Brooklyn College

Science Research Day

May 9, 2008

Abstract Book

18TH ANNUAL BROOKLYN COLLEGE SCIENCE DAY

PROGRAM

9:30 AM   POSTER SETUP

10:00—12:00   STUDENT PRESENTATIONS AND JUDGING

12:15 PM   LUNCH IN BEDFORD LOUNGE (SUBO)

12:30 PM   WELCOME AND REMARKS

                        PRESENTATION OF AWARDS
                        High School Division
                        Undergraduate Division
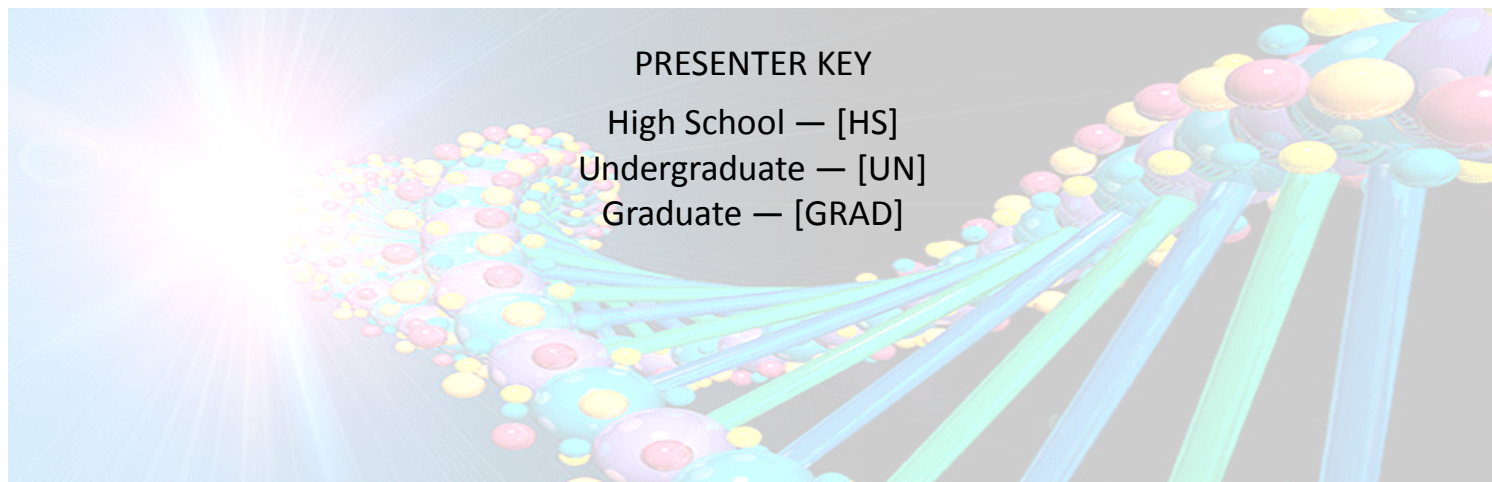   Graduate Division

ALL ARE INVITED TO LUNCH IN THE BEDFORD LOUNGE

PRESENTER KEY

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

PSY- 1 OUTCOME-SPECIFIC ENCODING IN FLAVOR PREFERENCE REVERSAL LEARNING DOES NOT DEPEND UPON BASOLATERAL AMYGDALA OR ORBITOFRONTAL CORTEX

Janina Scarlet[12] (GRAD), Vincent Campese[12], Matthew Fein[1] and Andrew Delamater[1], [1]Brooklyn College-CUNY, Brooklyn, NY 11210, [2]Graduate Center-CUNY, New York, NY

Long Evans Rats received either basolateral amygdala (BLA) or orbitofrontal cortex (OFC) lesions prior to training. During the acquisition phase, the rats initially received one flavor (e.g. almond) paired with sucrose and another (e.g. banana) with polycose before being trained on a reversal of these contingencies. One of the nutrients was then devalued by being paired with LiCl. In a choice between the two flavors, lesioned and control rats alike avoided the flavor most recently associated with the devalued nutrient. This result suggests that these brain structures are not critical in coding the detailed aspects of the nutrients or in reversal learning in this procedure. Further studies examine the importance of sequential and simultaneous presentations of stimuli as factors in determining conditioned flavor preference.

PSY – 2 DOES COLOR MODIFICATION IMPACT PERCEPTION OF PHOTOGRAPHIC IMAGES?

Miroslav Shubernetskiy (HS), James Madison High School, Brooklyn, NY

In today's world the impact of color is a highly debated and researched topic. Even though the human eye sees in color vision, the scientific community knows very little about its impact on our perception of preferred hues in different media and applications. This study is to investigate the impact of minor shifts in color on people's preferences of photographic images.
A group of subjects was tested by administering a survey which consisted of fifteen paired digital images which were modified to have a fixed deviation of 800 Kelvin (Color Temperature) between each pair. The experimental subjects viewed each pair of images on a computer screen for 7 seconds and stated their preference on a questionnaire.
The resulting data has significance in many real world applications including marketing, construction, persuasion in advertising, photography, politics, and others. The review of the existing literature suggests that controversies exist over color preference and significance. Investigators have documented that people from tropical climates perceive colors differently from those who reside in subtropical regions, possibly due to strong UV exposure. This study proved that people have statistically significant color (color temperature) preferences toward photographic images.

PSY – 3 THE THERAPUTIC EFFECTS OF EXPRESSIVE WRITING IN BONE MARROW TRANSPLANT PATIENTS

Antoinette A. Allen (HS), Brooklyn Technical High School, Brooklyn, NY

The use of Holistic treatments as a supplement to conventional treatments for disease is a growing trend in the United States, yet there is confusion as to which methods have tangible results. This study focused on the effects of expressive writing and the

reoccurring themes and elements in the writing samples of the bone marrow transplantation population. Participants were obtained from a larger joint study conducted by Mount Sinai.

School of Medicine and Hackensack University Hospital. In the larger study, patients completed an initial phone interview with a 15-page questionnaire, three evenly spaced writing samples with and a follow-up interview with a longer questionnaire. The scores were entered into SPSS (Statistical Package for the Social Sciences). The writing samples were transcribed and coded for four elements (Physical Experience, Family/Community, Threat vs. Challenge, and Emotional/Introspective thoughts). The outcome scores for Expressive Writing and Expressive Helping groups were pulled from the SPSS database and compared to US norms to identify problem cases and general trends. It was discovered that there was no clear correlation between writing sample elements and outcomes, but in comparison to US general norms, the participants outperformed the 50th percentile in Well-Being and Energy, despite being an affected population.

PSY – 4 POSTERIOR BRAIN SIZE REDUCTION IN A 5-YEAR FOLLOW-UP STUDY OF PATIETS WITH SCHIZOPHRENIA

Marina C. Lukac (HS), Serge A. Mitelman, Adam Brickman, Lina Shihabuddin, and Monte S. Buchsbaum, Mount Sinai School of Medicine, New York

Reduced brain size and smaller frontal lobe have been observed on brain images from patients with schizophrenia, the most severe of mental illnesses. Whether these findings are present at the onset of the illness or develop over its course remains an important question. In this study, MRI images were obtained twice, 5 years apart, in 43 patients with schizophrenia and 14 normal subjects. The width and length of the brain were measured on a horizontal slice located at the level of the anterior and posterior commissures (AC-PC). The results showed a statistically significant decrease in the area of the patient's brain over the 5-year period as compared to the decrease of the normal brain by t-test, indicating greater brain shrinkage in schizophrenia. The results also showed that the decrease in the length of the posterior parts of the brain, from the AC to the back of the brain was significantly greater in patients than in normal volunteers. Since the visual and auditory regions are located in the posterior parts of the brain, these results offer a novel explanation for the hallucinations and inability to recall long-term memory, which is common in schizophrenia. Conversely, the results do not indicate a significant decrease in the length of the frontal lobe in schizophrenic patients which has been found to be smaller at the onset of the illness. Taken together, these results indicate a progression of the illness affecting sensory and perceptual areas of the brain in schizophrenia.

