosquito prevention workshop and improve community control of mosquitoes.

ENV – 1 THE EFFECTS OF SMOG ON UV EXPOSURE

Nathan Hasbani and **Tanya Kbabia** (HS) with Steven Kaye, Magen David Yeshivah HS

The incidence of malignant lymphomas has been increasing rapidly, but the causes of these malignancies remain poorly understood. One hypothesis holds that exposure to ultraviolet radiation increases lymphoma risk.

It is well documented that the ozone in the stratosphere, the ozone layer, protects the earth's surface for most incoming ultraviolet radiation. As ground level smog also contains ozone it has been hypothesized that reduced air pollution can lead to increase ultraviolet exposure. In the United States, skin cancer rates have increased following implementation of the Clean Air Act.

The Vernier data logger and Lab Pro software coupled to ultraviolet sensors provides instrumentation to monitor ultraviolet radiation and record the data. As sun intensity reaches its maximum at noon (EST), the most intense ultraviolet radiation should be detected. Additional readings, taken before and after noon will be used as references.

Graphs of ultraviolet intensity, were prepared using Lab Pro. Initial results showed an indirect correlation between air pollution levels and ultraviolet radiation. In addition, there was a direct relationship between cloud cover and ultraviolet exposure making it necessary to record data only on days with bright sunlight because clouds block the ultraviolet radiation.

ENV – 2 THE ATLANTIC OCEAN TSUNAMI: WILL A VOLCANIC COLLAPSE INUNDATE US?

Isaac Malakh (HS) with Steven Kaye, Magen David Yeshivah Celia Esses High School

In recent years there has been interest in the potential large tsunami in the Atlantic Ocean. Historically they occurred as a documented by fossil tsunami evidence at various sites. Potential weaknesses on the slopes of volcanic islands which have the potential to collapse triggering tsunami waves. 10 Uri Ten Bink states that an east coast tsunami would most likely occur if an underwater avalanche, or an underwater landslide would occur. The potential cause of some Atlantic tsunamis is the partial collapse of a volcanic island with a large mass of materials suddenly sliding into the sea material displacing a large volume of water. Massive flank failures of island stratovolcanoes are extremely rare phenomena and none have occurred within recorded history". Mathematical modeling of slope conditions at sites on the Canary Islands as well as Kilauea, in Hawaii. Papers have identified strato volcanoes on a number of midocean islands as sites of slope instability and major flank collapse. These authors state that "at least ten major flank collapses have occurred in the Canary Island chain in the past million years it was estimated that a major collapse can occur somewhere in in the Canaries every 10,000 years or so (Day et al.1999).. The volcano of Cumbre Vieja on the island of La Palma was identified as unstable and as a likely site for a major collapse. If a collapse occurs on one of the Canary islands causing a tsunami. Drawing the expanding wave diameter as the waves travel it is possible to estimate wave speed based on a measured distance of 111.32 kilograms per degree (69.17 m/p degree). Based on these numbers a distance of 6289.58 kilometers (3908.10 miles) has been calculated from the island of Tenerife to New York City. The speed of the tsunami traveling mid ocean has been determined to be 900 kilometers per hour +/- 100(550 miles +/- 50). A flank collapse could cause a block slide up to 15-20 km wide and up to 15-25 km long.

ENV – 3 REMEDIATION OF CONTAMINATED SOIL IN URBAN ENVIRONMENTS WITH *PLEUROTUS OSTREATUS* AND MICOORGANISMS

Wen Li Wang (HS) Midwood High School and Environmental Sciences Analytical Center, Brooklyn College (CUNY), Brooklyn, NY 11210

Newtown Creek, located in New York City, is a 3.8-mile long estuary that divides Brooklyn and Queens. Since the 1800, Newtown Creek had continuous industrial activity. It also had one of the biggest oil spills in the country. The bioswale at Eastern Parkway is a part of the New York City Department of Environmental Protection (DEP)'s project on building a green infrastructure. The soil found in Newtown Creek and Eastern Parkway Bioswale is highly contaminated and filled with toxins. To help detoxify Newtown Creek and the bioswale at Eastern Parkway, mycelium, the vegetative part of a mushroom, was used. A strand of *Pleurotus ostreatus* from Prospect Park was cloned continuous and put into rye and then soil from Newtown Creek and the bioswale at Eastern Parkway. Two DNA tests were conducted during the beginning and towards the end of the experiment to examine the growth of beneficial microorganisms. Since the results fluctuate, the results are inconclusive. There are some good and some bad examples. For example, novaphingobium has some remediating powers but it decreased, and achromobacter is known to be a contaminant and it decreased. It's to be determined in future experiments whether or not mycelium increases or decreases beneficial microorganisms.

