

Brooklyn College

# Science Research Day

Abstract Book  
May 13, 2005

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## PROGRAM

### 15<sup>th</sup> ANNUAL BROOKLYN COLLEGE SCIENCE RESEARCH DAY

9:30 A.M.	POSTER SETUP
10:00-12:00	STUDENT PRESENTATIONS AND JUDGING
12:15 P.M.	REFRESHMENTS IN THE GOLD ROOM
12:30 P.M.	WELCOME AND REMARKS
	PRESENTATION OF AWARDS
	High School Division
	Undergraduate Division
	Graduate Division

ALL ARE INVITED TO LUNCH IN THE GOLD ROOM

### PRESENTER KEY

High School - \*

Undergraduate - #

Graduate - ^

## **PSY – 1 GENDER DIFFERENCES IN ADOLESCENT AND PARENT EMOTION TALK**

**Naomi J. Aldrich**<sup>^</sup>, and Harriet R. Tenenbaum Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210, and the CUNY Graduate Center

The present study investigated gender differences in adolescents' and their parents' use of two gender-stereotyped emotions- sadness and anger. Parents and their adolescent children discussed four interpersonal dilemmas and answered questions regarding those dilemmas in mother-child and father-child dyads. Given that the majority of the research has been conducted with young children, the present study sought to explore whether parents discussed sadness and anger differently when their children were adolescents. Secondly, we were interested in whether children appropriated these gender differences when they became adolescents and were more adequate conversational partners. Based on previous emotion research, we hypothesized that the children and their parents would speak of emotions in a gender-stereotyped consistent manner. Specifically, we believed that daughters would speak more of sadness than would sons and that sons would speak more of anger than would daughters. We also hypothesized that mothers and fathers would use more instances of sadness while speaking with daughters and more instances of anger while speaking with sons. Results indicated that mothers used more instances of sadness with their daughters than with their sons, and fathers used more instances of anger with daughters than with sons. Additionally, daughters –but not sons- were found to discuss anger more with their fathers than did sons. Results suggest that parents may contribute to the gender differences in emotional expression and experience found in adulthood.

## **PSY – 2 PARENT INFLUENCES ON THEIR CHILDREN'S COURSE DECISIONS**

**Chivon Anderson**<sup>#</sup>, Zahava Burger, and Harriet Tenenbaum, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

In this study we examined who influences children to make course selections- themselves or their parents. It was hypothesized that parents contribute to child's course decisions. Moreover, we hypothesized that mothers would have more influence than fathers. Participants included 12 fifth through eighth grade students (mean age = 11.58 years). They were seven boys, five girls (mostly of European-American descent), and their mothers and fathers. The findings revealed that the child's influence was greater than the parents' influence on the child's course choices. Disconfirming the second hypothesis, neither mothers nor fathers played a stronger role in children's decisions. The results are interpreted in relation to how children may contribute to their own socialization.

### **PSY – 3 THE CREATIVITY OF INVENTED ALIEN CREATURES: THE ROLE OF INVARIANTS**

Yana Durmysheva<sup>^</sup>, and Aaron Kozbelt, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

In this study participants imagined, drew, and wrote about novel alien creatures. Unlike much prior research, which has mainly examined how participants rely on available exemplars and categorical knowledge in this task, here we focus on understanding the basis of creativity judgments of the alien creatures. We hypothesized that judges would reliably rate the creatures' creativity, that instructions to avoid common invariants (two eyes, four limbs, and bilateral symmetry) would increase creativity, and that some common attributes would emerge in creatures judged as highly creative. Characteristics of drawings and paragraphs were reliably coded and used to predict judged creativity. Results showed high reliability in creativity judgments, no significant impact on creativity of instructions to avoid common invariants, and a core set of variables that positively predict creativity (Extraordinary abilities, Miscellaneous, and Personal information). The results imply that judges systematically use several criteria that tap into common aspects of the creators' problem representations and that these apply even to the most creative instances.

Supported by PSC-CUNY Research Award (#656633-0034) to Aaron Kozbelt

### **PSY – 4 IMPLICIT ATTITUDES TOWARD MUSLIMS MEASURED BY THE IMPLICIT ASSOCIATION TEST**

Karla Felix<sup>^</sup>, Jaihyun Park, and Grace Lee, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Three studies examined (a) implicit attitudes and (b) the relative strength of such attitudes toward members of a realistic target group (*i.e.*, Muslims), using the IAT. Previous studies suggested that repeated exposure to information associating members of a social group (*e.g.*, Muslims) with evaluative attributes (*e.g.*, terrorism) might create automatic attitudes toward them. Consistent with this expectation, the IAT results indicated strong implicit preference for White over Muslim names while the magnitude of such a bias was substantially diminished on explicit measures (Study 2). More interestingly, participants exhibited implicit preference for Black over Muslim when measured by the IAT while no difference was found between the two groups in familiarity with the names and in attitudes assessed by explicit measures (Study 3).

**PSY – 5 THE INFLUENCE OF LANGUAGE PROFICIENCY AND CROSS-CULTURAL EXPERIENCE ON BILINGUALS' COGNITIVE ABILITIES**

Anatoliy Kharkhurin<sup>^</sup>, Arthur Reber, and Polina Tilei, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

This study examines the factors in bilinguals' development that contribute to their potential cognitive advantages. The hypothesis was that, in addition to the virtue of speaking two languages, bilinguals who experience and participate in two cultures may benefit from the meta- and paralinguistic advantages of biculturalism resulting in an increase in their cognitive flexibility and divergent thinking abilities.

In the cross-cultural study, 228 Russian-English bilingual college students living in the US and Russia were compared with 47 monolingual English native speakers. Bilinguals were classified by their exposure to American and Russian cultures and their proficiency in English and Russian. Divergent thinking abilities were assessed with the standard tool in the field, Abbreviated Torrance Test for Adults (ATTA).

A MANCOVA showed that when the effect of cross-cultural experience was partialled out, bilinguals outperformed monolinguals on the fluency and elaboration measures, but not on the originality measure of the ATTA. A partial correlational analysis showed that when the effect of language proficiency was controlled for, bicultural individuals tended to obtain lower fluency and originality scores than their monocultural counterparts.

The results are discussed in terms of the possible effects of conceptual changes on bilinguals' cognition and a spreading activation as a cognitive mechanism underlying divergent thinking. Supported by the National Science Foundation grant [0414013]

**PSY – 6 CONDITIONING AND EXTINCTION OF FLAVOR-FLAVOR AND FLAVOR-NUTRIENT PREFERENCES IN MALE AND FEMALE RATS**

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Animals learn to prefer flavors associated with the sweet flavor of sugar as well as with its postoral nutritive effects. This study compared the strength and persistence of flavor-flavor (FF) and flavor-nutrient (FN) preferences. In Experiment 1, male rats were trained with grape or cherry-flavored saccharin solutions. The FN group's CS+ solution was paired with intragastric infusions of 8% glucose (US), and the CS- solution paired with water infusions in alternate one-bottle sessions. The FF group was not infused but had 8% fructose added to the CS+ solution. The US was presumed to be the sweet taste of fructose because fructose infusions do not condition preferences. Two-bottle extinction tests were then conducted with the CS+ vs. CS- without the sugars. Both groups initially displayed similar CS+ preferences (78-79%) but with repeated trials, the preference extinguished in the FF group (50%) but not in the FN group (74%). Because no extinction of FF preference occurred in a prior study of female rats, Experiment 2 compared males and females using a modified FF procedure. Both sexes showed moderate but persistent CS+ preferences when they were trained and tested alike. Exp.1 demonstrated that oral fructose and IG glucose conditioned flavor preferences of similar initial magnitude, but that the fructose, flavor-based preference extinguished more

rapidly than did the glucose, nutrient-based preference. Why Exp. 2 produced a persistent fructose-based preference is under investigation. Understanding the role of taste and nutrition in drink preferences is relevant to concerns about soft-drink consumption and human obesity. Supported by: NIH Grant DK31135

**PSY – 7 STEREOTYPES AND SEXISM IN BLAMING VICTIMS OF DATE RAPE**  
**Kasumi Yoshimura**<sup>^</sup>, and Curtis D. Hardin, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Date rape involves not only violence against women but also social reactions to the victims. Research shows that rape victims are blamed for being raped to the degree that they are deemed sexually provocative and to have not resisted enough. However, little is known about what regulates these reactions. To explore how stereotyping may regulate rape victim blaming, we had Japanese and American participants assess responsibility in a date rape scenario in which victim ethnicity (Japanese, American), victim femininity (tattoo, no tattoo) and victim resistance (overt, covert) were experimentally manipulated and participant sexism was measured. Among Japanese participants, the victim was blamed less when she resisted than when she did not resist except when the victim (1) was Japanese and judged by people high in hostile sexism, and (2) had no tattoo and judged by men. American participants blamed the victim more when she had a tattoo than when she didn't, except when she was judged by men high in hostile sexism. Moreover, victim resistance did not reduce blame for tattooed American victims when judged by men. Although results are complex, they suggest that blaming victims of rape may be influenced by ethnic stereotypes as well as culturally specific norms of femininity.

**PSY – 8 THE ROLE OF GABA IN THE CONTEXTUAL MEDIATION OF EXTINCTION OF PAVLOVIAN CONDITIONING**

**V.D. Campese**<sup>^</sup>, and Andrew R. Delamater, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Rats were used to investigate the role of GABA (the brain's primary inhibitory neurotransmitter) in the contextual specificity of extinction of appetitive Pavlovian conditioning. Subjects were first given Tone – food pairings in one context (C1: T-food), and Light – food pairings in a second context (C2: L-food). Each stimulus was subsequently presented without food (i.e., they were extinguished) in the context contrary to where they had been paired with food previously (i.e., C1: L-, and C2: T-). These stimuli were then tested without food in both contexts 1 & 2. Fifteen minutes prior to these tests, FG 7142, a GABA inverse agonist, was administered at 5 dosage levels (0 mg/kg, 2.5 mg/kg, 5.0 mg/kg, 10.0 mg/kg, or 15 mg/kg). In test, the vehicle group (0 mg/kg) exhibited higher levels of responding to the stimulus when it was tested in its acquisition context (C1: T and C2: L) than when it was tested in its extinction context (C1: L and C2: T). This discrimination between acquisition and extinction contexts was reduced in a dose dependent fashion for the groups tested with FG7142. Such a finding implicates a role for the GABAergic system in the contextual mediation of extinction learning.