PSY – 5 PAVLOVIAN TO INSTRUMENTAL TRANSFER OF CONTROL IN A HUMAN LEARNING TASK

Natasha Nadler[1] (GRAD) and Andrew Delamater[2], [1]Graduate Center-CUNY, New York, NY 10016, [2]Brooklyn College-CUNY, Brooklyn, NY

The Pavlovian-instrumental transfer (PIT) test often used in non-human animal research was studied with humans. Subjects learned to press two response buttons for different "reinforcing" outcomes (pictures of distinct objects), they were then asked to observe the predictive relationships between distinct stimuli and those objects. In the PIT test, subjects selectively increased their response that shared an object with the stimulus, suggesting that this procedure can be used to study selective PIT in humans.

PSY – 6 PERCEPTUAL GROUPING AND VISUAL COGNITION

__Csilla Antonovsky__ (UN) and Daniel D. Kurylo, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY.

To a large degree, visual processing occurs in a hierarchical series, whereby lower levels are subordinate to high-order function. Given this relationship, it was hypothesized that perceptual grouping ability, which occurs at an intermediate level of processing, would correlate with visual cognition, which is a high-order function. To test this, 46 subjects received tests of perceptual grouping and visual cognition. For the grouping test the stimuli first appeared as highly organized patterns, which decreased over trials. Participants indicated whether stimuli appeared to be organized as a vertical or horizontal pattern. Participants also received tests of visual cognition: facial recognition and social sequencing. The facial recognition test contained a sample of human faces presented on either black and white or two-tone, isoluminant colors. Participants matched a standard with one of four choices. The social sequencing test contained scenarios represented on six colored photographs, which participants arranged in chronological order within thirty second. Results showed that there were no significant correlations among the three tests. These results indicate that although perceptual grouping precedes high-order visual function in a hierarchical series, perceptual grouping ability does not predict performance on visual cognition tasks used here.

PSY – 7 PERCEPTUAL GROUPING AND HIGH-ORDER COGNITIVE CAPACITIES

__Gabriella Brick Larkin__[1,2] (GRAD), Csilla Antonovsky[1], Tahela Davidov[1], Daniel D. Kurylo[1,2], [1]Psychology Department, Brooklyn College CUNY, Brooklyn NY 11210 [2]Psychology Department, Cognition, Brain and Behavior Subprogram, The Graduate Center CUNY, Brooklyn, NY

Inspection time studies have suggested a relationship between sensory processing and psychometric intelligence, although the nature of the relationship is unclear. The aim of the present study was to determine whether perceptual grouping correlates with standardized tests of intelligence. Participants viewed briefly presented dot patterns, and indicated the manner in which dots were organized. Three perceptual components were measured: 1. Grouping Threshold, reflecting organization limits; 2. Inspection Time, reflecting processing speed; and 3. Processing Load, reflecting processing speed with increased load on grouping. In addition, a battery of standardized intelligence tests was collected (WASI, SAT, and DANVA). Results indicated a significant correlation between Grouping Threshold and WASI Performance. Inspection Time correlated with all WASI measurements, as well as SAT Verbal scores. Processing Load correlated only with WASI Matrix Reasoning. Factor analysis indicated that WASI and SAT measurements formed two principal components. SAT Verbal, SAT Quantitative, and WASI Vocabulary loaded on one component (Verbal-g), representing cognitive tasks most susceptible to education- and culture-related differences. SAT Quantitative also loaded on the second component (Analytic-g), along with the other WASI measurements. Analytic-g represents cognitive tasks typically categorized as innate intelligence. Results indicated a significant relationship between Inspection Time and both Verbal-g and Analytic-g, as well as with each of their components. Grouping Threshold was related only to Analytic-g and its components. Results indicate that perceptual grouping, which relies on integration across cortical sites, correlates with psychometric intelligence. Results suggests that the perceptual measurements taken in this study reflects both innate and acquired capabilities.

PSY – 8 INSTRUMENTATION FOR LUMINANCE REGULATION IN PERCEPTUAL MEASUREMENTS

St. Clair DeShong (GRAD) and Daniel D. Kurylo, Psychology Department, Brooklyn College-CUNY, Brooklyn, NY

Limits of visual abilities may be determined by progressive adjustment of stimulus levels in response to an observer's performance. For automated regulation of this procedure, strict control needs to be maintained over stimulus levels, as measured from the position of the eye. To accomplish this, instrumentation was developed for a computer-controlled luminance regulation system. An optical system established Maxwellian viewing, in which a collimated light source was reduced below the diameter of the pupil. An exact copy of the stimulus, partitioned by a 50% mirror, was detected by a photometer, which was interfaced to a computer via an RS232 serial port. The system was controlled by customized software that matched photometric readings to desired luminance levels by regulating analog voltage to the lamp. Digital levels, after mathematical adjustments to linearize luminance, were passed to a digital-to-analog converter. Computer analog output then controlled power to the lamp by means of a custom made programmable power supply, based upon a non-inverting voltage gain op-amp circuit. Using this system, perceptual detection thresholds were measured across levels of background luminance. This system provides highly accurate, automated control of psychophysical measurements for application in vision research.

PSY – 9 T1R3 KNOCKOUT MICE TASTE POLYCOSE BUT NOT SUCROSE

Steven Zukerman[1] (GRAD), Robert F. Margolskee[2], Anthony Sclafani[1], [1]Psychology, Brooklyn College of CUNY, Brooklyn, NY, [2]Neuroscience, Mount Sinai School of Medicine, New York

In addition to their well-known sweet taste for sugars, mice and some other mammals (but not humans) can taste starch and starch-derived glucose polymers (e.g., polycose). T1R3 is a recently discovered mammalian sweet taste receptor that mediates the mouse's preference for sugars and artificial sweeteners. We examined the role of the T1R3 receptor in the preference for polycose using T1R3 knockout (KO) mice that lack the sweet receptor. T1R3 KO mice and B6 control mice were given two-bottle preference tests (60 sec or 24 hr) with either sucrose solution vs. water or Polycose solution vs. water. In 60-sec tests, the T1R3 KO mice preferred polycose to water, although their overall preference was less than B6 mice (82% vs. 94%). In 24-hr tests, the T1R3 KO mice also preferred polycose to water, although their threshold preference was higher than that for B6 mice (2% vs. 1% concentration). In contrast, the KO mice failed to prefer sucrose to water in 60-sec tests. In 24-hr sucrose tests the B6 mice preferred 0.5 – 32% sugar to water while KO mice were indifferent to 0.5 – 8% sugar but preferred 16-32% sucrose, which may be due to post-oral effects. These results indicate that the T1R3 sweet receptor is not essential for polycose preferences but is required for sugar preferences in mice. Our findings support prior work in our laboratory indicating that polycose and sucrose have different taste qualities in rodents.

PSY – 10 OPIOID MEDIATION OF THE RAT'S PREFERENCE FOR SUGAR VERSUS STARCH.