ENV – 4 SOIL CARBON DIOXIDE RESPIRATION IN URBAN ENVIRONMENTS

Xiao Yan Hu (HS) Midwood High School, Dr.Zhongqi Cheng and Dr. Hermine Huot Department of Earth and Environmental Science, Brooklyn College-CUNY, Brooklyn, NY 11210

The purpose of this project is to have a better understanding of urban soils in NYC by studying its carbon dioxide (CO_2) respiration level. Soil respiration is a measure of CO_2 released from the decomposition of soil organic matter (SOM) by soil microbes and respiration from plant roots and soil fauna. It acts as an indicator of soil's healthiness. Collected urban soils were categorized into three groups: soils formed in human transported materials, soils formed in naturally deposited materials, and topsoils from green infrastructure sites. It was hypothesized that soils formed in naturally deposited materials have the highest CO_2 level because they have less contamination and higher microbial activity. The two objectives of this project are to compare the CO_2 level and microbial activity between the different categories of urban soils, and to study the inherent factors (pH, salinity, total organic carbon) that can possibly affect soils CO_2 respiration. The Solvita CO_2-Burst Test Kit was used to measure the CO_2 levels of the samples. Samples were obtained from 24 sites around NYC. The results obtained from the experiment don't show the difference among the 3 groups and there is a high variability within each group. The only inherent factor that shows a relationship with the CO_2 level was the pH. Soils around pH of 6 have the highest microbial activity. This research could help to study more about inherent factors that affect soil respiration.

ENV – 5 QUANTIFICATION OF BLACK CARBON AND LABILE CARBON IN URBAN SOILS OF NEW YORK CITY

Vivian Cheng (HS), Midwood High School-Science Research Program, Dr. Hermine Huot, Dr. ZhongQi Cheng, Department of Environmental Science, Brooklyn College-CUNY, Brooklyn, NY 11210

This project is part of a collaborative project between Brooklyn College and USDA-NRCS. Black carbon results from incomplete burning of biomass and fossil fuels; a stable form of carbon in soil. In a context of climate change, quantifying black carbon stored in urban soils is important because this compartment of C storage hasn't been assessed. Soil samples were collected from sites in NYC to assess black carbon (BC) and labile carbon. There are three categories of soil samples: soils formed in naturally deposited materials (NDM), soils formed in human transported materials (HTM) (e.g. coal ash, construction debris), and topsoil of green infrastructure sites (GI).To quantify the amount of BC and labile carbon, a method similar to Chemo-Thermo Oxidation of soil at 375°C (CTO-375) was used. The soil samples collected from a coal ash dump site (Rikers) have very high content of black carbon. The average percentage of BC in HTM soils, excluding Rikers, is higher than the average percentages of BC in NDM soils and GI topsoil; the opposite goes for labile carbon. T-tests showed that there is a significant difference of percentage of BC in total organic carbon (TOC) between HTM with Rikers and GI, HTM with Rikers and NDM, GI and NDM, and HTM without Rikers and NDM; the same thing goes for percentage of labile carbon in TOC. Therefore, there is a correlation between the amount of human artifacts and amount of black and amount labile carbon in TOC with Rikers.

ENV – 6 *FOOD WASTE TO NATURAL ORGANIC FERTILIZERS: THE LEACHATES FROM COMPOSTING PROCESSES*

Melissa Lee (HS) Midwood High School, Department of Earth and Environmental Sciences, Brooklyn College-CUNY, Brooklyn, NY 11210

Food waste is a major issue in American society. It causes pollution and is a waste of organic resources. To combat this problem, food waste can be composted and has three beneficial uses: replacing costly energy sources, reducing runoff, and fertilizing crops. This 3-month study examined the pH, salt, and nutrient contents of the leachates collected from different composting methods and at different stages of composting. The pH of all the samples averaged between 3.4-4.7. The salt contents were high, ranging from 1.3-13.6 parts per thousand. All the samples had high ammonia and phosphorus contents, whereas only a few had elevated nitrate levels. The effectiveness of the diluted leachates for the growth of wheat grass was also compared, from the most efficient to the least: aerobic compost bin (at the Lower East Side Ecology Center in Manhattan, Global Enviro, Vokashi Composting. Leachates from the composting processes may not be as effective as commercial fertilizers such as Miracle Gro, but they showed much better performance than the control. Thus they can potentially be used as organic bio-fertilizers to promote plant growth when sufficiently diluted.