## **PSY – 9 DEVELOPING TESTS TO EVALUATE PERCEPTION IN PATIENTS WITH BRAIN INJURY**

**Jean Willer Constant#**, and Daniel D. Kurylo Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Visual object and facial recognition may be impaired by brain injury, and damage to different parts of the brain affect perception of different stimulus features. Although standardized tests have been previously developed to determine the level of impairment, they do not determine the characteristics of impairment relative to the site of injury. To improve these testing procedures, new tests have been developed. These tests isolate specific features of a stimulus such as luminance and color contrast. A set of photographs was manipulated through digital graphics editing in terms of high contrast luminance and isoluminant color. To calibrate ceiling and floor effects, sixteen panels in each condition were given to control subjects who consisted of thirteen young people between 20 and 29 years of age and five middle age people between 40 and 59 years of age. Results indicate that for the high luminance condition, subject groups did not differ significantly ( $t(13) = 0.57$ ;  $p > 0.05$ ). For the color condition, the middle age group performed significantly lower than the young group ( $t(13) = 2.58$ ;  $p < 0.05$ ). These results validate that performance differences occur across stimulus features, thereby demonstrating that these tests are able to identify impairment in particular part of the brain. The tests will now be administered to brain injured patients. It is hypothesized that based upon the site of injury, some subjects will be impaired on one stimulus condition, but perform normally on the other.

Supported by LSAMP and NSF

## **PSY – 10 DIFFERENTIAL EFFECTS OF TRAUMATIC BRAIN INJURY ON IMPLICIT AND EXPLICIT PROCESSES**

**Leib Litman^**, **Noam Fischman^**, Sarah Weinberger, Richard Waxman, and Arthur Reber, Peninsula Hospital Center, Far Rockaway, NY, and Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210.

Traumatic Brain Injury (TBI) can produce profound deficits on various cognitive tasks. The following study attempts to show that despite the loss of functioning that often results from TBI, there are certain processes that remain largely unaffected following brain injury. It has been proposed (Reber, 1992; 1993) that cognitive tasks that rely on implicit modes of acquisition should be more resistant to neurological damage than tasks that depend on an explicit mode of acquisition. In this study this hypothesis was tested in TBI patients and normal functioning controls using three variations of a classic Artificial Grammar (AG) paradigm: Learning, Memory and Transfer. A test of explicit memory for letter sequences was used as a control measure. In addition, several subtests from the Wechsler Adult Intelligence Scale III-R (WAIS III-R) and the Wechsler Memory Scale (WMS) were used to assess explicit functioning. The data showed that while the TBI participants scored substantially lower than the control group on all of the explicit measures, they still showed significant AG learning and were able to transfer the AG learning to a novel stimulus set. The TBI group did show less AG learning and transfer than the controls, but the data suggest that a substantial proportion of the difference stems from poor explicit functioning in the TBI

group. The findings are consistent with the position that the AG paradigm relies on both implicit and explicit acquisition and that while explicit functioning of TBI patients is compromised, implicit cognitive processes remain relatively intact following brain injury.

### **PSY – 11 LEARNING PATTERNS UNCONSCIOUSLY: FURTHER REFINEMENTS OF A SINGLE BUTTON SRT TASK.**

**Leib Litman<sup>^</sup>, Noam Fischman<sup>^</sup>**, Ruslan Ivanov, Richard Waxman, and Arthur Reber, Peninsula Hospital Center, Far Rockaway, NY, and Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210.

The sequential reaction time task (SRT) is a classic method of studying implicit (unconscious) procedural learning (Nissen and Bullemer, 1987). In this task participants become faster at following targets that appears sequentially on a screen while, for the most part, not being aware of the existence of a sequence. It has recently been argued (Litman et al., in preparation) that learning in this task can be subdivided into two components: cognitive and motoric. Recently a version of an SRT task has been developed with virtually no procedural component, allowing for the examination of unconscious learning that is purely cognitive. In the study presented here this task is examined in more detail, specifically with regard to whether knowledge in this task truly is implicit.

The findings showed clearly that every participant learned the sequence implicitly. Virtually none of the participants had conscious knowledge of this pattern. However, subjects were able to quickly acquire conscious knowledge of the pattern once they were encouraged to look for it. The findings are consistent with the idea that implicit knowledge in sequential tasks need not be procedural, and that the extent to which tasks are learned implicitly or explicitly is strongly dependent on task demands.

### **PSY – 12 STUDIES OF TACTILE LEARNING IN PACIFIC GIANT OCTOPUS, *ENTEROCTOPUS DOLFINI***

**Faiza Arshad<sup>#</sup>**, Michael Kuba, and Frank W. Grasso, Department of Psychology, Brooklyn College of CUNY, Brooklyn NY 11210

Octopuses use their eight flexible arms to grasp and manipulate objects in complex and cluttered physical situations. The purpose of this project is to explore the tactile mechanism or mechanisms by which octopuses sense the objects they manipulate. We hypothesized that octopus's suckers allow them to make subtle tactile discriminations (i.e., texture). We developed and built a Y-maze to test this hypothesis. We put pieces of shrimp at different locations in Y-maze and covered the side facing the octopus with duct tape so that octopus could not see the shrimp. Octopus could only use the bottom of Y-maze to reach for & remove the shrimp pieces. This required the Octopus to rely on its chemo & tactile sense to locate the shrimp. Two Pacific Giant Octopuses (GPO) were run through 15 trials, 5 minute each, in this study. Initially Octopus roamed around the Y-maze and didn't accomplish the task but after 3-6 trials the Octopuses learned to remove the pieces from the Y-maze using its suckers and arm movements. In this experiment Octopus learned to remove food from Y-maze, but we don't know yet if they employ their chemical or tactile sense to perform this



task. In the next part of the experiment we are planning to build a Y-maze with one textured arm, to explore the learning of tactile discrimination.

**PSY – 13 ONGOING STUDIES OF OLFACTORY AND HYDRODYNAMIC CONTRIBUTIONS TO WAKE PERCEPTION AND WAKE TRACKING BEHAVIOR IN CATFISH (*ICTALURUS NEBULOSUS*)**

**Jose N. Gonzalez^**, and Frank W. Grasso, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Catfish (*Silurus glanis*) have been shown to track the wakes of prey-fish in the absence of visible light (Pohlmann, Grasso, & Breithaupt, 2001). This was interpreted to mean that this species of catfish is using sensory modalities other than vision to perceive the proximity of the prey-fish. These modalities include the chemical and hydrodynamic senses. The purpose of our ongoing studies is to understand the relative contributions of these two modalities to wake tracking behavior. It is possible that a combination of chemical and hydrodynamic senses is being used or one of the two is significantly more important for wake tracking. Robotic prey-fish will be used to control the paths of prey-fish and advanced visualization techniques to characterize the prey's wake (PIV). The study will take place in flowing water to increase ecological validity and to capture more of the wake tracking behavior as both fish are challenged swimming upstream. Here, we present a pilot study that has allowed us to describe wake tracking behavior in both flowing and non-flowing water in a new species (*Ictalurus nebulosus*). Our preliminary conclusions are that catfish are better able to perceive cues in the wake and perform the behavior in still water.

**PSY – 14 RESPONSIVENESS OF SPINY LOBSTER (*PANULIRUS ARGUS*) TO pH AND L-GLUTAMATE**

**Emikule Greene#**, and Frank W. Grasso, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Previous studies indicated that spiny lobsters use their antennules as chemoreceptive organs, and respond to stimulation with different chemicals (e.g. amino acids) on these organs with Antennular Grooming Behavior (AGB). Daniel (1992) speculated that they do this in an attempt to clean their antennules. Using different levels of two independent variables, pH and chemical concentration, the present study was designed to test the responsiveness of spiny lobsters (*Panulirus Argus*) when stimulated with L-glutamate (.05mM and .01M concentration) at two pH levels (3.98 and 8.00). It was hypothesized that the lobsters would be able to differentiate between the different levels by either performing AGB or increasing their antennular movements. The responses of 13 spiny lobsters to the stimuli were observed in this experiment. Results of the study indicated that spiny lobsters did not differentiate between the two levels of pH or respond with AGB to any of the different concentrations of L-glutamate. The failure of this study to replicate Daniel's earlier findings requires explanation. We will discuss these issues.

**PSY – 15 SEASONAL SHIFTS IN DAILY ACTIVITY PATTERNS IN NATIVEZED MONK PARAKEETS POPULATIONS OF BROOKLYN, NEW YORK**

Lakiesha Lubin#, and Frank W. Grasso, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Monk Parakeets (*Myiopsitta monachus*) are gregarious animals that live and forage in large dynamic social groups. They also maintain communal nests arranged in spatial groupings referred to as colonies. One such colony is on and in the vicinity of the Brooklyn College Campus. We systematically observed nest use in eighteen nests in this colony over the last two years (n= 261 observations per nest). The data we collected consist of their arrivals and departures for a duration of 3 minutes at various hours of the day. These data allow us to infer seasonal variations in the behavior patterns of this colony and the monk parakeets of Brooklyn College. Our observations show a synchronous peak of nest arrivals across most nests in the evening and a second peak in the morning. These patterns show constancy across nests and within a season. They also show variations in different seasons that are not clearly correlated with changes in day length. Interpretations of these variations will be discussed.

**PSY – 16 LEG PREFERENCE AND OBJECT MANIPULATION IN SLIPPER LOBSTERS**

Mahrukh Yousaf#, and Frank W. Grasso, Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY 11210

Slipper Lobsters are able to manipulate marine bivalves such as oysters, clams, and mussels open and or shuck them. Shucking is a behavior that comes naturally to Slipper Lobsters. They use chemical and tactile senses to perform this task. Lau (1987) observed that Slipper Lobsters cut the adductor muscles of live clams using their third pair of legs and speculated that the third sets of legs were specialized for this behavior. We tested the hypothesis that the Slipper Lobsters do not have a required leg preference to complete a shucking. To test the hypothesis, 11 different lobsters were used, 5 of them had their third pair of legs restrained and free in alternate trials We used a CCD video camera positioned to capture the view from below and the side of the animal to capture the shucking behavior. The lobsters were habituated in the tank for at least three weeks prior the experimental trials and they were not fed outside the trial episode. During at least one trial, Slipper lobsters were observed to open a live clam while their third leg was restrained. We conclude that the Slipper Lobsters do not have a required leg preference in completed the shucking as previously suggested by Lau.

**PSY – 17 FLAVOR-FLAVOR CONDITIONING BY SUCROSE AND POLYCOSE COMPARED IN SHAM-FEEDING RATS**

Kristine Bonacchi#, Karen Ackroff, and Anthony Sclafani. Department of Psychology, Brooklyn College of CUNY, Brooklyn, NY, U.S.A.

Animals develop preferences for novel flavors (e.g., cherry) when they are mixed with an already preferred flavor (e.g., sweet) through a process known as flavor-flavor conditioning.