Kristine B. Bonacchi (GRAD), Karen Ackroff, and Anthony Sclafani – Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY 11210

The brain opioid system is implicated in food palatability particularly related to sweet taste. Many studies report that opioid receptor blocking drugs (naltrexone) suppress the intake of sweet drinks. In this study we compared the effects of naltrexone on the rat's preference for sugar vs. starch drinks. Rats, unlike humans, have a separate "taste" for starch. In Experiment 1, hungry rats were adapted to drink 8% corn starch and 8% sucrose drinks (30 min/day). They were then given two-bottle choice tests following saline or naltrexone treatment (1, 3 mg/kg). Naltrexone decreased overall intake but increased the preference for sucrose. This was true in animals that equally preferred sugar and starch following saline as well as in animals that were sucrose preferrers. In Experiment 2, we investigated drug effects on the expression of a starch-conditioned flavor preference. Rats were trained to drink (30 min/day) different flavored (grape or cherry) starch and sucrose drinks on separate days. When given the choice of the two flavors each presented in a starch/sucrose mixture, the rats preferred the starch-paired flavor (68%). They lost this preference, however, when treated with naltrexone (57%). Results of both experiments are novel and indicate that starch preference is more dependent on opioid receptor activity than is sugar preference.

PSY – 11 T1R3 KNOCKOUT MICE TASTE SUGAR IN THE GUT BUT NOT IN THE MOUTH

Damien S. Glass[1] (GRAD), John I. Glendinning[2], Robert F. Margolskee[3], Anthony Sclafani[1], [1]Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY; [2]Biological Sciences, Barnard College, New York, New York; [3]Neuroscience, Mount Sinai School of Medicine, New York, New York

T1R2 and T1R3 taste receptors are needed for the perception of sweet taste. T1R3 knockout (KO) mice lacking the T1R3 receptor do not display a preference for sweeteners. When tested with sucrose at low concentrations T1R3 KO mice show no preference, but at high concentrations they develop a strong preference, which may be due to the post-oral nutritive effects of the sugar. Yet, these KO mice are missing T1R3 receptors in the gut that play a key role in the detection and absorption of intestinal sugar. The purpose of this study was to determine if deletion of T1R3 receptor impairs flavor conditioning with intragastric (IG) sucrose infusions. T1R3 KO mice and B6 control mice were fitted with chronic IG catheters and housed in infusion cages with ad lib food 24h/day. Over six training days they were given a flavored solution (e.g., grape) paired with IG infusions of water followed by another flavor (e.g., cherry) paired with IG infusions of 16% sucrose. Following training the mice were given a two bottle choice test between the flavored solutions paired with the matched infusions. Both KO and B6 mice displayed similar intakes of the sucrose-paired flavor (12.6 vs. 13.3 g/day) and they strongly preferred it to the water-paired flavor (92% vs. 90%). The results indicate that T1R3 receptors in the gut are not necessary for the post-oral rewarding effects of sucrose.

PSY – 12 HEROIN SENSITIZATION AND ITS EFFECTS ON APPETITIVELY MOTIVATED BEHAVIOR IN RATS

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

This study was performed to determine if repeated exposures to heroin sensitizes food-based appetitive responding in rats. Rats acquired a Pavlovian discrimination in which one 20 second stimulus was paired with food (CS1+) and another was presented alone (CS2-). Half of the rats then received 2mg/kg intraperitoneal (IP) injections of heroin while the other half received IP injections of saline (NaCl) repeatedly for 9 days. Responding to the two Pavlovian CSs was then assessed under extinction conditions. Rats given heroin registered more correct magazine responses per minute than the control rats; however this difference was not statistically significant.   Following this test, the Pavlovian discrimination acquired previously was reversed (CS1-, CS2+). The rats which received heroin acquired the reversal discrimination more rapidly than those which received NaCl. These results suggest that heroin sensitization increases appetitively motivated behavior for food. Whether this effect occurs because of enhanced food motivation per se or enhanced learning about food will require additional research.

PSY – 13 VIRTUALLY TESTING ANT STRATEGIES OF PHEROMONE TRACKING

Dylan Lombardo (UN) and Frank W. Grasso, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY

Eusocial insects, such as ants, have been used as inspiration for collective robotics. When returning from a food source, foraging ants lay pheromone trails, which other returning foraging ants follow and replenish. Longer pheromone trails have more time to evaporate and successively receive less replenishment. Eventually, the shortest trails will remain and the ants will only navigate these trails. Pheromone tracking requires simple behavior of each foraging ant. The task was to explore strategies of ant pheromone tracking behavior, with robots. We simulated ant pheromone trail following behavior in a Webots simulated environment. Virtual trails were detected by an ant-inspired algorithm and were used for guidance to and from the nest. The effect of pheromone deposition on trail following was tested. The hypothesis was that the number of completed trips to and from a food source will be maximized, with a specific rate of pheromone deposition. The rate of deposition was altered and the number of completed trips was recorded. The results support the hypothesis that simple behavior of robots can replicate ant pheromone tracking behavior, with a specific deposition rate.

PSY - 14 EFFECTS OF PREY SIZE ON PREY-CAPTURE BEHAVIOR IN CATFISH

Erin N. Bythrow, (UN) and Frank W. Grasso Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY

Wake tracking, the ability to follow disturbances behind an object moving through fluid, is a topic of considerable theoretical and practical interest. In general, larger objects produce larger wakes and disturbances. This experiment examines the effects of differing prey weights and lengths on wake-tracking behavior in catfish. We hypothesized that the time to first attack and time to capture would increase for prey that were small or large and that

these times would be lower for prey of medium size. We varied the size of preyfish presented to picivorous catfish under conditions of infra-red illumination which precluded the use of vision for prey-capture. We found a significant difference in the average time to first attack based on prey length ($F(2,8) = 5.298$, $p < .05$), and the average number of attacks based on both prey length and width ($F(2,8) = 18.07$, $p < .01$, $F(2,4) = 9.023$, $P < .05$). We also found a difference of marginal significance in the average time between attacks based on prey length, but the difference failed to reach statistical significance ($F(2,6) = 5.08$, $p = .051$). These results suggest that catfish are able to detect prey of larger sizes more readily than smaller sized prey. The most likely explanation for these results is that catfish are using wake-tracking to localize prey and the wakes of larger prey are easier to detect.

PSY – 15 TOWARD THE DEVELOPMENT OF AN ARTIFICIAL BIOSONAR SENSORY SYSTEM: THE ROLE OF THE TRAGUS IN THE SPATIAL SENSITIVITY OF A MODEL BAT EAR
Gregory E. Perrin IV (UN), Rolf Mueller, and Frank W. Grasso, Department of Psychology—BCR Lab, Brooklyn College, CUNY, Brooklyn, NY

Echolocating bats have been used as models for the design of biomimetic sonar sensors for robotic applications. These bats' biosonar systems rely heavily on the physical structure of their outer ears, known as pinnae. Smaller scale physical features such as sound-diffracting flaps and ridges are likely to play an important role in spatial perception, though their use in an artificial sensory system has not been studied. The largest and most prominent of these features is typically the tragus. Computer simulations of the effects of ear shape on sound reception demonstrate that the features like the tragus should yield Frequency-Swept Fanbeams (FSFs) in natural bat pinnae shapes. The common characteristic of FSFs is that they show focal directivity, where component beams are wider in one direction and the position of their maximum changes systematically with frequency. The objective of this study was to test the potential use of artificial tragus and pinna in the development of a biomimetic sonar sensor. FSFs were observed in a scaled physical model of the bat ear by measuring the amplitude of the acoustic transfer function with a microphone, rotating the model ear at 20 angles relative to a white-noise sound source. Transfer functions were estimated in the presence and absence of a model tragus. These results show that the tragus could play a part in vertical sound localization by creating, and manipulating the FSFs.