ENV – 7 DEGRADATION OF TPH-DIESEL IN SOIL THROUGH MYCOREMEDIATION

Lucy Lin (HS), Midwood High School Science Research Program, Brooklyn, NY, 11210; Zhongqi (Joshua) Cheng, Department of Earth and Environmental Sciences, Brooklyn College-CUNY, Brooklyn, NY, 11210

The purpose of this research is to test the effectiveness of mycoremediation on urban soils. Mycoremediation is the process where fungal organisms such as mushrooms are used to degrade deleterious toxins in soils. In this case, the toxin was TPH-Diesel and the mushroom was Pleurotus ostreatus. The project utilized samples from three different sites in New York City: two, from accessible street ends (Plank Rd. and Apollo St.) located along Newtown Creek, which is an EPA Superfund site, and one sample from Eastern Parkway, NYC's Department of Environmental Protection bioswale site. A bioswale is a landscape system designed to remove pollutants from surface runoff waters. At first, the mushroom mycelium was cultured in petri dishes and then used to inoculate rye. Then, the inoculated rye was mixed with the soil collected from the three sites. Control samples from each site, without the mycelium were kept for comparison.

Both the controls and mycelium samples were grown for two months. The initial and final levels of TPH-diesel in each sample were tested and compared to the controls. The hypothesis that mushroom mycelium would reduce TPH-Diesel levels in the soil was refuted because the control samples, put under the same conditions, reduced just as much, or in some cases even more than the mushroom mycelium samples. This research is valuable because it shows the multiple conditions that need to be overcome to incorporate mycoremediation successfully into urban areas like NYC.

PHYSICS – 1 THE EFFECTS OF SODIUM PYROPHOSPHATE TETRABASIC ON THE CONDUCTIVITY OF V^{4+} ELECTROLYTE FOR THE VANADIUM REDOX FLOW BATTERY

Raymond Yu (HS) Midwood High School and Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

The Vanadium redox flow battery (VRFB) has potential use as a major energy storage device. For applications such as communication and transportation devices, the energy density of the VRFB would need to be higher. However, multiple problems emerged as the concentration of electrolytes increase, especially precipitation. Sodium pyrophosphate tetrabasic (SPT) was found to be an effective precipitation inhibitor. However, SPT's possible negative effects on Vanadium^{4+} ions were unknown. In this research, electrical impedance spectroscopy was conducted to find the effect of SPT on the conductivity of V^{4+} electrolytes. The results showed an indirect correlation between the conductivity and the increase in SPT concentration. The addition of low concentration SPT had a minimal effect on the conductivity of the vanadium solution and thus it's safe to be used in the VRFB. SPT is a chelating agent that binds with a vanadium metal ion and creates a larger molecule that can reduce the conductivity. However, the low amount of SPT added did not have a major negative effect on the solution. The study of improving the VRFB's energy density and efficiency can help promoting a clean world without climate change through partnering with renewable energy sources such as solar, wind, and hydro energy.

Supported by Professor Suarez, Brooklyn College Material Science and Physics Lab

PHYSICS – 2 SPIN-LATTICE AND SPIN-SPIN RELAXATION TIME OF MONOSACCHARIDE AND DISACCHARIDE PROBED BY PULSED NMR

Mona Hassan (UN), Syed Rizvi, Luke Bennett and Mim Nakarmi, Department of Physics, Brooklyn College-CUNY, Brooklyn, NY 11210

Monosaccharide is the simplest form of carbohydrates while disaccharide is the combination of two monosaccharides. We will employ pulsed nuclear magnetic resonance in this experimental study. The goal of this study is to find spin-lattice relaxation time (T_1) and spin-spin relaxation time (T_2) of monosaccharide and disaccharide using pulsed NMR spectrometer. Monosaccharide with six carbon atoms and disaccharide with twelve carbon atoms are compared in this study. These carbohydrates are dissolved in water. Monosaccharides are expected to have larger relaxation time than disaccharides. These relaxation times can provide significant details about the structural nature of sugars.

PHYSICS – 3 INVESTIGATION OF ENERGY LEVELS OF THE RUBIDIUM ATOM USING DIODE LASER SPECTROSCOPY

Steven Lee, **Eric Ashendorf**, **Jarvis Gu** (UN), Andrew Katsari and Mim Lal Nakarmi
Department of Physics, Brooklyn College of the City University of New York, Brooklyn, NY 11210

In this experiment, we investigated the energy levels of the Rubidium atom using a diode laser of wavelength around 780 nm. Rubidium is an alkali metal which is commonly found in minerals, and has important uses in both industry and scientific research. The diode laser is

assembled with a grating in order to make it tunable and provide an external cavity. The diode laser is tuned through piezoelectric material attached on the grating and the diode current. We probed the two isotopes of naturally occurring Rubidium, ^{85}Rb and ^{87}Rb, residing within an absorption cell assembly containing Rubidium vapor. We observed the excitation from ground state to excited state of both ^{85}Rb and ^{87}Rb, corresponding to $5S_{1/2}$ to $5P_{3/2}$, using absorption spectroscopy. Further, analysis of the absorption spectrum of the Rubidium sample cell was done to reveal hyperfine splitting of the energy levels using the pump-probe method.