In a prior study, we reported that 2% sucrose, but not 2% Polycose conditioned a flavor preference in rats. Yet, rats are strongly attracted to both Polycose and sucrose, although they differ qualitatively in flavor. The present study determined if more concentrated solutions of sucrose and Polycose differ in their ability to support flavor-flavor conditioning. We first determined that 16% Polycose and 8% sucrose were iso-preferred by sham-feeding rats (the sham-feeding method was used to eliminate postingestive effects of the caloric solutions). Two groups of rats were trained to sham-feed (30 min/day) one flavor (CS+, e.g. grape or cherry) paired with 8% sucrose or 16% Polycose, and the other flavor (CS-) paired with 0.2% saccharin during alternate one-bottle sessions. During subsequent two-bottle choice tests, the rats displayed a significant preference for the sucrose-paired flavor (65%), but not for the Polycose-paired flavor (45%). Yet, during one bottle training the rats consumed more Polycose than sucrose. These findings extend the earlier results obtained with dilute solutions and demonstrate that “sweet” taste is more effective at conditioning flavor-flavor preferences than the “palatable” taste of Polycose. Why iso-preferred sucrose and Polycose differ in their ability to condition preferences requires further study. One interesting possibility is that the tastes of Polycose and sucrose differentially activate brain dopamine circuits involved in reward learning.

Supported by NIH Grant DK-31135

### **ANTH – 1 GLACIERS AND BONES: A ZOOARCHAEOLOGICAL APPROACH TO CLIMATE CHANGE RECONSTRUCTION**

**Hugo R. Asurza#**, Konrad Smiarowski, and Sophia Perdikaris, Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

This presentation is aimed at reconstructing the climate fluctuation during occupation at Hofstaðir through the use of zooarchaeological data. Hofstaðir is a Viking Age farm site, in Myvatnssveit Iceland, dating from Landnam until early modern times. The increased representation of domestic mammal bones (especially cattle and sheep) in zooarchaeological assemblages represents cultural preference for meat as a major source of food, and reflects an unusually high social status of inhabitants of this settlement. The wealth of the chieftains of Hofstaðir would allow them to have a lavish life, if it wasn't for the hard environmental conditions of the North Atlantic. Climate changes, even minor, can be disastrous for farmers in Iceland. We can hypothesize that during times of short summers and long winters the stocks of animals have to decrease to allow for herd survival through the winter, and large number of neonatal deaths would be observed. In cold times therefore, the people of Hofstaðir would have to exploit other locally available resources to compensate for meat shortage. We therefore suggest that the higher ratio of salmonid fish (local trout and char), as well as imported prepared cod to domestic mammals in some contexts indicates such times of stress.

Supported by: NSF OPP REU

## **ANTH – 2 IDENTIFICATION OF FOSSIL PRIMATE INCISOR TEETH FROM COLOMBIA**

**Svetlana Fontaine#**, and Alfred L. Rosenberger, Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

The goal of this study is to identify a collection of twenty eight isolated teeth of fossil monkeys from La Venta, Colombia. Potentially, these belong to a Miocene ancestor of the living squirrel monkeys, *Neosaimiri fieldsi*, which is known by many dental and postcranial remains. More than 200 teeth were gathered from the site, known as the Masato Site. The original materials for this study were thought to be first and second incisor teeth, all from the same species. The goal of this study was to test this hypothesis. The first task was to identify upper and lower teeth, distinguish right from left, and determine their correct tooth position as first or second incisors. We also sought to infer how many individuals were represented. The latter involved assessing relative age differences, sexual dimorphism, and species variation. By examining overall size and shape, looking at ratios describing relative crown height and width, occlusal relationships and wear patterns, it was determined that more than one species was likely present in the sample, and that there were more than two individuals per species. Also, six of the teeth turned out to be premolars. The fossil monkeys from the La Venta site are 10-14 million years old and important to the understanding of the evolution of primates because it is a very “modern” fauna. These findings mean that all the molars found at the Masato Site, previously identified as one species, need to be reexamined. This study can also be extended to investigate which, if any, of these species is the actual ancestor of squirrel monkeys.

## **ANTH – 3 POSITIONAL BEHAVIOR AND SPATIAL PREFERENCES IN A CAPTIVE POPULATION OF SPIDER MONKEYS *Ateles geoffroyi***

**Margaret A. Gavin#**, Dept. of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

This study examines locomotor patterns and spatial utilization in the captive population of three adult *Ateles geoffroyi* at the Staten Island Zoo as a baseline for habitat enrichment. Data were recorded weekly using instantaneous scan samples at one-minute intervals, sixty minutes per session, for 16 hours of observations over a period of three months. Ad libitum sampling was employed to record other, less frequently observed behaviors, such as grooming or vocalizations. Three locomotor patterns were analyzed: quadrupedalism (encompassing arboreal and terrestrial quadrupedalism), climbing (vertical ascents/descents, horizontal climbing), and modified brachiation (limited arm/tail swinging). One postural pattern, sitting/resting, was analyzed. The enclosure was divided into eleven zones reflecting the areas the animals used.

Preliminary results show that the male, “Grandpa,” was much more active than either of the two females during the sessions. Modes of locomotion utilized by Grandpa were divided fairly evenly between quadrupedalism, climbing, and modified brachiation, the most dynamic form of locomotion. One of the females, “Trouble”, employed quadrupedalism, climbing and modified brachiation fairly equally. The other female, “Nun”, the least active of the three, employed quadrupedalism and climbing much more than modified brachiation;

in some sessions she did not brachiate at all. The animals spent most of their time apart, usually occupying separate preferred zones. Rarely a grooming session or embrace was observed; the former occurring variably among all three animals, the latter between the two females.

**ANTH – 4 WHAT DO YOU EAT IN UTOPIA?: ANALYSIS OF FAUNAL REMAINS FROM THE 19<sup>TH</sup> CENTURY PLANNED COMMUNITY OF FELTVILLE, NJ**

**Maureen Kick^**, and Sophia Perdikaris, Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

Feltville was a utopian industrial village established in Union County, New Jersey in 1845 by the prominent New York stationer and Unitarian reformer, David Felt. Intended as an alternative to the increasingly degraded physical and moral environment of the urban working class, Feltville boasted a bucolic setting, housing in New England style cottages, backyard gardens, a free school, and a non-denominational church. Although purportedly successful, the community dissolved after only fifteen years, and few historical sources pertaining to this social experiment remain.

It is hypothesized that analysis of faunal remains recovered during archaeological excavations at the site will shed light on the economic and social structure of the village, as well as reveal patterns of subsistence and foodways of the residents. Preliminary analysis of faunal remains recovered from two Felt-era features suggests that while Feltville's residents ate a diet not unlike that of their urban contemporaries, they were able to exploit their environment, supplementing their diet with locally obtained wild foods, such as deer, box turtle and catfish. The results of this analysis will not only add to our understanding of working class life during the Antebellum Period, but will also increase our knowledge of the myriad utopian movements that arose in response to the increasing industrialization and urbanization of this period.

**ANTH – 5 SURVIVING IN THE NORTH: SUBSISTENCE AND ECONOMY IN THE NW**

**Elina Melamed\***, and Sophia Perdikaris, Midwood High School and Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

Iceland is situated between Greenland and Norway, located in the North Atlantic Ocean, it is completely surrounded by water. Thus, its economy was largely shaped by its environment. The surrounding waters provided the population with much of the necessities needed for survival, compensating for lack of arable land suitable for crop production. The large archeological collection of fish remains obtained from coastal settlements of Akurvík and Gjogur serve to confirm that fishing played a large role of the regional subsistence. Such trade permitted the development of a currency based on dried fish known as stockfish. Domestic mammal's bones obtained from the collection indicate that a limited variety of meats were available. Marine mammals also constitute a small part of the Icelandic archaeofauna, providing evidence of active whaling in the region. Such archeological

collections may serve to draw a link between the past and the present of Iceland, where to this day fishing constitutes nearly 75% of the national exports.

### **ANTH – 6 COWS AND POWER: DETECTING SOCIO-ECONOMIC STATUS FROM ARCHAEOLOGICAL REMAINS**

**Raymond W. Pettit**<sup>#</sup>, Peter O. Kuchar, and Sophia Perdikaris Department of Anthropology, Hunter College-CUNY, 10021, and Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

The Norse settled Iceland in ca. 870 AD. This process involved introduction of domesticates to an ecosystem not prepared for their impact. As a result, the fragile environment degraded rapidly, forcing farmers to focus primarily on raising sheep. Farmers willing to invest in cattle may have done so in order to express status, since the potential loss of a single cow represented a greater economic setback than the loss of a sheep.

This project focuses on two sites, Hofstaðir and Skálholt, whose faunal remains yield high levels of cow bones in comparison to lower status farmsteads such as Hrísheimar and Sveigakot. Located in the Northeast, Hofstaðir was settled very early on and quickly established itself as a high status pagan farm. Skálholt, situated in the South, was the Christian religious and cultural center from 1056 until 1785. Through analysis of faunal remains from these sites, a pattern of continuous use of cows as potential power indicators emerges. Despite major political and ideological changes over an extended period of time, this archaeofaunal pattern seems to be remarkably stable.

Supported by NSF OPP REU

### **ANTH – 7 FROM NEOLITHIC TO THE BRONZE AGE: DOMESTIC AND WILD ANIMAL USE AT BRONOCICE, SOUTHERN POLAND**

**Konrad Smiarowski**<sup>^</sup>, and Sophia Perdikaris, The Graduate School and University Center of CUNY, and Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

Bronocice is a site in Southern Poland continuously occupied for at least 1,800 years (3920 B.C. – 2100 B.C.) by early Neolithic farmers. They were one of the first people of the North European Plain to be influenced by the agricultural revolution, spreading from the Fertile Crescent of southwestern Asia. Faunal remains from archaeological excavations conducted in 1993 reveal a wide range of wild and domestic species. Such a long occupation of the site provides a unique opportunity to observe long term changes in animal husbandry and patterns of domestication, as well as exploitation of wild species, in both Neolithic and Bronze Age cultures. The transition in time from one to another can be observed through analysis of animal bones. Emerging patterns of animal utilization through time also enable us to see how the decision making of early European farmers modified natural landscape, and how those changes in turn affected them.

**ANTH – 8 COMMODIFYING NATURAL RESOURCES: UNEARTHING THE HABITATIONAL DYNAMICS OF NW ICELAND IN 12<sup>TH</sup> AND 15<sup>TH</sup> C.**

**Oleksandr Volkov#**, Courtney Scott, Dmitri Chitov, Eduardo Martinez, and Sophia Perdikaris, Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn, NY 11210

Prior to arrival of the first settlers in 870+/- 2, Iceland was abundant with various natural resources, such as extensive forest coverage and wild fauna. Particularly, the NW Iceland served as the perfect ground for the marine fish spawning. As a result, once populated, the area of the Reykjaness peninsula was used for extensive fishing. The research presented herein will juxtapose the socio-economic and occupational dynamics of Gjogur and Akurvik, a fishing farm and a fishery. While the analysis of the archaeological record of the former supports the local economy/subsistence model, the latter reveals seasonal patterns of habitation/occupation. Furthermore, data for Gjogur is indicative of the transition from mostly meat consumption toward a more fish-centered dietary pattern. Most importantly, the chronology of archaeological record from both sites is supportive of the wider socio-economic processes occurring in the NW Europe of the late medieval period that is illustrative of the emergence of Cod as the frontier commodity on the exchange market.