PSY – 16 VIDEO GAMES-THE EFFECT ON RATE OF SOLVING MATH PROBLEMS
Rozana Zarbailova (HS), Department of Biology, Franklin Delano Roosevelt High School, Brooklyn, NY

For the experiment, it was to test if video games affect the rate of speed that a person does their work. There were ten girls who were all fourteen years old. Each girl had thirty minutes to complete a set of ten math problems. Then each girl played the same video game for thirty minutes and they did the same math problems over again.
The problem for this experiment was: do playing video games effect the rate of doing math problems? The hypothesis was that video games do effect the rate of doing the math problems. The girls all came to the same place. Each person did the math problems and then played the video game. This experiment helped prove that the hypothesis was correct. The purpose of this experiment was to see if video games effect the rate of doing math problems. The control group of the experiment was the girls taking the math test without playing video games. The experimental group was the girls taking the math test after playing the video games. The dependent variable was the amount of time it took to finish the math test. There

was one professor who did a similar experiment like this. His name was Dr. Vincent P. Mathews. The only thing is that he did the experiment by having kids watch the video games, but in the experiment that had just been done, the kids were playing the video games.

PSY – 17 PLUME FINDING USING A LEVY TAXIS BASED ALGORITHM, A PARAMETER SEARCH OPTIMIZATION STUDY

Kamil Kloskowski (UN), Zohar Pasternak, and Frank W. Grasso, Dept. of Psychology, Brooklyn College-CUNY, Brooklyn, NY

Strategies for finding sources of chemicals in an environment characterized by free-flowing fluid and turbulence is an important and challenging field of study. This problem can be divided into two parts, finding traces of chemicals of interest (plume finding) and tracking those traces to their source (plume tracking). Of the two, plume finding is the more difficult because it must be conducted in the absence of information coming from the source, or the knowledge that there is a source to be found. Looking at the case of plume finding in a river we developed a computer simulation environment constructed with actual fluid flow and plume dispersal data. Using levy-taxis, a statistical search strategy that splits the motion of a simulated agent into motion length (μ) and direction (ρ) components, we were able study the effectiveness of different variants of this strategy in search for an optimum.   With a $\rho=1$ the agent goes straight against the flow, while the closer to 0, the more random the motion. With a μ approaching 1 the agent makes large steps while closer to 3, step length is short. We found that using flow information as a search cue in a levy-taxis strategy leads to more effective plume finding than more traditional systematic search strategies in the river environment.

PSY – 18 EXPLORATIONS OF THE TEMPORAL CONTROL OF BODY PATTERNS BY OCTOPUS

Elizabeth Fahey (UN), Shuk C. Tsoi and Frank W. Grasso The BCR lab, Department of Psychology, Brooklyn College-CUNY Brooklyn, NY

Cephalopods have the unique ability to change patterns of reflected color and contrast from their entire body surface through neural controls that operate on the millisecond time scale. They produce these changes through mass distributed parallel neural of activation muscles that regulate the reflective properties of at least different types of chromatophores located in the skin. The central control mechanisms of this system are not well understood though it is known that visual input is essential. We explored the timing of neural control by varying frequency of flashes of light to the optical the system of an octopus and recording the resultant changes in the reflected light intensities on its skin in video footage. We analyzed the changes in skin reflectance following light flash stimulation using digital image analysis software to determine the duration of response. Changes detected on the skin were synchronized with the transient visual stimuli. This finding confirms that the body pattern displays on the skin are at least partially dependent on visual input.

PSY – 19 A STUDY OF SIMPLE MAZE LEARNING IN GOLDFISH

Samera Kanwal (HS), Erin Bythrow and Frank W. Grasso Midwood High School and the BCR Lab, Department of Psychology, Brooklyn College-CUNY, Brooklyn

Fish are very ancient animals in evolutionary terms and analyzing their learning mechanism and how they adapt to their environment can teach us how other animals learn to live in their habitats. Since goldfish are good swimmers, eat food, and sense obstacles, it is hypothesized that they would be able to learn to navigate a maze in the dark. To analyze the

fishes, a Plexiglas maze was constructed with two small holes for animals to proceed from the start side to the goal side of a testing tank. The goal side of the tank contained goldfish food blocks. Trials were run for two minutes each and at the end of the trial if some fishes were on the goal side the trial was considered to be a success. Trials were repeated several times to divide the fishes according to their accomplishment and specifically select the smart fishes (the ones that navigated the maze) out. Results showed that seven fishes out of fifty-three successfully navigated the maze from the start to the goal side on the first trial. This showed that this maze task was one that the goldfish did not readily complete. We expect that this number will improve with repeated trials if the fish are given more opportunities to learn the task. Additional trials are underway in this ongoing experiment.

PSY – 20 PRELIMINARY STUDIES OF MAZE LEARNING IN THE OCTOPUS (*OCTOPUS BIMACULOIDES*)

Shuk C. Tsoi (GRAD), Elizabeth Fahey and Frank W. Grasso, The BCR lab, Department of Psychology, Brooklyn College-CUNY Brooklyn, NY

A long history of learning research in octopuses has demonstrated they are capable of advanced sensory-motor learning and memory processes comparable to those of higher vertebrates. Yet, the cephalopod nervous system that controls learning has a fundamentally different architecture from the vertebrate nervous systems. As the first part of multi-phase experiment, we hypothesized that octopuses can use tactile inputs to learn where to place a single arm in the simple discrimination of Y- maze. In the first phase of this study we sought to determine whether or not these animals could use their arms to remove unseen food items from the maze. The pattern of food removal from the arms of the maze indicated the animals might learn this task but performance did not reach our success criteria. We conclude that shorter time interval between trials might produce a better learning curve for this task in the octopus. Studies to examine the effect of shortened inter-trial interval are now in progress.

PSY – 21 ROBOT IMPLEMENTATION OF THE LEVY-TAXIS ALGORITHM FOR PLUME-FINDING

Stephen Volz (UN), Kamil Kloslowski and Frank W. Grasso, The BCR lab, Department of Psychology, Brooklyn College-CUNY, Brooklyn

Strategies for finding sources of chemicals in an environment characterized by free-flowing fluid and turbulence are an important and challenging field of study. The Levitaxis search algorithm was developed to guide a robotic agent's search for a chemical plume. It generates search vectors based on two variables. The first, ρ, determines the angle in which the agent will move, and the second, μ, determines the distance the agent will travel in that direction,. The plume finding aspect of the Levitaxis algorithm was compared to the simpler and more exhaustive Zigzag search algorithm, in which the agent "zigzags" across the environment at a predetermined, upstream angle (β). Testing was conducted in an arena simulating a scaled model river environment in air rather than underwater. The search algorithms were implemented in a Khepera II robot through custom Matlab programming. The Khepera II's kinematics were restricted to match those of a real autonomous underwater vehicle (AUV) for which the algorithms were designed. Performance was measured by a performance index that combined spatial efficiency and success in detecting the plume. The Levitaxis search algorithm out preformed the zigzag algorithm, which the agent had difficulty executing due to its limited sensor range. These findings suggest that truly exhaustive search algorithms are infeasible for an aquatic search agent, due to the extreme turns required when encountering

a riverbank. Overall, the results agree with simulation studies that suggest that Levytaxis is an efficient search strategy for chemical search in dynamic fluid environments.