PHYSICS – 4 COMMUNITIES' REACTIONS TOWARDS WIND ENERGY.

Asma Kashan, **Ghadeer Alharbi**, **Aeshah Alwadai** (GRAD) Department of Physics, Brooklyn College, The City University of New York, 2900 Bedford Avenue, Brooklyn, NY 11210

The quest for sustainability has not been an easy one and the communities are finding it wiser to maintain the status quo rather than allow governments or organizations develop alternative energy sources infrastructure close to where people stay. Carbon dioxide as a problem is widely recognized in every corner of the world, but embracing solutions to this problem has remained a problem due to NIMBY Not In My Back Yard). Once community with a particular development establishes that there will be very little direct benefits, they react through resentment. NIMBY in wind energy comes as a surprise for many, given the fact that wind energy seeks to provide a healthier and more sustainable way of life compared to conventional energy sources such as HEP and fossil fuels. The reaction towards renewable sources has been mixed and even where NIMBYISM is in place, people have taken variant approaches to signify their lack of support and concern for wind energy infrastructure establishments. Therefore, it is safe to say the NIMBY in wind energy is a key obstacle towards sustainability and the growth of renewable energy. The hypothesis of our project is to use data and graphs to investigate the NIMBYISM reactions to the wind farms in China, Germany, and US. Besides that ranking these three countries in terms of which country has the most opponent in graph. Furthermore, examining the public opinions about the wind farms before and after implantation of turbines. Also, includes data about the advantage of using wind power as a renewable energy source globally and in the three countries in terms of mitigating CO2 emissions.

PHYSICS – 5 ON THE WAY TO GLOBAL ENERGY TRANSITION: ICELAND AS A ROLE MODEL FOR USE OF GEOTHERMAL ENERGY

Priscilla Naraine, **Denis Ladyzhenski**, **Jack Edelman** (GRAD) Department of Physics, Brooklyn College, CUNY, 2900 Bedford Avenue, Brooklyn, New York 11210

Iceland, considered part of Europe, is unique in that it uses large amounts of geothermal steam for its energy needs. Due to the carbon footprint and global warming hazards produced by the burning of fossil fuels, the hypothesis that geothermal energy can supply much of a nation's energy requirements was investigated, using Iceland as a role model.
In Iceland, geothermal energy is used to heat homes, swimming pools, and greenhouses. In 2004, it generated 1406 GWh/a of electricity, whereas Europe in total generated 5745 GWh/a from geothermal. The world in total generated 56.786 GWh/a of electricity from geothermal sources.

Iceland's Carbfix project helps reduce the carbon footprint resulting from the burning of fossil fuels. Carbon dioxide is injected into rock layers below volcanoes. The carbon dioxide combines with divalent metal ions of minerals to sequester carbon as calcite, magnesite, dolomite, and siderite.

A disadvantage of geothermal energy usage is that geothermal sources are near tectonic shifts which are sources of earthquakes as well as volcanic eruptions. Increased geothermal drilling produces observed increases in seismic activity. Most of the earthquakes are in the 3 or lower regions of the Richter scale. At these low intensities, most earthquakes go undetected in the absence of sensitive measuring equipment, and the drilling process can monitor the seismic activity.

These findings indicate that Iceland is a good role model for geothermal energy utilization; it is clean and reduces fossil fuel carbon footprints.

PHYSICS – 6 IMAGING LATTICE STRUCTURE OF HIGHLY ORDERED PYROLYTIC GRAPHITE USING SCANNING TUNNELING MICROSCOPY

Waqas Kahlid, **Domenec Paterno** (UN), Dennis Ladyzhensky, and Mim Nakarmi
Department of Physics, Brooklyn College, 2900 Bedford Ave, Brooklyn, NY 11210

The scanning tunneling microscope (STM) is a common device used in research and industry to obtain atomic-scale images of metal surfaces in three dimensions. In conjunction with computer software, the STM produces a contour plot of the arrangement of the molecules on the surface of a metal. From this plot, we can determine material features such as surface texture, defects, and the size and shape of molecules. We employed instructional STM to image the lattice structure of Highly Ordered Pyrolytic Graphite (HOPG). One of the crucial components to the functionality of the STM is the proper preparation and installation of the scanning tip. Mechanical and electrochemical methods of scanning tip preparation are investigated and implemented to image the lattice structure of the graphite surface. Our resulting images were used to calculate the lattice constant of the graphite to be within 8.1% of accepted values.