Supported by NSF OPP REU

**ANTH – 9 ROONEYIA AND THE ORIGINS OF THE ANTHROPOID SKULL**

**Sai Man Wong#**, and Alfred L. Rosenberger, Department of Anthropology and Archaeology, Brooklyn College of CUNY, Brooklyn NY, 11210

Anthropoid primates (monkeys, apes, and humans) are unique among mammals in having a fully formed eye socket – a face. The origins and adaptive significance of this feature continues to be debated. Our new approach to this problem employs modeling skulls in 3D based on accurate laser digitization of specimens, fitting virtual eyeballs for measurement, and investigating the anatomical relationships of key features. The 3D models are rendered using over 2 million polygons at a sampling resolution of .025 mm, ensuring high fidelity and accurate measurement.

The research strategy focuses on possible anatomical antecedents to the eye socket in the living tarsier and in a fossil primate from Texas, *Rooneyia viajensis*. The hypothesis that the eye socket serves to insulate the eyeball from interference by chewing muscles located just behind it was tested, and we failed to corroborate it. This study proposes that several features that have been overlooked so far may be preadaptations to the evolution of the anthropoid eye socket, and that these are common in a group of fossils (tarsiiforms) long suspected of being closely related to anthropoids.

These features involve the expansion for the forebrain, enlargement of the frontal bone, and development of a sill beneath the eyeball that provides structural support. Selection for the reduction of the snout and olfactory system - long thought to be correlated with enhanced eyesight and orbit evolution - may not have been associated with these early steps in the evolution of the anthropoid orbits.

### **SCAS – 1 WORKING MEMORY AND LANGUAGE COMPREHENSION: A DEVELOPMENTAL STUDY**

**Aviva Braun<sup>^</sup>**, Ronit E. Roth, and Klara Marton, Department of Speech and Hearing Sciences, Brooklyn College of CUNY, Brooklyn, NY 11210

Working memory plays a major role in language comprehension and production. The current study investigated whether sentence length or complexity has a larger impact on working memory performance. In addition, the study examined whether variations in linguistic complexity similarly influence working memory performance across age groups, thereby indicating a developmental pattern. It was hypothesized that an increase in age results in a decrease in the number of errors. Furthermore, it was expected that there would be different error patterns across groups.

Three groups participated in this study: 25 younger children, 25 older children, and 25 adults. A Modified Listening Task was presented, in which a nonword repetition task was combined with sentence comprehension by using sentences that differed in length and syntactic complexity. Performance accuracy decreased as sentence complexity increased. Sentence complexity, but not sentence length, affected performance accuracy. There was a group effect in the amount of errors. Younger children produced more multiple than single errors. These findings show improvements with age in working memory and executive functions because of the interaction between these factors. The findings on the relationship between age and linguistic structure have clinical implications for children with different language disorders.

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and by PSC-CUNY award

### **SCAS – 2 INTERACTION BETWEEN WORKING MEMORY AND VOCABULARY IN CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT (SLI)**

**Chava Schutz<sup>#</sup>**, and Klara Marton, Department of Speech Communication Arts & Sciences, Brooklyn College of CUNY, Brooklyn, NY 11210

The question for the current study was whether children with SLI, similarly to typically developing children (TLD), use their long-term memory to increase their working memory performance. Three lists of nonwords (no meaning, nonwords with high- and low-frequency mono-syllabic words) were used to examine this question. The following hypotheses were tested in this study: 1. Children with SLI perform more poorly with each nonword list than their age-matched peers; 2. All children produce the highest repetition accuracy with nonwords that include meaningful syllables; 3. Children with SLI make different types of errors than their peers.

Two groups (SLI, control) of children (N=26) participated in the current study (7:00-10:00 years). The stimuli were 3 lists of nonwords with 16 items each (3-4-syllables long). The results showed that the children with TLD repeated more nonwords correctly than the children with SLI with each list. The errors of the children with SLI were more complex than those of their peers and did not differ across lists. There was no difference in the pattern of error complexity across lists for the children with SLI. Children with SLI did not use their



long-term lexical knowledge to support their working memory performance as efficiently as their peers. The reason for this finding can either be because they have a more limited vocabulary or because of their difficulty with accessing their long-term knowledge.

This research was supported by a grant from NIH/NIDCD  
and by a PSC-CUNY award

**SCAS – 3 THE EFFECT OF LONG-TERM VOCABULARY KNOWLEDGE ON WORKING MEMORY PERFORMANCE IN CHILDREN WITH LANGUAGE DISORDERS.**

Milana Pinkhasova<sup>^</sup>, and Klara Marton, Department of Speech Communication Arts & Sciences, Brooklyn College of CUNY, Brooklyn, NY 11210

This study examined the relationship between working memory, the long-term lexicon, and language comprehension in children with Specific Language Impairment (SLI). Specifically, we examined the interaction between the long-term lexicon and children's working memory performance. Further, we investigated whether this interaction is influenced by the size of vocabulary or by the ability to access vocabulary to greater extent.

Three groups of children (n=40) participated in this study: children with SLI (8;0-10;0), age-matched and language-matched controls. The stimuli were 2 listening span tasks: traditional and active. Both tasks required from the participants to listen to sets of sentences including simple and complex sentence structures, answer a question after each set of sentences, and repeat the last word of each sentence. In the second task, children were asked to complete each sentence first, and then their words were used as stimuli in the active listening span task. Across all three groups, performance for both tasks was better with the simple sentences than with the complex ones. An increase in the number of sentences per set resulted in a decrease in performance accuracy. The typically developing children performed better in the active than in the traditional task, indicating that their working memory performance was supported by their long-term lexicon. Children with SLI performed similarly across tasks. These results illustrate that the children with SLI did not benefit from their long-term knowledge during working memory performance.

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and by a PSC-CUNY award

## **EDU – 1 THE RELATION OF STANDARDIZED TEST PERFORMANCE WITH FUTURE PERFORMANCE**

**Rachael Kilian^, Allison Ruina^**, Department of Elementary Education, Brooklyn College of CUNY, Brooklyn, NY 11210

The goal of this study was to find the impact of standardized testing on students' future performance. Standardized tests are used to both predict a student's future performance and to measure a student's actual knowledge. Our initial hypothesis was that standardized tests may predict a student's future performance but are not accurate in measuring a student's actual knowledge.

A model was designed to test this theory. Included in this model were several other variables (Authentic Assessment Performance, Socio-Economic Status, and Quality of Education) deemed significant to support the study. To investigate the correlations between these variables a questionnaire was developed and distributed among 132 people over the age of 18 in the New York Metropolitan Area. The questionnaire required participants to reflect on their high school experiences including high stakes test performance and overall school performance.

The results indicated that standardized tests were more accurate than school assessments in predicting a student's future performance but less than half as accurate in measuring a student's actual knowledge, supporting our initial hypothesis. A further implication is that poor standardized test scores may be negatively labeling students. Additionally, while there is a moderate correlation between Authentic Assessment Performance and SES, the correlation is higher between SES and Standardized Test Performance, showing tests may possibly be biased.

Administrators and evaluators should consider alternative means to measure a student's achievements. The results of the study suggest that authentic assessment is both more accurate and effective than standardized test results yet it is grossly under valued.

## **EDU – 2 SOURCES OF VARIATION IN STUTTERING TOLERANCE LEVEL**

**Olena Kopylenko-Korrol#**, and Manual Martinez-Pons, Department of Education, Brooklyn of CUNY, Brooklyn, NY 11210

The goal of the study is to identify sources of variation in stuttering tolerance level on the part of laypersons. Findings regarding laypersons' tolerance of stuttering suggest that nonspecialists begin having difficulty in communicating with persons who stutter when the latter stammer about five percent of the time. The purpose of the study was to find sources of variation underlying the response of laypersons to stuttering. It is hoped that the findings will assist in screening of individuals proposing to work with persons who stutter.

**BIO – 1 CREATION OF A GFP-ACTIN EXPRESSION CONSTRUCT FOR  
*TETRAHYMENA THERMOPHILA***

Michael Gotesman<sup>#</sup>, and Roland E. Hosein, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210.

Actin was first isolated in 1942, by F. Bruno Straub, in Szent-Györgyi's laboratory. Because the isolated substance activated myosin, it was named actin. Actin exists in two forms: a low viscosity, monomeric or globular (G) actin and a high viscosity, filamentous or fibrous (F) actin. GFP-tagging is widely used for studies of actin in protein trafficking. An earlier project in our laboratory cloned a *Tetrahymena thermophila* actin gene into a rDNA plasmid vector (pVGF-1) that contained a GFP gene. Expression of the GFP-fusion protein revealed that actin has a role in nuclear division in *Tetrahymena*. Production of GFP-tagged proteins in pVGF-1 is auto-inducible, and there is no way of regulating the production of GFP-tagged actin. Therefore, the effectiveness of using this plasmid is limited. Other laboratories have engineered a modified version of pVGF-1 known as pIGF-1. This vector is the same as the pVGF-1 except that it has a metallothionein (MTT1) promoter that regulates transcription of insert genes. The MTT1 promoter becomes induced when cells are grown in the presence of cadmium 2<sup>+</sup> ions. This mechanism of control allows the pIGF-1 vector to be more effective in studying GFP-tagged actin or other proteins. The objective of the current project was to clone actin into the pIGF-1 plasmid. Standard recombinant DNA methodology was used to create a new construct that contains the in-frame actin sequence linked to a GFP sequence.

Supported by NSF.

**BIO – 2 MUTATIONS IN THE YEAST KINESIN-LIKE *Cin8p* ARE ALLEVIATED  
BY OSMOTIC SUPPORT**

Eduard Korolyev<sup>^</sup>, and Dan Eshel, Biology Department, Brooklyn College of CUNY, Brooklyn, NY 11210

The kinesin-related spindle motor protein Cin8 plays important roles in yeast mitosis. Loss of its function in the absence of either Kip1p, a kinesin-related motor of the same family, or Dyn1p, the yeast cytoplasmic dynein heavy chain, is lethal. We report here that mutations in *cin8* render cells more sensitive to the cell wall compromising agents calcofluor white and SDS and that *cin8 kip1* and *cin8 dyn1* temperature sensitive mutants grow normally at the restrictive temperature when osmolytes such as sorbitol, sucrose or KCl are added to the medium. Sorbitol, however, does not alleviate the sensitivity of these strains to cell wall perturbing agents nor does it repair the spindle orientation defect associated with the *dyn1* mutation. In addition, the inclusion of sorbitol in the medium renders the above mutants more resistant to the microtubule depolymerizing drugs benomyl and thiabendazole but not to medamine. The presence of the mutated *cin8* allele (*cin8-3*) is essential for the effect of sorbitol on cells with the above genotypes and when *cin8* is entirely deleted the phenotype cannot be suppressed by sorbitol. Two genes we identified in a screen for multicopy suppressors of the *cin8 dyn1* temperature sensitivity are *GIC1* and *KRE6*. The association of these gene products with the cell wall, together with other results described above suggests a tight relation between the microtubule cytoskeleton and the cell wall. This relation could be

either through physical interactions or mediated indirectly by one or more of the MAP kinase pathways that affect the cell wall.