PSY - 22 EFFECT OF MELANIN DEFICIENCY ON PHOTOTAXIS OF *AMBYSTOMA MEXICANUM*

Angelo E. Ngai (HS) and Frank W. Grasso BCR Lab, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY

A behavioral study was conducted on observing the phototaxis of *Ambystoma mexicanum* with differing amounts of melanin in individual axolotls. While numerous studies have gone into researching melanin's protective qualities against UV rays, research with regards to its role in influencing animal behavior is more limited. The goal of the study was to determine if axolotls with deficiencies in melanin would display a statistically significant difference in phototaxis and if so, to what degree. It was hypothesized that animals with decreasing melanin levels would become increasingly photophobic due to their loss of protection from light and increased sensitivity to lower wavelengths. Dark and light skinned animals were placed in a half dark, half light arena and observed for light preference. In contrast results showed a trend where animals with the darkest skin (and therefore the most melanin) displayed the highest negative phototaxis while lighter skinned animals were relatively neutral. A possible explanation would be that rather than increase the animal's sensitivity to light the melanin deficiency actually altered the development in the axolotls causing them to lose their light perception in either their eyes or skin.

PSY – 23 DOES ACTIVITY RATE AFFECT MEMORY SPAN?

James Repetti (HS), Franklin Delano Roosevelt High School, Brooklyn, NY

The purpose of this project is to determine if a person's activity rate affects their memory span, a test of short term memory, which tests how many numbers, or letters a person can hold onto and recall. The average memory span is usually seven, plus or minus two. My hypothesis is that if a person is active, then, they will have a higher memory span. In this experiment, the first step was to ask each participant a few simple questions to determine whether they were active or non-active. Then, the experiment and what they had to do was explained. Next, a number sequence was read and they had to write down what they remembered. This was repeated multiple times with new number sequences, each adding one more number. Finally, the papers that each participant wrote what they remembered on were checked for results. After conducting this experiment and putting together the results, I have formed the conclusion that my hypothesis was correct. The results showed that the people in the active group had a higher memory span compared to the people in the non-active group. All seven people in the active group had memory spans from 5-9, averaging to 7, while the seven people in the non-active group had memory spans from 3-5, averaging to 4. The importance of this project is to show that a person's activity rate does affect their memory span and in order to keep your mind working at its best, you have to use it.

PSY – 24 DOES MUSIC AFFECT THE WAY A MOUSE THINKS?

Kiara Castillo (HS), Franklin Delano Roosevelt High School, Brooklyn, NY

The goal of this experiment is to determine whether music actually affects the way a mouse thinks or concentrates when going through a complicated puzzle, such as a maze! In the attempt to try and determine whether or not music has an effect on mice- in use were many materials, such as a large cardboard box, glue, tape, white lab mice, stopwatch, music, and

etc. The purpose of using all of these different materials was to 'build the maze and 2record the time in which each mouse reaches the finish line with or without the music. Once all of the testing is done, we have to compare the information in data table or line graph and see the difference (in time) of which each mouse had completed the maze. Separated into two groups (Groups A and B) Group A, is the group of mice that would have to run through the maze while music is playing and Group B, is the group of mice that would have to run through the maze without any music. In this experiment, it is hoped that the given results will give us the answer to the question, "Does music affect the way a mouse thinks?" In other words, meaning that hopefully from this experiment the mice in Group A will reach the finish line in a shorter time period than the mice in Group B. Therefore, once the results are in, we will be able to determine whether music affects the way a mouse thinks.

PSY – 25 VALIDATION OF Q-TRACKS MEASUREMENT SCALE: A MEASURE OF TRANSACTIVE MEMORY SYSTEMS IN ORGANIZATIONS

Rommel Robertson, **Carmen Carrion** (UN) and Elisabeth Brauner, Dr. rer. nat., Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY

The aim of the present study is to create normative values for a newly developed transactive memory systems scale (Q-TRACKS). The Q-TRACKS scale measures how individuals in organizations manage information and how this affects collaboration and task completion among employees. There were 273 participants comprised of a combination of Brooklyn College students and members of other employment organizations. Participants completed Q-TRACKS and the preexisting Lewis transactive memory system scale to find correlations that will validate the means. Discriminant and convergent validity were assessed by comparing the correlations of both scales.
Our findings reveal significant correlations between Q-TRACKS and Lewis subscales. Correspondingly, the data for internal consistency also presents significant findings.

PSY – 26 COMPUTER PROGRAMMING FOR GENERATING VISUAL STIMULI

Farhan Bukhari (UN) and Daniel D. Kurylo, Department of Psychology, Brooklyn College-CUNY, Brooklyn, NY

Critical to vision research is the generation of visual displays with precise control over stimulus metrics. Generating stimuli often requires adapting commercial software, which greatly restricts the scope of research. Investigations were made here of selected programming approaches to determine their viability in stimulus control. Approaches were guided by available display hardware, operating systems, programming languages, and graphics packages most appropriate for vision research. The framework of a generic computer program was developed that can be adapted for use with a broad range of experimental applications. Stimuli are generated in the context of trial events, allowing the display of text messages, monitoring subject responses and reaction times, and inclusion of contingency algorithms. At each stage of software development, empirical testing was performed to verify temporal, spatial, and luminance specificity of stimuli. This approach allows direct control and management of computer-generated visual stimuli while utilizing the full capabilities of modern hardware and software systems.

SCAS – 1 DO WORKING MEMORY AND EXECUTIVE FUNCTION PREDICT LANGUAGE COMPREHENSION IN TYPICALLY DEVELOPING CHILDREN AGES 10-11?

Elena Kroupnik (GRAD) and Klara Marton, PhD, Department of Speech and Language Pathology and Audiology, Brooklyn College-CUNY, Brooklyn, NY

The aim of the present study was to examine whether working memory (WM) and executive functions (EF) predict language comprehension in typically developing children (TLD). In order for children to understand spoken language, they have to be able to store the verbal input and simultaneously process the previously received information (Baddley, 2004). This process requires various executive function skills, such as attention switching (Towse, Hitch, & Hutton, 1998), inhibition of unnecessary information (Hasher & Zacks, 1988), and focusing on task-relevant thoughts (Engle & Kane, 2004).

Twelve children participated in the study (age range = 10;0 [years; months] to 11; 7). The experiments targeted both verbal and nonverbal domains. Three verbal tasks (2 verbal fluency and 1 phonological working memory task) and 4 nonverbal executive function and working memory tasks (delayed matching to sample, spatial span, rapid visual information processing and stop-signal test) were used to study the relationship between these cognitive functions and language comprehension (text comprehension, sentence comprehension, speeded sentences, and noisy sentences). The data were entered into a multiple regression analysis. The results indicate a strong association between children's ability to comprehend spoken language and their executive function and working memory skills.

WM and EF are important components in children's abilities to be successful at school. WM is required to understand spoken language; reading comprehension; syntactic processing; vocabulary acquisition (Marton and Schawartz, 2003); and writing. EF is the ability to keep your mind on what you are doing in order to accomplish a given task (Geffner Convention, 2007).

SCAS – 2 DEVELOPMENT OF A TEACHING TOOL FOR SPEECH-LANGUAGE PATHOLOGY STUDENTS: LEARNING LARYNGEAL ANATOMY

Lyudmila Khodzhayeva (UN), Elena Selioukova, B.A., Ciara Leydon, Ph.D., CCC-SLP, Renee Fabus, Ph.D., CCC-SLP, TSHH, Department of Speech Communication Arts and Sciences, Brooklyn College-CUNY, Brooklyn, NY

The primary biological function of the larynx is to protect the airway against foreign bodies during breathing and swallowing. As an overlay, the larynx has the capacity to produce sounds. Structural and functional laryngeal impairments compromise safe intake of food and liquid and efficient expression of wants and needs. Graduate speech-language pathology students must demonstrate knowledge of the anatomy and physiology of the larynx to provide intervention for clients presenting with swallowing and voice disorders. However, students demonstrate difficulty both with long-term recall of anatomical structures and identification of these structures in three-dimensional tasks. We developed a protocol for the identification of laryngeal structures including extrinsic and intrinsic muscles and cartilages using a sheep model. This protocol will serve as a teaching tool for use in graduate classes to facilitate retention of *knowledge of* laryngeal anatomy and application of this knowledge base to the implementation of treatment strategies for voice and swallowing disorders. Future studies will evaluate the efficacy of using this dissection protocol to promote retention of knowledge and its application to clinical interventions.