PHYSICS – 7 INVESTIGATION OF CLUSTERS OF GOLD NANOPARTICLES DEPOSITED ON GLASS VIA ATOMIC FORCE MICROSCOPY

Jonathan Hanon, **Jessina Wong**, **Danny Dilone**, **Moshe Brodt** (UN) and Mim Lal Nakarmi
Department of Physics, Brooklyn College, Brooklyn, NY 11210

Atomic force microscopy (AFM) was employed to investigate clusters of gold nanoparticles deposited on glass substrates. Thin films of gold were deposited with different thicknesses, ranging from 4nm to 8nm, using sputtering. The samples were heated at different temperatures, ranging from 450-550°C. Changes of color were visually observed while heating the sample due to formation of gold nanoparticles. The formation of nanoparticle clusters was investigated by taking images of the samples that were prepared with different thicknesses and at different temperatures, and analyzed by comparing images of bare substrate, gold thin film, and gold nanoparticles formed after heating. We will also present the distribution of particle sizes and its correlation with its color.

PHYSICS – 8 ON THE WAY TO GLOBAL ENERGY TRANSITION: SAUDI ARABIA (*RENEWABLE ENERGY STRATEGY AND SOLAR ENERGY DEPLOYMENT ROADMAP)*

Mai Alharbi, **Dhoha Alshalawi**, **Fatimah Alrashdi**. (GRAD)
Department of Physics, Brooklyn College, The City University of New York, 2900 Bedford Avenue, Brooklyn, New York 11210.

Kingdom of Saudi Arabia is the largest Arab state by land area 2,150,000 $km^{2.}$ The population of Saudi is approximately 29,898 million in 2015 and expected to increase about 40.4 million in 2050. As the population growth in Saudi1.85% (2010-2015), the energy consumption of oil will rise to be 850 million barrels by 2030 which is 30% of current production. So, Saudi government planned to develop renewable energy to have free fuel for export, diversify resources of energy mix, improve energy efficiency, introduce huge investments opportunities, and reduce 60% of co2 emissions per capita. In 2010, K.A.CARE established by royal order to contribute sustainable development using science, research, and industries related to renewable energy. Now, there are 45 of solar resource monitoring stations distributed all over Saudi different regions. The station in K.A.CARE city observe maximum 1500W/m^2 from 7am to 6pm in 26 APR, 2015.The target of the city is to increase the numbers of stations and to have 54GW per day by 2032 because the Kingdom have the most intense sunlight in the world – 105 TKW/H a day, which is equivalent to10 billion barrels of crude oil. Developing solar energy by 2030 will save oil consumption about average of 17.5 million barrels per year, and the oil consumption for power generation will be 270 million barrels per year (10% of current production).

CIS – 1 IMPLEMENTATION OF THE LANDAU-VISHKIN 1989 ALGORITHM

Robin Cohen, Professor Dina Sokol, and **Yocheved Levitan** (UN), Department of Computer Science, Brooklyn College-CUNY, Brooklyn, NY 11210

Landau-Vishkin 1989 is an approximate string-matching algorithm that provides a dynamic programming solution for finding all occurrences of a pattern-text alignment with at most k differences. This algorithm runs in near linear time, specifically O(nk), where n is the length of the text and k is the maximum edit distance. Landau-Vishkin 1989 can be used to compare strings and find meaningful results in a reasonable amount of time and space.
We present an implementation of the algorithm that was programmed in Java using the Eclipse integrated development environment. This implementation follows the 1989 algorithm presented in the paper, *Fast Parallel and Serial Approximate String Matching*, by GM Landau and U Vishkin. Our program implements a suffix array as opposed to the suffix tree detailed in the paper, as the array presents a more space and time efficient alternative to the tree.

CIS – 2 ANALYZING ASSISTIVE TECHNOLOGIES

Dani Banbahji (UN) and Aviv Maman, Department of Computer and Information Science, Brooklyn College-CUNY

Assistive Technology (AT), or any device or item or system that is used to enhance, maintain, or improve the quality of life and functional capabilities of people with disabilities, is a rapidly growing field of research and development in the more general area of Information Technology

(IT). This project aims to discuss and highlight the advancements of AT with regards to carefully designed innovations that are becoming more effective, affordable, accessible, and easy to use. Innovations such as mobile technology have had drastic impact in the field of AT, allowing for many different user interfaces, which even the disabled can interact with. Tablets along with smartphones have lead the charge in the explosion different interfaces and user experiences. New avenues such as wearables also promise great innovation. This project also aims to evaluate the effectiveness of some of the advancements in the field, which include mobile computing. In addition, some history, future challenges, and other promising areas of development are outlined to help inform viewers and help guide developers to rewarding and promising research.

CIS – 3 WHAT MAKES THE MOST EFFECTIVE FIBER OPTIC CABLE BONDS

Jack Gabbay and **Jack Mavorah** (HS) with Steven Kaye, Magen David Yeshivah H.S.