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### **BIO – 3 GENETIC ANALYSIS OF FUSION-DEFECTIVE INSERTIONAL MUTANTS USING ARTIFICIAL FUSION TECHNIQUES**

**Keycharianne Navarro#**, Charlene L. Forest, and Munevver Aksoy,  
Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

We are using the green alga *Chlamydomonas* to study the molecule(s) that cause fusion of the gametes. The mating process in *Chlamydomonas reinhardtii* involves agglutination followed by an adhesive interaction between organelles located in the plasma membrane. These organelles or “mating structures” are covered by a glycoprotein “fringe”. Once they interact, fusion begins, leading to the formation of a zygote. We have produced fusion-defective mutants that have plasmids inserted in the gene coding for the putative fusion protein and plan to use these mutants to isolate the fusion gene. Because these mutants cannot fuse, we cannot determine if the fusion defect is genetically linked to the insertion. My experiments focus on the mutant named *Clone 45* created by Tammy La, a master’s student. This mutant is able to agglutinate, but cannot fuse. This project involves developing methods that will allow us to fuse these mutants with wild type cells, so that we can study their genetics. We had used polyethylene glycol (PEG) in an attempt to produce diploids by artificially fusing vegetative cells. Genetic analysis of diploids will allow us to determine if the mutation is dominant or recessive. We had been able to isolate some colonies that grew on the selective media. These cells were tested for mating, which suggested that we may have diploids. Further analysis of the DNA sequence is needed to determine if real diploids were obtained. Once these techniques are standardized they can be used to study other mutants as they are produced.

### **BIO – 4 ROLE OF *Tbx6* IN THE MIGRATION OF TAIL BUD CELLS OF SOMITE STAGE MOUSE EMBRYOS**

**Moses M. Feaster#**, and Virginia E. Papaioannou, Brooklyn College of CUNY,  
Brooklyn, NY 11210

T-box genes play a role in the specification and differentiation of early mesoderm at gastrulation. *Tbx6* is a gene involved in the specification of paraxial mesoderm into somites, the precursors to adult skeletal muscle, bone, and cartilage. Mutation of *Tbx6* creates irregularly formed somites in the anterior region of the embryo, while posterior paraxial mesoderm instead differentiates down a neural pathway to form neural tube-like structures on either side of the axial neural tube. Other posterior mutant cells are not specified as paraxial mesoderm or neural tubes, but instead persist in the tail bud during development, developing an enlarged tail bud phenotype by 9.5 days postcoitus (dpc). We will try to determine whether the *Tbx6* gene affects the migration of cells in the mouse tail bud; our hypothesis is that the null mutants do not exhibit migratory behavior, thereby resulting in the clustering of

cells in the enlarged tail bud. Tail buds were dissected from midgestation (8.5 and 9.5 dpc) embryos and allowed to culture on a permissive surface in order to examine cell migration.

### **BIO – 5 FORAGING PATTERNS AND COMMUNAL NEST BEHAVIORS OF NATURALIZED MONK PARAKEETS IN BROOKLYN**

**Crystal Cuevas\***, and David Klein, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

The Monk Parakeet (*Myiopsitta monachus*) is a medium-sized parrot native to South America but has established naturalized breeding populations in a number of locations in the United States, including Brooklyn. This species of parrot is unique because it is the only species to construct a freestanding compound nest containing several isolated chambers. Parakeets depend upon group dynamics while foraging. To study cooperative foraging, nest sites were located on the Brooklyn College campus and six were focused on. For each nest, the number of birds flying in and out, times and temperature was recorded. Temperature plays an important role in foraging activity of the parakeets (i.e. warmer days have more activity than colder days). For the future, it will be important to continue studying these basic parameters of the entire population and then examine foraging interactions on a smaller scale.

### **BIO – 6 MONK PARAKEETS NEST STRUCTURE**

**Denis Dankin\***, and Steven Kaye, James Madison High School, Brooklyn, NY

The Quaker or Monk Parakeet, *Myiopsitta monachus* is almost entirely green, with the exception of the bluish gray forehead cheeks, throat and breast. This bird has length of 11.5 inches and a body weight 127-140g. The neotropical bird is a native of south America and has reported from southern Bolivia and Peru through Brazil, Paraguay and Uruguay. The largest populations occur in Argentina where they extended into regions of temperature climate.

Since 1971, Monk Parakeets have been reported throughout northeastern New York, parts of New Jersey, Connecticut, Massachusetts, Virginia, and Florida. These North America populations most likely arose from escaped specimens or the escape of a shipment of parrots from Kennedy Airport in 1968 and from an overturned truck on Interstate 95. Researchers at Brooklyn College suggested that these birds build their nest openings intentionally facing South to capture solar warmth and to avoid the cold winds. Observations of nests from 5 nesting colonies in various sections of Brooklyn suggest a random distribution of nest openings. Observations were performed with a compass and adjustment has been made to compensate for the magnetic declination. Data was analyzed using SPSS.

**BIO – 7 THE BIOCHEMICAL COMPOSITION AND MUSCLE CELL SIZE OF THE ADDUCTOR MUSCLE IN DIPLOID AND TRIPLOID BAY SCALLOPS, *ARGOPECTEN IRRADIANS***

**Sandy Hoffman**#, Chester B. Zarnoch, Martin P. Schreiber, Amandine S. Surier, and Richard C. Karney, Aquatic Research and Environmental Assessment Center (AREAC), Brooklyn College, The City University of New York, The Graduate Center, The City University of New York, and Martha's Vineyard Shellfish Group (MVSG)

Induced triploidy has been shown to lead to better performance in aquacultured fish and shellfish. Previous research on several scallop species suggests that the development of a triploid scallop will result in increased growth rates, a larger adductor muscle mass, differences in the accumulation of biochemical reserves in the adductor muscle and a larger muscle cell size. The bay scallop, *Argopecten irradians*, is an economically important species valued for its adductor muscle whose wild populations are overexploited through commercial fishing. This species has considerable potential for large scale aquaculture. The proposed hypothesis is that the adductor muscle of triploid bay scallops will have a difference in biochemical composition and larger muscle cell size as compared to diploid bay scallops. The adductor muscles of diploid and triploid bay scallops were sent to AREAC from the Martha's Vineyard Shellfish Group and were analyzed individually to determine the mean total percent composition of proteins, carbohydrates, and lipids. In addition, the muscle cell size of diploid and triploid adductor muscle was analyzed using NIH ImageJ software. The results show no significant difference ( $P < 0.05$ ) between diploid and triploid bay scallops in terms of total percent composition of protein, carbohydrates and lipids in the adductor muscle. However, the triploid sample had a mean adductor muscle cell size that was 25% larger than the diploid. Research by MVSG shows that mean adductor muscle wet weight in triploid scallops is 26% greater than in diploid controls, this can be explained by the larger muscle cell size observed.

This work was supported by a grant from the Northeast Regional Aquaculture Center to the Martha's Vineyard Shellfish Group (Oak Bluffs, MA).

**BIO – 8 EFFECT OF ETHANOL ON EMBRYONIC DEVELOPMENT IN ZEBRA FISH**

**Julie Alekberova**\*, and Afaf Ibraheem, James Madison High School, Brooklyn, NY 11229

Ethanol has a profound effect on embryonic development. Exposure of embryos to this drug at their critical early life stages can inhibit growth and development. To study effects of ethanol with relevance to human Fetal Alcohol Syndrome, we conducted experiment on zebra fish.

Different levels of ethanol were used to illustrate that higher concentrations led to more significant inhibitory effect on development of the zebra fish embryos. Untreated control groups showed normal embryonic growth and hatching time, while experimental groups treated with ethanol showed slowed growth as well as higher mortality rate. To further

expound this investigation, we tested DNA samples from the different embryos (control and experimental) using gel electrophoresis. Results were not conclusive, thus the need for further research.

Supported by United Way CAPS Science Grant Initiative, 2005

### **BIO – 9 OBSERVING THE VARIOUS EFFECTS THAT ENVIRONMENTAL STRESS INDUCE UPON PLANTS AND THEIR RELATIVE RATES OF CHLOROPHYLL PRODUCTION**

Yakov Yudayev\*, and Denis Tsvang, James Madison High School, Brooklyn, NY 11229

The purpose of this experiment is to observe and record the effects of a variety of environmental stresses, more specifically, chemical stresses, and how they relate to the chlorophyll production within the plants. The plants (lawn grass) were grown in a controlled environment. Then under the same controlled environment, different lots were treated with a variety of chemical solutions for a period of 5 weeks. During the treatment process, observable data was collected, and then samples were collected for chlorophyll extraction. Extracts were ran through a spectrophotometer and recorded. With this data, new methods of protecting crops as well as increasing the growth rates, and with more advanced research, even pre-dating the plants life/death cycle for optimal crop harvests can be developed and employed.

Supported by United Way CAPS Science Grant Initiative, 2005

### **BIO – 10 INVESTIGATING THE METABOLISM OF PRO-VITAMIN A ACCUMULATION IN *DUNALIELLA SALINA* (GREEN ALGA)**

Jasmeen Kaur#, and Juergen E. W. Polle, Department of Biology, Brooklyn College, Brooklyn, NY 11210

The main purpose of this project is to isolate the entire sequence of a gene of one enzyme of the carotenoid biosynthetic pathway of the green alga *Dunaliella salina*. This enzyme Phytoene Synthase catalyzes the first entry-step of a sequence of reactions of the carotenoid biosynthetic pathway eventually leading to synthesis of  $\beta$ -carotene, which is Pro-Vitamin A. In order to accomplish this task, we used an available cDNA sequence from a database, in this case Genebank (NCBI). This sequence was used for primer design to perform Polymerase Chain Reaction (PCR). Sequencing of the PCR products revealed that the phytoene synthase gene of *D. salina* contains at least four exons and three introns. Once the full sequence is obtained, we will be able to use it for comparative studies with genes of other enzymes in the carotenoid biosynthetic pathway.

**BIO – 11 WHICH ORGANIZMS ARE FOUND IN NYC TAP WATER**

Nathan Horowitz\*, Eddie Shkalo, Charles Manopla, and Steven Kaye, Megan David Yeshiva High School, Brooklyn

Recent News reports provided a warning to the public that multi-cellular crustaceans and other organisms were found in New York City drinking water. The reports claimed that there are no health concerns, however there are problems for people who observe the laws of kashrus, and others who were concerned about the quality of NYC tap water.

A PUR water filter attached to a home faucet initiated the study. After allowing the filter to filter the water for several months it was dried and sliced open. The contents were then examined microscopically. The filter yielded the remains of Cyclops, Diatoms, and Algae. Photomicrographs were prepared using a digital camera. Further research maybe conducted in the future.