SCAS – 3 DEVELOPMENT OF A TEACHING TOOL FOR SPEECH-LANGUAGE PATHOLOGY STUDENTS: LEARNING NEURAL ANATOMY

        Elena Selioukova (GRAD) B.A., Lyudmila Khodzhayeva, Ciara Leydon, Ph.D., CCC-SLP, Renee Fabus, Ph.D., CCC-SLP, TSHH, Department of Speech Communication Arts and Sciences, Brooklyn College-CUNY, Brooklyn, NY

The didactic teaching of anatomy alone does not aid the student in learning the material. The self-report of retention of neural anatomy and physiology matter of material is poor. An evaluation of the efficacy of hands on dissection in improving understanding and retention of the complex anatomy and physiology of the brain is lacking. In this study, we sought to develop a teaching tool for future use in undergraduate and graduate hands on learning of cranial structures and functions. Using commercially available ovine brains, we developed and implicated a protocol for revealing systemic identification of key structures. Here we present a tool for teaching speech-language pathology students neural structures underlying speech, language, swallowing, and hearing deficits. We further identified differences in structure of human versus sheep brains. Future studies will evaluate the efficacy of using this dissection protocol and teaching tool in understanding and recalling anatomical and physiological structures underlying speech, language, swallowing, and hearing deficits.

BIO - 1 ISOLATION AND ANALYSIS OF *CHLAMYDOMONAS REINHARDTII* FUSION MUTANTS

Charlene L. Forest and **Guoxiang Fan** (GRAD), Department of Biology, Brooklyn College, CUNY

The purpose of this research is to look for the regions of the protein that are required for the *Chlamydomonas reinhardtii* gamete membrane fusion. UV irradiation was used to induce point mutants in Chlamydomonas. I have isolated two fusion-defective mutants (GF9 and GF10) from the Sr-u-2-33(mt-) strain using the streptomycin selection procedure and these two mutants were referred to as GF9 and GF10. GF9 is a fusion-defective mt- mutant: it is able to adhere to wild type mating type+ (wt mt+) cells during mating but cannot fuse at any temperature. At 25°C, the number of cells adhering peaks at 20 minutes (34.7% pairs). At 33°C peaks at 60 minutes (41.7% pairs). GF10 is a slightly leaky fusion-defective mating type (-) (mt-) mutant. When mated with wild type mating type+ (wt mt+) cells, they can agglutinate very well. They also can form a few zygotes at both 25°C and 33°C. They fused better at 33°C than at 25°C. These UV-induced mutants will be used to analyze the domains of the protein that are crucial for its function. Since GF10 is leaky, we can study its genetics at the permissive temperature. However, these experiments are still in progress.

BIO – 2 SUBSTRATE EFFECT ON LEARNING ABILITY AND AGGRESION PATTERNS IN FRESHWATER CRAYFISH

Hans Michell (UN) and Jennifer Basil, PhD, Department of Biology, Brooklyn College, CUNY

In its natural habitat, *P. clarkii* is typically found treading on rough/rocky substrates. Several past experiments have been conducted to test for the effects of various substrates on the different parameters of *P. clarkii*, ranging from their life cycle, to memory patterns, to olfactory capabilities, to range of motion, etc. For the purposes of this experiment, attention was placed on learning ability, aggression, and social patterns of *P. clarkii* as a function of substrate. We grew *n* number of *P. clarkii* on a somewhat more natural substrate, consisting of gravel, and *n* number of *P. clarkii* on a completely smooth substrate. We hypothesized that in the absence of the natural substrate (gravel), aggression levels would increase, as *P. clarkii* [who at times use the pieces of gravel as "play toys"] grown on the smooth substrate have nothing within their environment through which to channel their attention and excess energy. Prior experiments have also shown that *P. clarkii* having been reared on a rocky substrate display more complex memory patterns than those reared on a smooth substrate. As such, we hypothesized that *P. clarkii* from our lab grown on the rocky surface would learn certain habits and behaviors that, over time, would be lost if transferred to a smooth substrate. We then went a step further and hypothesized that those same behaviors would reemerge if the same *P. clarkii* were transferred back to the rocky substrate, but over a much lesser time interval than what it would take for those raised on a smooth substrate to learn the same behaviors.

BIO-3 A STUDY OF GENES RESPONSIBLE IN GAMETOGENESIS OF CHLAMYDOMONAS *REINHARDTII*

Sandra Ospina (UN), and Charlene Forest, PhD, Department of Biology, Brooklyn College, CUNY

Chlamydomonas *reinhardtii* is a primitive model of choice for studying gamete fusion. In this study we are searching to discover which genes are responsible for gamete fusion. This in turn will perhaps lead to understanding the mechanism of gamete fusion in more evolved

organisms. Insertional mutants were created using digested plasmid pSP124S, which was cut using the restriction enzyme BAMH1. The transformation was carried out via Kindle's glass-bead method. After screening was performed, it was concluded that the mutants created were not mating deficient mutants, and therefore were of no interest for this study. A second insertional mutagenesis has been attempted this time using a different plasmid (pHyg3MA), which has been isolated recently and which has been proven to give a higher yield of transformants than pSP124S. The resulting transformed colonies are being screened to see if any mating deficient mutant has been created. The pHyg3MA plasmid was digested with restriction enzyme Not1. Once the mutant has been obtained, various methods of genetic analysis will be performed and the second phase of the study will commence.

BIO-4 ANALYZING MOSQUITO MIDGUT METAMORPHOSIS USING RNAI

Maria Mercedes (UN) and James Nishiura, PhD, Department of Biology, Brooklyn College, CUNY

Mosquito are vectors of microbes and viruses that cause many diseases such malaria, dengue and yellow fever. They are holometabolous insect that undergo a complete metamorphosis. Mosquito metamorphosis starts during the 4th instar. During mosquito metamorphosis a remodeling of the mosquito midgut occurs in which diploid cells replicate to form the adult epithelium and programmed cell death of larval polytene cells occurs. In this experiment, we are testing this hypothesis by knocking down HR3 expression by the injection of HR3 directed RNAi. Fourth instars were injected 24 hours after the molt with HR3 dsRNA. Morphological analysis showed that injected larvae had defects in cuticle formation and midgut metamorphosis. Some injected larvae developed into pupae that had midguts having many polytene cells indicating that the polytene cells did not go apoptosis. These results suggest that injection of dsRNA to HR3 seem to have some effect in the remodeling of the midgut. Our future plan is to optimize conditions of injection, do Real-time PCR measurements of RNA concentrations, in situ hybridization studies, and Bromodeoxyribose (BrdU) incorporation to analyze which cells are present. We also plan to do RNAi for knock-down of other transcription factor genes. We hypothesized, if the knock-down of the transcription factor HR3 inhibits the expression of ftz-ft the larval will nerve reach the adult stage. We hope that our investigation becomes useful to improve mosquito insecticide and decrease the number of human dying of malaria, yellow fever, and dengue.