There are several ways that fiber optic cables can be joined and are used in by communication companies. Difficulty in joining fiber cables served for many years as a deterrent to their use by the communications industry. While most of these problems have been resolved, some methods be effective and some of which can lose data. In this project we will be testing the different bonds to see which way of bonding is the most efficient. Several methods of bonding fiber optic cables will be investigated and tested using a low power laser as a light source and fiber optic cables to transmit the light beam. The effectiveness of light transmission through bonded fibers was determined visually. In addition, if possible an Arduino micro controller reading light intensity on a photoresistor will be used to measure the light intensity.

CIS – 4 BIG DATA - IT'S PRESENT AND FUTURE IMPACT ON OUR LIVES

Avinash Jairam (UN), Department of Computer and Information Science, Brooklyn College-CUNY, Brooklyn, NY 11210

Big Data refers to data sets which are too large to be analyzed by conventional database technology. This study was a literature review of several scholarly journals and online articles which explained how Big Data technology works and how it can benefit society.

Big Data analytics have the potential to reveal patterns in data sets which were previously hidden. The use of this technology in the fields of healthcare, commerce, and public safety was investigated because the general public interacts with them daily.

Big Data technology is enabling law enforcement agencies to analyze crime data in real time, and thereby predict and prevent crimes before they occur. Also, this technology is allowing cancer researchers to sequence and analyze the genomes of cancer patients in order to identify what strain of the disease a patient has. Accordingly, the patient can be treated with drugs geared to fight that particular strain. Moreover, Big Data technology is serving as a virtual salesperson to visitors to online stores. It is used to determine what interests a customer may have and subsequently suggest relevant products.

Unfortunately, if not used in a proper way, Big Data technology has the potential to threaten the privacy of individuals. In order to prevent this, new privacy legislation is needed which will

monitor and regulate its use. To summarize, this research is an attempt to explain how Big Data currently affects our lives and what potential it has for the future.

ENG – 1 ROBOTIC SPEED CONTROL THROUGH LIGHT INTENSITY REGULATION

Meyer A. Sakkal and **Ralph Shalom** (HS) with Steven Kaye, Magen David Yeshivah H.S.

Robotic devices can be programed to preformed different tasks. Sensors can be used for data acquisition to read the external environment, digitize external conditions, and provide data for the robot or the computer circuit to act on.

Photo resistors and devices are that regulate voltage in a circuit in response to light intensity. A circuit has been designed, which detects light and converts it to a voltage suitable for inputs into a microcontroller. The software reads voltage intensity and varies the locomotion speed and/or duration of a small robot. The software allows digital signals to serve an analog function, ramping the robots speed up, or down in response to light intensity. Photo resistors and digital speed control have to the potential to be used in many types of autonomous devices.

CHEM – 1 CYCLOADDTION OF VINYLKETENE AND METHYL IODOPROPIOLATE

Patrice N. Sanderson (HS) Midwood High School and Department of Chemistry, Long Island University, Brooklyn, NY, 11201

Organic synthesis deals with the creation of new organic compounds that will further advance the pharmaceutical and organic chemistry field in knowledge about compounds, whose existence can have benefits to this field. The vinylketene with iron is made in a cold, oxygen free environment. Then the cycloaddition happens in the form of cyclization which is the combining of the vinylketene and the Iodopropiolate into a flask with a solvent. Then the reaction is then purified using techniques like Flash Column Chromatography. To find out if the purified product was created an NMR, Nuclear Magnetic Resonance, sample is created of the product created. The NMR shows if the desired components of the predicted compound is actual in the sample. The NMR of the vinylketene and the Iodopropiolate showed all desired components but it also had some unclean aspect in the spectrum. The yield of the compound was around 2.7% which is not so abundant.

CHEM – 2 THE SYNTHESIS OF THREE TRICARBONYL IRON(0) VINYLKETENE COMPLEXES

Cindy Chee (HS) Midwood High School, Wayne F.K. Schnatter, Department of Chemistry and Biochemistry, Long Island University Brooklyn Campus Brooklyn, NY 11201

The tricarbonyl [3-methyl-2-trimethylsilyloxyvinylketene] iron(0), tricarbonyl [4-methyl-2-trimethylsilyloxyvinylketene] iron(0), and tricarbonyl [2-trimethylsilyloxyvinylketene] iron(0) complexes are synthesized in order to create cyclic compounds for pharmaceutical industries to create new drugs or drugs for lower costs.