**BIO – 12 A COMPARISON OF ALARM CALLS OF FREE LIVING MYIOPSITTA MONACHUS IN BROOKLYN, NY AND CORDOBA PROVINCE, ARGENTINA**

Morris Betesh\*, and Steven Kaye, Magen David Yeshiva High School, Brooklyn, NY

The Myiopsitta Monachus or Monk Parakeets have established colonies in Brooklyn, NY over the past twenty years. A study done in Argentina in 1983 by Martella and Bucher recorded the alarm calls on analog audio equipment as well as examining their behaviors. The parrots nesting in Brooklyn were recorded in 2004 using digital audio and graphing equipment making the results more accurate. The alarm calls and associated behaviors recorded in Brooklyn and Argentina appear to be extremely similar, suggesting that the vocalizations and reactions of the Monk Parakeet have not evolved or changed since being introduced to the north east.

**BIO – 13 THE EFFECTS OF GIN ON FLOWERING BULBS**

Ilya Chernyatjev\*, and Steven Kaye, James Madison High School, Brooklyn, NY

A recent article in the NY times called attention to the practice of adding gin to the water in which a paperwhite narcissus is being grown. This column stated that this practice has a long tradition although its effectiveness has never been tested. According to horticultural lore, when gin is added to the water it reduces the length of the flower stem. An experiment was designed in which bulbs that were started in soil were transferred into hydroponic growing conditions. Some were grown using tap water, other with varying concentrations of ethanol solution or gin.

Preliminary results suggested that the bulbs growing in alcohol solutions had cells within their stems that were shorter and wider in structure than those grown in water alone. Based on a review of existing literature and present observations, I hypothesize that the addition of alcohol to the growing media may cause a change in the internal vapor pressure of the plant cell and a change in the morphology of the cell wall.



## **BIO – 14 THE ROLE OF ARABINOGALACTAN PROTEINS IN AGROBACTERIUM TUMEFACIENS-MEDIATED TRANSFORMATION OF PLANT ROOTS.**

**Nicole Romeo#**, Esan Wilkinson, Lourdianne P. Charles, and Theodore Muth, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

*Agrobacterium tumefaciens* is a common soil bacterium that causes crown gall disease in plants. In crown gall disease tumors can be seen growing on the roots, and shoots of plants. The tumors are due to excess production of plant hormones. *Agrobacterium tumefaciens* transfers a piece of its DNA into the plant, which becomes part of the plant's genetic makeup. When expressed in the plant these bacteria genes code for plant growth hormones that causes the cell to divide uncontrollably and form a tumor. In this project we seek to identify factors that promote the interaction between the bacteria and the host plant. We will screen for cell adhesion factors using an Arabidopsis mutant stock collection. The *Agrobacterium*-mediated transformation assay will be used to identify mutants that are resistant or hypersensitive to Agro-mediated transformation.

## **HNS – 1 EFFECT OF DIETARY TRANS VS. CIS FATTY ACIDS ON THE METABOLIC SYNDROME IN RATS**

**Jennifer Hernandez#**, Carla Finco, Tiffany Weiss, Kenneth Axen, and Kathleen V. Axen, Department of Health and Nutrition Science, Brooklyn college of CUNY, Brooklyn, NY 11210

Previous work in our laboratory suggested that high-fat diets of various compositions differed in their effects on risk factors for cardiovascular disease and Type 2 diabetes mellitus. In particular, we had observed that a diet containing partially hydrogenated vegetable oil, known to be high in *trans* fatty acids, was effective in producing some of the risk factors for these diseases: these risk factors are collectively known as the Metabolic Syndrome. We hypothesize that the *trans* fatty acids will be one of the determinant factors promoting the risk factors of the Metabolic Syndrome.

The present study compared the effects of two high-fat (45% of calories) diets, one (T) containing 27% of its fat as *trans* fatty acids, with an equally high fat diet containing no *trans* fatty acids, on a number of features of the Metabolic Syndrome in rats. A control group (N) was given a normal (15% of calories) fat diet with no *trans* fatty acids. Our 8 week comparative study utilized 21 male Sprague-Dawley rats. During the sixth week of the study rats were food-deprived overnight, and a glucose tolerance tests (intraperitoneal injection of 50% glucose solution, 1 g of glucose/ kg of body weight) were performed.

No significant differences were found between groups in glucose tolerance, although both T and C high fat groups showed higher glucose levels at the end of the test. In the seventh week of our study both high-fat groups consumed significantly more kcal and gained more body weight than the N group. In addition, the liver weight of the (N) group was less (10.29 g), than that of the C (11.62 g) and T (12.36 g) groups, suggesting that these rats may have had more fat in their livers. However, the weights of the visceral fat pads did not differ, significantly among the three groups. There also proved to be no overall differences in their fasting plasma HDL-cholesterol, triglycerides, or total cholesterol levels. To date, no

differences have been found between animals on the *trans* vs. *cis* acid diets. However further body composition analysis and measurement of plasma levels of hormone insulin and leptin are in progress.

### **HNS – 2 EFFECTS OF POLYBROMINATED DIPHENYL ETHERS ON LIVER CELLS**

**Kenghana Munroe#**, and Jean Grassman, Brooklyn College of CUNY, Brooklyn, NY 11210

Polybrominated diphenyl ethers (PBDEs) are flame-retardant chemicals that are used in everyday items from computer casings to carpet pads to foam cushions in chairs and couches. The concentrations of PBDEs in human blood, breast milk, and body fat indicate that most people are exposed to low levels of PBDEs. Their structure of PBDEs is similar to the dioxins which are carcinogens, and also developmental and reproductive toxicants. Little is known about the health effects of PBDEs. The goal of my project is to determine the extent to which polybrominated diphenyl ethers (PBDEs) affect the expression of selected genes, *CYP1A1*, *CYP1A2*, *CYP1B1*, and *AHR* in liver cells. These genes were selected because they are known to be induced by dioxins.

Liver (HEPG-2) cells derived from a hepatocellular carcinoma cell line were used. Cells were cultured at a density of  $10^5$ /ml with media containing 2, 5 and 10  $\mu$ m PBDE for 72 hours in a humidified incubator with 5.0% CO<sub>2</sub>. Cultures containing cells in only media or media plus vehicle control were also included. Reverse transcription was carried out to convert the RNA to cDNA. Real Time polymerase chain reaction (PCR) using primers conjugated to Taqman probes was done to determine the extent of the induction of selected genes. Limited evidence of dosimetric induction was found although future studies are needed to examine the impact of the vehicle control.

### **PEES – 1 THE EFFECT OF DECREASED ESTROGEN LEVELS ON TRABECULAR BONE STRUCTURE IN RAT TIBIAE**

**Karen Koser#**, and Vanessa Yingling, Department of Physical Education and Exercise Science, Brooklyn College of CUNY, Brooklyn, NY 11210

Bone mass accrual during late adolescence is important because it may offset the effects of osteoporosis later in life. It was hypothesized that decreased estrogen levels would prevent the development of peak bone mass. A model was developed in which puberty was delayed using GnRH antagonist injections (Cetrolix) in Sprague Dawley female rats. The study consisted of a short-term control group (n=12), a short-term experimental group (n=12), a long-term control (n=12), and a long-term experimental group (n=12). The rats in both the short term and long term experimental groups were given the injections for 18 days, after which the rats in both the short-term control and experimental groups were sacrificed. The injections were discontinued in the long-term experimental rats after the 18<sup>th</sup> day of administration. The long-term rats were sacrificed at the age of 6 months. Through histomorphometric analysis, it was determined that the trabecular numbers, bone areas, bone perimeters, and bone volumes, were significantly lower in the short term experimental group than in the short term control group. The trabecular spacing was

significantly larger in the short-term experimental group than in the short-term control group. The trabecular void areas were significantly lower in both the short-term and long-term experimental groups. The differences in trabecular number, bone area, bone perimeter, bone volume, and trabecular spacing in the long-term experimental group were not significant. In conclusion, bone structure was significantly depleted in the short-term experimental group, while the long-term experimental group seemed to experience a compensatory effect.

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### **PEES – 2 DIRECT LOADING IN A LOW ESTROGEN ENVIRONMENT IN PREPUBESCENT RATS**

**Garvin G Taylor<sup>^</sup>**, and Vanessa R Yingling, Department of Physical Education & Exercise Science, Brooklyn College of CUNY, Brooklyn NY 11210

The purpose of this study was to determine if delayed puberty using gonadatropin-releasing hormone antagonist (GnRH-a) injections affects the response of cortical bone to compressive loading in female rats.

Ten Sprague-Dawley rats (21 days of age) were randomly placed into 2 groups. The control group (C) established baseline data for compressive loading on the ulna. The low estrogen group (LE) was given GnRH-a injections beginning at 25 days of age until sacrifice at 38 days. The right ulnae of both groups were loaded to approximately 4000 ustrain from day 32-36. Calcein injections were given on days 29 and 36. The right and left ulnae were dissected and prepared for histomorphometric analysis.

A delay in puberty resulted from the GnRH-a injections as confirmed by the delayed vaginal opening and the decreased estradiol levels in the LE group. A significant increase in the total area perimeter and marrow perimeter in the left ulna resulted in the LE group. On the endosteal surface, there was a decrease in BFR in the LE group and compressive loading increased BFR in the C group, but had no effect in the LE group.

In summary, the GnRH-a injection protocol did suppress estradiol levels and delay puberty in the LE group; furthermore, BFR was suppressed at the endocortical surface.

This study is important in understanding how age of puberty can affect peak bone mass and strength, which correlates to the incidence of stress fractures in young women.

### **PEES – 3 A MODEL OF DELAYED PUBERTY IN RATS**

**Garcia Watson<sup>#</sup>**, Vanessa Yingling, Brooklyn College of CUNY, Brooklyn, NY 11210

During puberty one factor that affects peak bone mass are estrogen levels. We hypothesize that low estrogen levels during bone development can negatively affect bone length. The purpose of this investigation is to determine the dose of GnRH antagonist that is necessary to delay puberty.

All animals, n=60, were randomly assigned to three treatments groups, dose (1) 1.25mg/kg, dose (2) 2.5mg/kg, and dose (3) 5mg/kg received daily injections of GnRH antagonist. All

animals were monitored daily for any changes in vaginal opening which is an indicator of puberty.

Previous studies established the average day of vaginal opening was  $31.3(\pm 2.23)$ . Daily injections of GnRH antagonist at dose (2) 2.5mg/kg should delay the onset of puberty at 93%. At dose (2) 2.5mg/kg, uterine (79.76%) and ovarian (83.94%) weights were significantly lower than the control group. A decrease in femoral bone length (35%) was found,  $P < 0.001$ .

In summary GnRH injections at dose (2) 2.5mg/kg will significantly delayed puberty, attenuate femoral epiphyseal bone growth, as well as a reduction in ovarian and uterine weights.