BIO – 5 THE EFFECT OF SALVIA DIVINORUM ON THE HEART RATES AND RESPIRATION OF DAPHNIA MAGNA

Morris Ishay, Alberta Waingort, Albert Azar and Melanie Srour (HS) Magen David Celia Esses High School, Brooklyn, NY

Salvia Divinorum is an herb that has been used in traditional Mazatec Mexican rituals and customs for many years. It is a member of the Lamiaceae family and is of the genus and species Salvia Divinorum. It is widely known by the name Diviner's Sage or Sally D. Salvia Divinorum is distributed as the dried leaves and is either smoked or prepared as a tea and ingested in that way. Salvia Divinorum has been identified as having psychoactive effects and its active ingredient affects the human brain in the kappa opioid receptor. The immediate effects include uncontrollable laughter, reliving past memories or places, visions of membranes, films or other surfaces, sensations of motion and forces pulling on various body parts, merging with objects and the perception of being in many places at once. Salvia Divinorum is now being used as a legal alternative to dangerous illegal drugs such as LSD or heroin. Because of it's unique actions on the brain it is not classified as a narcotic and is legal in most states, including New York.

Solutions will be prepared from Salvia Divinorum which is dissolved in pure distilled water at various concentrations with Daphnia Magna used as a bioassey. We will determine a proper conncentration of Salvia that will not be fatal to the Daphnia. There will also be a control group of Daphnia which will be closely monitored without being exposed to Salvia. Immediately following the introduction of the Salvia solution to the Daphnia we will record their heart and breathing rates using digital cameras and compare them to the heart and breathing rates of the untreated Daphnia. Preliminary experiments suggest that even strong concentrations of Salvia solution do not have a major effect on the heart rate.

BIO – 6 WHAT IS THE EFFECT OF SYLENIUM ENRICHMENT ON THE RATE OF GLUCOUSE METABOLISM IN YEAST CULTURES?

Infra Walayat (HS), Department of Biology, Abraham Lincoln High School Brooklyn, NY

Selenium is widely used anti-oxidant to prevent cancer it is also thought to improve glucose metabolism however, recent study found that people who consumed two hundred micro grams of selenium daily are at a higher risk of developing type 2 diabetes. This research project was developed to test whether selenium supplements shows glucose metabolism in yeast cells. Yeast 1 gram, glucose 5 grams, and water pour into two calibrated fermentation tubes. One of the tubes also contains 50 grams of selenium. The productions of CO_2 in the tubes were timed over 90 min. periods. In all trials the addition of selenium sped up the time it took for the CO_2 to reach 5 millimeter in the experimental fermentation tube.

Since the production of CO_2 and the yeast glucose solution is a product of glucose metabolism, the increase rate of CO_2 production indicates the speedier break down of glucose.

BIO – 7 FUNCTIONAL ANNOTATION OF THE MyTH4 DOMAIN USING BIOINFORMATICS TOOLS

May Lai* (GRAD), Shuk C. Tsoi *, Yuliana Leon, and Shaneen Singh. Department of Biology, Brooklyn College, CUNY, Brooklyn, NY

Myosins constitute a large super family of proteins with diverse properties adapted for a variety of important cellular activities. The relevance of myosins for mammalian physiology and pathology is underscored by the finding that many pathological conditions and genetic diseases are associated with mutations in myosins. Some important questions that remain unanswered in the field of myosin pertain to the role of the domains present in a particular region of the proteins called the tail. This present work investigates one such myosin tail domain called the MyTH4 domain, a domain whose structure and function is essentially unknown but has been implicated in pathological conditions associated with mutations in myosins and is also found in another class of motor proteins called Kinesins. Using a computational approach that integrates various bioinformatics and computational tools, for the first time, we propose a structural fold for the MyTH4 domain called the "alpha alpha superhelix" which is often found in proteins that are involved in protein-protein interactions. MyTH4 domains modeled on this fold allow us to predict biological function for this domain and provide a starting point for understanding why mutations in these domains in myosin and other proteins result in pathogenic conditions.

* Both authors contributed equally to the work.

BIO – 8 THE CORRELATION BETWEEN EPSTEIN-BARR VIRUS AND NASOPHARYNGEAL CANCER IN TAIWANESE MEN AGES 40-60

Lorene Leung (HS), Brooklyn Technical High School, Brooklyn, NY

Nasopharyngeal Cancer (NPC) is a tumor arising from the epithelial cells that cover the surface and line the nasopharynx. Epstein-Barr Virus (EBV) is a herpes virus, which initiates an early active infection. The purpose of the analytical study was to examine the hypothesis that with the detection of immunoglobulin A (IgA) antibodies associated with EBV, the antibodies against the antigens of the virus will act as serologic markers and show that EBV can infect the epithelial cells in the nasopharynx. Four different age groups were studied ranging from 40-60 for 1200 Taiwanese males. Three variables, IgA antibodies against EBV-capsid antigen, anti-DNase antibodies, and neutralizing antibodies, were measured and tested for seropositivity. The results of males who tested negative were compared with those who tested positive in IgA antibodies against the EBV antigens. The males who tested positive for NPC had the most percentage of IgA and anti-DNase antibodies detected, where as those who tested negative had the least. A ten year follow-up period was analyzed. The males continually had a higher rate of being seropositive than being seronegative. Secondary data was compared in Statistical Analysis. By using t-test and Pearson's product correlation test, these showed that the data was significant and that the hypothesis was correct. There was indeed a strong correlation between EBV and NPC. This study provided insight on future treatment of NPC. The correlation showed that the IgA antibodies could act as early detectors for diagnoses of NPC patients.

BIO – 9 GENOME-WIDE CHARACTERIZATION OF TWO PHOSPHOINOSITIDE BINDING DOMAINS OF THE ARABIDOPSIS THALIANA USING HIGH-THROUGHPUT AND MANUAL COMPUTATIONAL ANALYSES

Ewa Wywial (GRAD), Department of Biology, Brooklyn College, CUNY, Brooklyn, NY

Phosphoinositide binding domains have emerged as molecules responsible for trafficking and anchoring of membrane oriented proteins from yeast to mammalian cells. Two such domains, i.e. the Pleckstrin homology (PH) and FYVE domains, are of special interest because of their unique characteristics and genome wide prevalence. Structurally, the PH domains share a fold of seven β-strands and one C-terminal α-helix whereas the FYVE domains comprise two small double-stranded β-sheets, one C-terminal α-helix and eight Zn2+ ion-binding cysteines. Regardless of their structural similarity, the PH and FYVE domains constitute functionally diverse families as yet largely uncharacterized for plant proteins. Here we carried out extensive searches of Arabidopsis databases of protein sequences using an automated pipeline and manual inspection to verify previously known and identify unknown instances of PH and FYVE domain-containing proteins. Then, we integrated experimental and predictive data on sequence and structure to propose a genome-wide domain-based classification of both Arabidopsis PH and FYVE proteins separately. Consequently, we have re-defined forty nine Arabidopsis PH and fifteen Arabidopsis FYVE proteins into fourteen and five classes, respectively. Our results show the exclusive presence of plant specific variant PH and FYVE domain-containing proteins, such as the PRAF proteins. When possible, phospholipid-binding partners and in vivo functions have been proposed for members of each of the classes based on their molecular models and their biophysical properties.

BIO – 10 THE EFFECT OF SALVIA DIVINORUM ON THE LIGHT RESPONSE OF DAPHNIA

Charles Sutton and **Ezra Pichotto**, Magen David Yeshiva Celia Esses High School, Brooklyn, NY

Salvia Divinorum is an herb that has been used in traditional Mexican customs. Salvia Divinorum is a part of the mint family. It is a hallucinogenic plant native to the northeastern Sierra Mazateca region in Mexico. The Mazateca Indians have used it for centuries for healing and divine rituals. The psychoactive component of Salvia Divinorum is Salvinorin A.