To synthesize tricarbonyl [3-methyl-2-trimethylsilyloxyvinylketene] iron(0), the reaction from 2-Bromopropene, tert-Butyllithium, and tetrahydrofuran, THF, was first set up. For tricarbonyl [4-methyl-2-trimethylsilyloxyvinylketene] iron(0), either the reaction from trans-1-Bromo-1-propene, tert-Butyllithium, ether, pentane, and THF, or the reaction from cis-1-Bromo-1-propene, tert-Butyllithium, ether, pentane, and THF was set up. For tricarbonyl [2-trimethylsilyloxyvinylketene] iron(0), the reaction from tetravinyltin, n-Butyllithium, and THF was set up. After the regulations of temperatures, iron(0) pentacarbonyl was then added. The solvents were then evaporated and dichloromethane was used in replacement in order to prevent THF from polymerizing. In order to have a protecting group, silicon, for the vinylketene, triisopropyltrifluoromethanesulfonate was added. The complexes were then analyzed by ^{1}H-NMR and ^{13}C-NMR, which showed that crucial hydrogen peaks and carbon peaks are present, respectively. The infrared spectroscopy also showed that the vinylketene, the $Fe(CO)_3$, and the isopropyl group are present. The yields of the tricarbonyl [3-methyl-2-trimethylsilyloxyvinylketene] iron(0), tricarbonyl [4-methyl-2-trimethylsilyloxyvinylketene] iron(0) from trans-1-Bromo-1-propene, tricarbonyl [4-methyl-2-trimethylsilyloxyvinylketene] iron(0) from cis-1-Bromo-1-propene, and tricarbonyl [2-trimethylsilyloxyvinylketene] iron(0) complexes were 81%, 73%, 16%, and 26%, respectively.

CHEM – 3 THE EFFECT OF HYDRALAZINE ON THE DEVELOPMENT OF LUPUS

Donald A. Gerber and **Carmine See** (HS) Midwood High School and Department of Medicine, SUNY Downstate Medical Center

Lupus is a disease with a lot of various stages and conditions. Various symptoms appear in patients that have no relationship with each other. Hydralazine creates a condition in patients that is similar to lupus called drug-induced lupus. Hypochlorite is a substance produced in the body that helps fight against pathogens. There is a possibility that hydralazine can be affecting the hypochlorite because the places that the symptoms appear have hypochlorite present. h\Hypochlorite and hydralazine will be placed together for a period of time in a test tube. A mixture of DTNB and cysteine will provide a substance for the hypochlorite to create a reaction. DTNB and cysteine creates a yellow substance that the hypochlorite would react to. The reactivity of hypochlorite will be recorded by the amount of time it takes to make the color disappear. The hydralazine makes the hypochlorite more reactive. The trials with hydralazine had a faster reaction time then trials without hydralazine. On average the hypochlorite reaction time is 1.46 minutes faster than hypochlorite without the presence of hydralazine. This can explain why the symptoms in patients appear as they are. Hydralazine could be making hypochlorite into a toxic substance in the body. The change in the hypochlorite could be a damaging agent in the body. New specific drugs can be made in order to help patients. Current drugs are too nonspecific, which causes the immune system to weaken. Further research should be done on actually blood samples of lupus patients to support this theory.

CHEM – 4 LEAD INDUCED DIFFERENCES IN BONE PROPERTIES IN OSTEOCALCIN +/+ AND -/- FEMALE MICE.

Olga Berezovska,[1] **Gozde Yildirim** [1] (GRAD), William Budell, [1] Caren Gundberg,[2] M.C.H. van der Meulen, [3,4] Adele Boskey,.[4] and Terry Dowd [1]. [1] Department of Chemistry, Brooklyn College-CUNY Brooklyn, NY, [2]Department of Orthopedics, Yale University School of Medicine, New Haven, CT, [3]Sibley School of Mechanical and Aerospace Engineering, Cornell University, Ithaca, New York, and [4] Hospital for Special Surgery, New York, NY.

Bone is a reservoir for Pb and lead has detrimental effects on bone. Osteocalcin (OC) inhibits bone formation and impairs remodeling while Pb has been shown to increase bone turnover. We determined whether OC plays a role in the detrimental effects of lead in bone. Two month old female OC +/+ and OC-/- mice were exposed to Pb in the drinking water (blood Pb of 20 μg/dl) for 4 months. Bone mineral properties from 6 mo old femora were assessed by Fourier Transform Infrared Imaging, Micro-computed tomography, bone biomechanical measurements and serum turnover markers (P1NP, CTX). The OC-/- mice showed significantly higher bone formation rate and no change in bone resorption vs +/+ mice. Lead significantly enhanced formation in both -/- and +/+ mice and resorption in +/+ mice, with a trend toward an increase in -/- mice. Significantly lower mineral to matrix ratio was seen in the Pb-free -/- mice compared to +/+ mice as well as a decrease in cortical bone stiffness in both Pb-free and Pb exposed -/- mice but not in +/+ mice. There was increased mineral to matrix ratio and crystal size in Pb treated -/- mice compared to untreated -/- mice, consistent with increased resorption. In contrast to +/+ mice, Pb was not as detrimental in cortical bones of -/- mice.

Possibly osteocalcin, through regulation of bone remodeling plays a role in the detrimental effects of Pb in bone. This study contributes to the molecular mechanism of Pb toxicity and osteocalcin function.