## **ENG – 1 CAN MICROCONTROLLERS BE USED FOR HOME AUTOMATION AND CONTROL?**

**Victor Atlasman\***, Steven Tsardounis, Lev Goltseker, and Steven Kaye, James Madison High School, Brooklyn, NY 11229

A microcontroller is a circuit that has memory, a processing unit and a bus for internal and external communication. Input and Output pins are assigned tasks via programming. The programming languages that are frequently used in microcontrollers are PIC-Basic or P-Basic although Java is used, occasionally. The program is downloaded to the microcontroller from an outside source and stored within its EEPROM chip.

Using a PIC 16F84A Microcontroller interfaced to a computer and wired relays, control capabilities are provided via communication with the serial port. The addition of a PC interfaced to one Microcontroller provides the potential for Home Automation over the Internet.

Additional microcontrollers could be addressed through a wireless network. Through the use of models, the practicality of this approach shall be certain, authentic, and efficacious to society's needs.

## **ENG – 2 POWER OF SUN**

**Lev Iglanov \***, and Steven Kaye, James Madison High School, Brooklyn, NY 11229

Photovoltaic cells are solid-state devices that convert light energy into electricity. Although photovoltaic cells have been available for a long time, they were not suitable for many applications because they were very fragile and only had a low output.

Recent developments have increased their performance and packaged them to prevent breakage. This solar tricycle proves that new technology solar cells are capable of providing enough electricity for transport application. In bright sunlight our solar tricycle generates an excess of 20 volts and has ability to rapidly charge a storage battery system making this vehicle capable of operating without direct sunlight.

If scaled up, small solar runabout vehicles could use this technology for fuel free non-polluting personal transportation. In addition if solar panels of this type are mounted on the roof of the city busses, trolleys or rapid transit trains they can help to supplement the low voltage power supply.

## **ENG – 3 SUBMARINES: ENHANCED MANEUVERABILITY, SPEED, AND OFFENSIVE CAPABILITIES**

**Viktor Nagornyy\***, and Steven Kaye, James Madison High School, Brooklyn, NY 11229

The concepts of aerodynamics were used for many decades in naval vessels, especially submarines. Both, water and air are fluids so aerodynamics will apply for both. However, the difference in density and viscosity prevents the usage of the same aerodynamic principles in both fluids without any modifications. Thus, specific modifications are required in order to convert an aircraft features into underwater technology. The features that must be modified to function underwater include turbines, side wings (hydroplanes), overall shape/size, tail

(rudder). All these features will be modified to fit underwater environment. All in all, with correct application and/or modifications of features found on aircrafts submarines maneuverability, speed and offensive capabilities can be enhanced. An engineering model was constructed, and analyzed visually to ascertain hydrodynamic capabilities of the new submarine.

#### **ENG – 4 BACK TO “BASICS”: AUTOMATED TRAIN CONTROL USING MICROCONTROLLERS**

**Mark Aboutboul\***, Joey Ishay, and Steven Kaye, Magen David Yeshiva High School, Brooklyn, NY

Rapid transit agencies and engineering firms have been investigating the use of automated train control for rail transit system. Microcontrollers are single chip computers that can be programmed to perform specific tasks. Using a Microcontroller an engineering project was developed to test the reliability of a Microcontroller monitored railroad switch. The Stamp BS2 Microcontroller was programmed, using the P-Basic language to determine the location of a train using photoresistor sensors. When the train triggers the sensor the Microcontroller sends a signal to a relay, which throws the switch, providing the correct route for the train. The completed circuit and demonstration model proved to be 100% reliable in detecting the presence of the train and sending it to the correct route. The low cost and reliability of Microcontrollers suggests that they should be used for decentralized vehicle automated control.

#### **CIS – 1 IMPROVING PERFORMANCE OF DISTRIBUTED HASKELL IN MOSIX CLUSTERS**

**Lori Collins^**, Murray Gross, and P.A. Whitlock, Computer and Information Science Department, Brooklyn College of CUNY, Brooklyn, New York 11210

Functional languages provide an inherently parallel way of programming. They have two powerful tools that surpass the limits of conventional programming making it our goal to develop further the Glasgow distributed Haskell (GdH) compiler. We present experimental results demonstrating a qualitative improvement in the performance of a Parallel Haskell implementation in a cluster environment in which PVM intermachine communication has been replaced by process migration under the control of the Mosix patches to the Linux kernel. Together with the software modifications that have been made to the Haskell run-time system, this performance improvement has implications in the area of automatic run-time optimization. With this verification we see that by overcoming the limitations posed by the original design we witness that rather than a micromanagement approach to load distribution, we find that under some circumstances a contention driven supervisory model outperforms an excessively limited load-balancing approach.

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## **MATH – 1 SYMMETRIES OF A SQUARE, EQUILATERAL TRIANGLE AND ITS APPLICATIONS**

**Grace P. Malonga#**, and T. Flesher, Math Department, Medgar Evers College, Brooklyn, NY 11225).

Symmetry and complexity are fundamental interdisciplinary concepts of research inspiring the natural sciences since the antiquity. Molecules have more or less symmetric and complex structures, which can be defined in the mathematical framework of group theory. In fact, all symmetries form groups, that is why the notion of group theory and symmetry group from abstract algebra is significant in this research that consist of the study of the symmetries of a square and equilateral triangle in terms of rotational and reflectional symmetries. When we consider the square as well as the equilateral triangle, the transformations that carry the polygons onto themselves are rotations and reflections. Each one of these transformations will change the position of the vertices to form a permutation that is a bijective function from the set  $(1,2,3,\dots,n)$  to the initial polygon. In the presented paper we define the operation on symmetries in an algebraically and geometrically point of view; we prove that the set of all symmetries forms a group under defined operation (\*) and we study the properties of this group such as the number of generators and their commutativity. We obtained similar result for the square as well as the equilateral triangle that allow us to generalize these properties for any regular polygon and to obtain the notion of dihedral group. The dihedral group  $D_n$  is a group based on the symmetries of regular polygons such as the square, triangle, The dihedral group is a group of order  $2n$  generated by elements  $r$  and  $d$  such that:  $r^n = 1$ ,  $d^2 = 1$ , and  $d*r = r^{-1}*d$ , where  $r$  is any rotation,  $d$  is any reflection, and  $n$  is the number of sides of a polygon.

### **ENV – 1 ENVIRONMENTAL EFFECTS OF TRAFFIC FLOW IN BROOKLYN**

**Stephanie Collins#**, Beancher Dixon, Svetlana Timsky, Donna Spence-Wint, Margo Didia, and Micha Tomkiewicz, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

The goal of this project is to identify the correlation between health effects and pollutants from car emission in Brooklyn. By visiting this borough in New York City and by using a map of Brooklyn, Traffic flow was approximated. Once this was investigated, we normalized traffic flow to population. From there we were able to calculate gas consumption and then the carbon dioxide emission. We compared this carbon dioxide emission with respiration by calculating the average amount of food we consume per day. The next step taken was to approximate pollutants emission due to traffic flow and their possible toxicological effects. Lastly, related health effects of pollutants were determined. We then used all the above data to correlate health effects with their causes.

### **ENV – 2 AN ATTEMPT TO ALTER THE BURNING OF FOSSIL FUELS IN THE FAVOR OF HUMAN INTERESTS**

**Morgan Murray-Miller#**, Department of Environmental Studies, Brooklyn College of CUNY, Brooklyn, NY 11210

The goal of this project is to grasp an understanding of global warming based on carbon dioxide (CO<sub>2</sub>) emissions. A methodology known as the IPAT model will explain why countries produce the amount of carbon dioxide they do, how much they will produce in the future, and how we can alter the IPAT equation to reach societies goal; the greatest wealth with minimal carbon dioxide emissions.

This is a statistical approach based on an equation. The data for the equation comes from the World Bank database. The results of the project will show that by the end of this century most people will be living in a developed country. The countries will become developed as a result of burning fossil fuels, which in return will boost their GDP, and then allow for more efficient burning. The conclusions will mathematically prove that the IPAT model works, and that we can use it to revolutionize the way countries will develop and burn fossil fuels in the future.

The importance of this project is to show an alternative scenario for the global output of carbon dioxide emissions. If we can fully understand the mechanisms behind why we need to burn fossil fuels, then we can change future conditions. The result would be a higher GDP (wealth) for a country and at the same time more efficient burning of fossil fuels, which means lower carbon dioxide emissions. This would be beneficial to the countries themselves and to the environment as a whole.



### **ENV – 3 THE ENVIRONMENTAL EFFECTS OF FLOW TRAFFIC FLOW IN QUEENS.**

**Victoria Ingram#**, Chalanda Walker, Dawn Cordaro, Teresa Mutolo, Erica Baizan, and Eva Vaquez, and Micha Tomkiewicz, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

The purpose of this study is to inform people about the health effects due to car pollutants and its effects on the environment. The amount of traffic flow is significant in finding out the amount of pollutants emitted by cars. The five boroughs of New York City were studied and because Queens is the largest borough, it is assumed that the amount of car pollutants will be greater thus the health effects will also be greater. In order to investigate the problem we drove to queens to count the amount of cars that traveled on two separate streets. We visited the small street 112<sup>th</sup> Street between 107<sup>th</sup> Avenue and 109<sup>th</sup> Avenue. We counted cars on the big street also, and we counted 95 cars in a 30 minute period. The big street according to the DOT had a rate of 4921 cars per day. We will show a correlation between gas consumption and negative environmental effects

### **ENV – 4 ENVIRONMENTAL EFFECTS OF TRAFIC FLOW IN STATEN ISLAND**

**Russell Lieberman#**, Alyson Guzi, Gina Angelo, Camille Hodges, Kristi Borovoy, and Micha Tomkiewicz, Department of Biology, Brooklyn College of CUNY, Brooklyn, NY 11210

This project presents the causes and effects of many of the environmental issues in the borough of Staten Island. By observing traffic flow of both small and large streets we were able to determine the AADT or Average Annual Daily Traffic. We also took into account the land area of Staten Island as well as the population. From this we were able to determine the gas consumption of the vehicles traveling throughout the borough; this allowed us to determine the amount of CO<sub>2</sub> that was emitted due to the traffic flow and emission of other pollutants such as VOC, NO<sub>x</sub>, and CO. We have compared the traffic emission to the average amount of exhaled CO<sub>2</sub> due to respiration by compiling the average amount of calories consumed per day. Now that we had all of this information we looked at the big picture. Using infoshare.com, we were able to determine cancer statistics, heart disease, as well as respiratory and circulatory problems within that borough. Overall, we found that there is in fact a great correlation between the traffic flow in Staten Island and the effects on the environment.