CHEM – 5 CYS-TRP DIPEPTIDE FLUORESCENCE LIFETIME AND QUANTUM YIELD RESPOND TO CHARGE (pH) -INDUCED CHANGES IN INDOLE RING AROMATICITY

Hillary Jaramillo (UN), Azaria Eisenberg and Laura Juszczak, Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY 11210

For roughly 40 years, the factors controlling the 30-fold variation in quantum yield for tryptophan within different protein environments have been a mystery. Through tandem computational and spectroscopic study of the dipeptide, Lys-Trp, under varying pH, A. Eisenberg and L. Juszczak (J Phys Chem B 2014, 118, 7059) have recently shown that changes in the dipeptide backbone charge state alter the distribution of ground state pi electron density on the indole ring. The pattern of changes in aromaticity, visualized through charge isosurfaces, is predictably related to quantum yield and average fluorescence lifetime. Generalization of these results requires variation of the non-Trp peptide and its position. Here, quantum yields and lifetimes are collected for the dipeptide, Cys-Trp. A companion poster for Trp-Cys is also presented (See poster by G. Rollins et al.). Fluorescence results are discussed concomitantly with computed isosurfaces.

Supported by NIH 5 SC3GM105562

CHEM – 6 TRP-CYS DIPEPTIDE FLUORESCENCE LIFETIME AND QUANTUM YIELD RESPOND TO CHARGE (pH) -INDUCED CHANGES IN INDOLE RING AROMATICITY

Godfrey Rollins (UN), Azaria Eisenberg and Laura Juszczak, Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY 11210

For roughly 40 years, the factors controlling the 30-fold variation in quantum yield for tryptophan within different protein environments have been a mystery. Through tandem computational and spectroscopic study of the dipeptide, Lys-Trp, under varying pH, A. Eisenberg and L. Juszczak (J Phys Chem B 2014, 118, 7059) have recently shown that changes in the dipeptide backbone charge state alter the distribution of ground state pi electron density on the indole ring. The pattern of changes in aromaticity, visualized through charge isosurfaces, is predictably related to quantum yield and average fluorescence lifetime. Generalization of these results requires variation of the non-Trp peptide and its position. Here, quantum yields and lifetimes are collected for the dipeptide, Trp-Cys. A companion poster for Cys-Trp is also presented (See poster by H. Jaramillo et al.). Fluorescence results are discussed concomitantly with computed isosurfaces.

Supported by NIH 5 SC3GM105562

CHEM – 7 SELECTIVITY OF VARIOUS SMALL MOLECULES FOR DNA QUADRUPLEX BINDING

Maryam Esperanza F. Razaz, **Diandra K. Smith** (UN), Yasemin Kopkalli, and Lesley Davenport. Department of Chemistry, Brooklyn College-CUNY, 2900 Bedford Avenue, Brooklyn, NY 11210.

Guanine-rich sequences within telomeric DNA can fold to form intramolecular DNA quadruplex structures (q-DNA) that can exist as parallel, anti-parallel or mixed-hybrid conformations depending on the presence of potassium or sodium ions. Recent studies have shown that the q-DNA structure can inhibit telomerase activity, an enzyme that is associated with solid cancerous tumors of somatic cells. The selective binding of certain small molecules, which can stabilize formation of the q-DNA structure, can serve as potentially exciting new chemotherapeutics. In this study, we have tested several small qDNA ligands for their binding selectivity and affinity for the qDNA conformation, in addition to model duplex DNA (d-DNA) sequences, such as poly-dA.poly-dT) and calf-thymus DNA (ct-DNA), in addition to a single-stranded (ss-DNA) control sequences. Using competition dialysis and UV-Vis spectrophotometry, we examined the binding of several metal porphyrin derivatives: N-methylmesoporphyrin IX (NMM); Co(III)-mesoporphyrin IX (MPIX); Cr(III)-MPIX; Mn(III)-MPIX; and 5,10,15,20-tetrakis(N-methyl-4-pyridyl)-21H,23H-porphine tetratosylate (TMPyP4); together with three polyaromatic molecules: benzo[b]fluorenone (BFb); benzo[a]fluorenone (BFa); and 9-fluorenone (9FL). Except TMPyP4, all molecules tested exhibited qDNA selectivity.

Supported by NIH-SCORE GM 095437-04 and NIH/NIGMS MARC GM008078

INDEX

*The names of presenters are bolded and underlined

F

G

H

I

J

K

L

M

N

O

P

R

S

T

V

W

Y

Z

LEGEND :

BIO – Biology
CHEM – Chemistry
CIS – Computer Information Science
ENG - Engineering
ENV – Earth and Environmental Science
HNS – Health and Nutrition Science
PHYSICS
PSY – Psychology
SCAS – Speech Communication & Arts Sciences