## **ENV – 5 ENVIRONMENTAL EFFECTS OF THE TRAFFIC FLOW IN MANHATTAN**

**Lisa Delaney#**, Frances El sayed, Lesliann Harford, Carolina Heredia, and Nikki Levy, Brooklyn College of CUNY, Brooklyn, NY 11210

The goal of this study is to determine the traffic volume in the borough of Manhattan and the environmental consequences of the traffic flow. The project includes data analysis, literature search and scientific monitoring and mechanisms of related health effects. To determine a hypothesis as to the cause and affects we made comparisons with the entire New York City area. We approximated the traffic flow in Manhattan in terms of units of cars per day and normalized that flow to the population. We then compared our findings with the entire New York City area. Our group also calculated the approximate gas consumption of the traffic flow to determine the amount of carbon dioxide emission. We also determined the effects pollutants such as Volatile Organic Compounds, Nitrogen Oxides, and Carbon Monoxide. We compared the carbon dioxide emission from the traffic flow to the carbon dioxide from respiration. The project also includes the toxicological effects of those pollutants. Lastly, we addressed the issues of demographics, socio-economics and hospital admissions in Manhattan. We then correlated the causes and effects of those issues to New York City as a whole.

## **ENV – 6 HEALTH EFFECTS OF CAR POLLUTANTS IN THE BRONX**

**Sophia Ofshtein#**, Brielle Klein, Anna Diaz, Lissa Claude, and Sereta Hall, Brooklyn College of CUNY, Brooklyn, NY 11210

The goal of this study is to determine the lasting health effects caused by car emissions in the Bronx. In an attempt at calculating these results, certain steps needed to be taken in order to get to this final product. After obtaining a map of the Bronx, isolating a certain section, physically counting traffic volume in that section of the borough and using calculations to obtain emission volume, we were able to come up with a final conclusion. Our very first step was to obtain maps of the Bronx. Each group member was assigned a certain section of the borough, to measure the length of the streets and also to shade the streets given to us by the Department of Transportation. Our next step in the process was to isolate clumps of small streets to find its area in miles. And from this data we were able to obtain the length of all the small streets in the Bronx through a series of intense calculations.

The physical process of this project involved our group members traveling to the Bronx to count traffic volume of a small street and a large street. With these numbers in place, we were then able to obtain the Average Annual Distance Traveled (AADT). And then we investigated the health effects of the combined car emissions. By taking the amount of gasoline emitted and comparing that to the number of miles driven a day, you get the amount of CO<sub>2</sub> released into the air.

### **CHEM – 1 EVIDENCE FOR LIMITED DIVERSITY OF RING SIZE IN MONOCYCLIC NATURAL PRODUCT MONOCYCLIC NATURAL PRODUCT MACROCYCLES**

**Aaron T. Frank#**, Nicola S. Farina, Orrette R. Wauchope, Mo Qi, Edyta M. Brzostowska, Nahed Sawwan, Paul Haberfield, and Alexander Greer, Department of Chemistry, Graduate School and University Center and The City University of New York (CUNY), Brooklyn College, Brooklyn, New York 11210

This project examines ring size patterns on the natural selection of macrocycles. Analysis of the chemical literature reveals a preference for 14-, 16-, and 18 membered ring systems. Data suggests the preference bear no relationship to the odd-even frequency in natural fatty acids. The results raise a question concerning the limited diversity of macrocycle ring sizes and the nature of the constraints that may cause them.

### **CHEM – 2 MOLECULAR DYNAMICS SIMULATION OF 1-BUTYL-3-METHYLIMIDAZOLIUM PHOSPHATE**

**Andre R. Grange#**, and Mark N. Kobrak, Department of Chemistry, Brooklyn College of CUNY, Brooklyn, NY 11210

Room temperature ionic liquids based on polyvalent ions are a new and poorly understood class of materials. We present the results of molecular dynamics simulations on an example of one of these materials, and discuss how ionic charge, structure and capacity for hydrogen bonding affect the structure of the liquid. Our results show that polyvalent ionic liquids are highly ordered at the microscopic level. We discuss the results of competition between steric and hydrogen bonding factors.

### **CHEM – 3 BIS (OXALATO) BORATE (BOB) ANION BASED IONIC LIQUIDS AND THEIR PROPERTIES**

**Neel Khanna#**, Allison Funston, James Wishart, and Mark N. Kobrak, Department of Chemistry, Brooklyn College of CUNY, Brooklyn, NY 11210, and Brookhaven National Laboratory, Upton, NY 11973-5000

Ionic Liquids, salts that are molten at room temperature, have demanded greater attention in recent research because of their potential applications as environment-friendly solvents in chemical reactions, particularly in nuclear chemistry. Production of these salts involves the combination of unique cations and anions to form novel ionic liquids. These liquids are therefore tailored to fit given purposes based on the physical properties imparted to them by their respective cations and anions. The bis(oxalato) borate (BOB) anion synthesized in this study is particularly interesting because of the presence of the element boron in the compound. Boron is a thermal neutron scavenger, meaning it can absorb neutrons that may have otherwise been available to cause further nuclear reactions. The BOB anion can therefore potentially make these liquids useful in the recovery and handling of nuclear fuels. In this study, the aforementioned BOB anion was

synthesized and combined with a series of cyclic pyrrolidinium cations, through metathesis reactions to produce novel ionic liquids. After cleaning and purification, these ionic liquids were characterized physically. The ionic liquids appeared viscous and were sometimes solid at room temperature probably due to the strong van der Waals forces between the large BOB anions, making the liquids possibly useful as solvents for high molecular weight organic substances. Future work will involve pulse radiolysis studies of these compounds to test their potential as solvents in nuclear chemistry.

#### **CHEM – 4 SYNTHESIS OF A C2-SYMMETRIC BIS-DIOXIRANE AND THE STUDY OF VICINAL PROXIMITY EFFECTS OF DIOXIRANE STABILITY**

**Nahed Sawwan**<sup>^</sup>, and Alexander Greer, Department of Chemistry Brooklyn College of CUNY, Brooklyn, NY 11210, and The Graduate Center of CUNY

We describe the design and synthesis of a novel bis-dioxirane (3,3'-dimethyl-[3,3']bidioxirane, 1) and 1-(3-methyl-dioxiran-3-yl)-ethanone (2) from a -15 • C biacetyl-oxone mixt. using a low temp. sepn. of the org.-sol. fraction. Evidence for unstable 1 and 2 was obtained with low temp. 1H, 13C, HMBC NMR spectroscopy and is consistent with the predicted GIAO-B3LYP/6-31+G(d) calcns. The reaction showed the generation of carbon dioxide, acetic anhydride, acetic acid, and trace carbonyl products and their hydrates. Computational and exptl. evidence suggest the participation of acyloxy and alkyl radicals in the decompn. reaction. One can use bis-dioxirane 1 to explore the boundaries of dioxirane stability in org. chem. This system provides a model for the discussion of proximity effects in dioxiranes and examines the nature of vicinal dioxirane chem. bonds.

#### **CHEM – 5 POLYSULFANE NATURAL PRODUCTS AS EVOLVED CHEMICAL WARFARE AGENTS**

**Edyta M. Brzostowska**<sup>^</sup>, and Alexander Greer, Department of Chemistry, Brooklyn College of CUNY, Brooklyn, NY 11210

Ascidians (tunicates) contain compounds with a large range of pharmacological activities. With the most common of chemical ingredients, elemental sulfur and dopamine, we hypothesize that an ascidian has developed a means to protect itself from predators using in essence chemical warfare. A novel aspect of this work is the idea that tunicates can filter elemental sulfur, transform solid insoluble S<sub>x</sub>, and transfer sulfur atoms chemically into a phenolic molecule for use as a protecting agent. Our work focused on a biomimetic HS<sub>x</sub>- reaction with *o*-quinone as a biosynthetic generator of antimicrobial (anticancer) *o*-benzopolysulfanes. Experiments using HPLC and SIM GC/MS revealed the presence of benzotrithiole, pentathia-benzocycloheptene, and heptathia-benzocyclononane compounds. The benzo-S<sub>3</sub>, -S<sub>5</sub>, and -S<sub>7</sub> products co-exist in equilibrium, where their relative concentrations are influenced by solvent. Detection of heptathia-benzocyclononane is an exciting new result that had been predicted by our

density functional theory (DFT) computation. This suggests that natural product *o*-benzopolysulfanes exist as a mixture of the S3-, S5-, and S7-homologs. Factors controlling the formation and interconversion of the S3-, S5-, and S7-polysulfanes and possible biological implications will be discussed.

### **CHEM – 6 ELECTROCHEMICAL CELLS**

**Qing Zheng\*, Jian Mei Xue\*, Jing Jing Xue\***, and Mr. Inoa, James Madison High School, Brooklyn, NY

The goal of this project is to save the oil by using the electrochemical cells to produce electricity. The cells use Magnesium Sulfate with Cupper Sulfate and Zinc Sulfate with Cupper Sulfate. The beakers, wires, and Mg strip, Cu strip and Zn strip are needed for the experiment. The project will demonstrate the energy in volts that each electrochemical cell produced. The reason that we started to do this project is because we wanted to do some contributions to our society since we are part of the society. If we can use this electrochemical cells reaction in the daily life, therefore, we can save lots of oil, which is non-renewable natural resource. And people would save money by paying the electric bills. In this case, Magnesium, Zinc and Cupper are much cheaper than oil. Through the experiment, it shows that the electrochemical cells could produce electricity, and Mg/Cu is produced even more. However, from some other aspects, that there would be no war between America with Iraq for the control of the oil, if we can use electrochemical cells to produce the electricity instead of using oil.

### **GEO – 1 SEDIMENTOLOGY AND FAUNAL CHARACTERSTICS OF RARITAN BAY BEACHES**

**Alicia Bruno#**, Leila Cohen, Mira Green, Lizzette Torres, Guillermo Rocha, and John Chamberlain, Department of Geology, Brooklyn College of CUNY, Brooklyn, NY 11210

Raritan Bay is a major estuary of the New York Bight. We sampled sediment and wrackline shell debris at beach localities on the south shore of the Bay as a means of quantifying sediment and animal distributions in littoral Bay environments. Samples were sieved using standard phi scale sieves, heavy minerals were extracted using sodium polytungstenate solutions, and grain composition was determined by microscopic analysis. Beach sediments become coarser and more poorly sorted from Sandy Hook westward toward the head of the Bay. Grains are rounded and spherical at Sandy Hook and become more discoidal toward the Bay head. Glauconite is the main dark component with magnetite, ilmenite, and garnet of lesser abundance. The wrackline assemblage at Sandy Hook is dominated by surf clams and blue mussels. Faunal assemblages in the Bay interior are dominated by slipper shells, ribbed mussels, and jackknife clams. Sites in the Raritan River upstream of tidal flux are dominated by the asiatic clam. We interpret these results to indicate that sediment abrasion and transport is more effective on ocean facing beaches in removing soft and more easily transported grains. Some sites show that grain size distribution depends also on man-made structures, which influence flow. Glauconite

## Physical Sciences

derives from Cretaceous sediments, especially the Navesink Formation, which outcrop along the shoreline of the Bay. Heavy mineral composition reflects glacial transport of granitic and gneissic rocks from northern New Jersey and New York. Species diversity decreases westward in Raritan Bay and appears to be related to sediment type.

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