The first recorded mention of Salvia Divinorum was made by Jean B. Johnson in 1938. R. Gordon Wasson and Albert Hoffman acquired the first specimen of Salvia Divinorum from the Mazatecs in 1962. In 2002, researchers discovered that Salvia Divinorum acts on the Kappa Opiate Receptor (KOR).The Kappa Opiate Receptor is where much of human perception is regulated. In humans, a psychoactive effect can only be produced when enough of Salvinorin A is absorbed through the oral mucosa and taken into the blood stream.

Research was conducted on the effect of Salvia Divinorum on the behavior of Daphnia Magna. Solutions were prepared and the test organisms were introduced, along with a closely monitored control group. Phototaxic response was tested with a spotlight placed outside a glass beaker containing Daphnia. We will document their response time with a stopwatch and record it with a digital camera. Preliminary research suggests that Salvia solutions were not toxic to the Daphnia.

BIO – 11 THE EFFECTS OF *ARTEMISIA VULGARIS* ON THE APICOMPLEXAN, C*RYPTOSPORIDIUM PARVUM*

(**Emily) Zong Yuan Gan** (HS), Brooklyn Technical High School, Brooklyn, NY

Artemisinin is a drug commonly used to treat multi-drug resistant strains of malaria caused by *Plasmodium sp.* in the phylum Apicomplexa. Artemisinin is a molecule extracted from the herb *Artemisia annua*, which is used in traditional Chinese medicine. *Artemisia vulgaris* is the American relative of *Artemisia annua. Cryptosporidium parvum*, also in the phylum Apicomplexa, is the protozoan pathogen that causes diarrhea-like illness and severe dehydration, called cryptosporidiosis. The purpose of this project was to determine if *Artemisia vulgaris* is an effective growth inhibitor of *C. parvum* and if so, to identify the molecule which could be used to treat cryptosporidiosis. Pure Artemisinin was added to HCT-8 cells with *C. parvum* and purified samples of Crude *A. vulgaris* were also added to HCT-8 cells with *C. parvum.* Immunofluorescent detection of MeriFluor and DAPI were utilized to count the number of oocysts/mL. The data was then represented in log and Crude Fraction 5 depicted statistically reduced oocysts compared to the control. Further HPLC, GC/MS, and ESI/MS scans were performed on Crude Fraction 5. These results presented that Crude Fraction 5 is likely to be lycopene, which indicates that we have isolated and characterized a novel agent, with hopes of treating cryptosporidiosis.

BIO – 12 A GENOME WIDE SNP ANALYSIS OF COPD PATIENTS

Juan Pablo Zhen Lio (HS), Brooklyn Technical High School, Brooklyn, NY

Chronic Obstructive Pulmonary Disease (COPD) is the fourth leading cause of death in the United States. COPD is a term that refers to chronic bronchitis and emphysema. The purpose of this study is to determine any SNP genotypes that are prevalent in COPD patients. In this study, 385 individuals were screened for COPD. Their genetic data was obtained and analyzed using PLINK, software used for association analyses. The Cochran-Mantel-Haenszel (CMH) was used to perform a case/control association test by taking into

account the subjects' ethnicity, Black or White. The top 20 most significant Single Nucleotide Polymorphisms (SNPs) were chosen. The subjects were divided into four groups based on ethnicity and COPD affection status. There were 53 unaffected blacks, 33 unaffected whites, 56 affected blacks, and 128 affected whites. The expected genotype frequency of each SNP was calculated by multiplying the sample size with the genotype frequency given by the HapMap Project HapMap Genome Browser. For genotypes with a frequency of 0, the Hardy Weinberg Equilibrium was applied, using the given allele frequencies. The observed genotype frequency was obtained from the genotypes of each individual. A chi square test was performed, comparing the expected normal genotype frequency with the observed COPD genotype frequency. The result of the test showed that it was not statistically significant. The limitations to this study include a small sample size, a limited number of SNPs analyzed, the broad definitions white or black ethnicities, and alleles and genotypes whose frequencies were both zero.

BIO – 13 SIGNALING INTERMEDIATE Dunc-115 REGULATES AXON PROJECTION

Mame Fall (UN) and Qi He, Department of Biology, Brooklyn College-CUNY, Brooklyn, NY

This project is to investigate the role of *Drosophila* gene Dunc-115 during axonal pathfinding. We have identified in our previous studies Dunc-115 as an important regulator in the process of building up the central nervous system. To further explore how guidance signals are relayed from surface receptors to the cytoskeleton, we have applied genetic interaction analyses to establish the signaling pathways where Dunc-115 operates. Our results show that Dunc-115 receives and relays signals from the Rho GTPase family members to actin filaments. This provides an important mechanism for organizing axon projection during central nervous system development.

BIO – 14 POTENTIAL ROLE FOR A PNC-27/-28 PEPTIDE-SPECIFIC BINDING SITE IN TUMOR CELL PLASMA MEMBRANES TO DIRECT PEPTIDE-DEPENDENT CYTOTOXICITY

Vernon Wu (HS) and Josef Michl, Department of Pathology, SUNY Downstate Medical Center, Brooklyn, NY

The p53 - mouse *double-minute-mutant* (mdm2) protein complex has recently become the target of promising cancer treatments. The interaction of p53 with mdm2 plays a central role in the regulation of cell division. In this laboratory, two peptides have been designed from the mdm2 binding domain of p53 and contain a penetratin sequence from the *antennapedia* protein. The peptides, PNC-27 and PNC-28, have been shown to be cytotoxic to cancer cells *in vitro* and *in vivo* without affecting normal cells or hematopoiesis. The purpose of this investigation was to determine whether there is a target molecule to explain this selective cytotoxicity. Specifically, we wanted to know if mdm2 is the peptide binding site on the tumor plasma membranes.

Tumor and normal cells were treated with PNC-27 for 24h. Lactate dehydrogenase (LDH) measurements taken from the supernatant for each cell line reveal that PNC-27 is selectively cytotoxic to all the tumor cells but had no impact on the growth of the normal cells. Live staining was performed on cells treated with PNC-27 for p53 and mdm2. Only the tumor cells show co-localization of the antibodies on their plasma membranes. Next, immunoblots probing for mdm2/hdm2/rdm2 and p53 were performed on the plasma membranes of these cell lines. Only the tumor cell lines expressed mdm2/hdm2/rdm2 in their plasma membrane preparations and p53 was not present in any membrane. Taken together, these results

strongly suggest that mdm/hdm2/rdm2 on the plasma membrane is a possible binding site to direct PNC-27/28 cytotoxicity for tumor cells.

BIO – 15 MOLECULAR MODELING STUDIES OF GRAM DOMAINS IN THE MODEL PLANT, *ARABIDOPSIS THALIANA*.

Jeffney Tanis (UN) and, Shaneen M. Singh, PhD, Department of Biology, Brooklyn College-CUNY, Brooklyn, New York

The GRAM (Glycosyltransferase, Rab-like GTPase activator, and Myotubularin) domain is found in glucosyltransferases, myotubularins, and other important membrane-associated proteins. The GRAM domain is found in various organisms across different phyla signifying a conserved biological function. It is not definitive how the GRAM domain works; however, experimental studies have revealed that the GRAM domain may act as a membrane targeting module and may be essential for proper association of the protein with its target membrane. The model organism *Arabidopsis thaliana* contains at least 20 known instances of the GRAM domain but almost nothing is known about the function of these domains in this plant. The major goals of this study are to (a) use an automated high-throughput comparative modeling pipeline to identify and model known and new instances of the GRAM domain in *Arabidopsis thaliana,* and (b) make predictions of the biological function of these GRAM domains in *Arabidopsis thaliana* and plants in general, the preliminary findings of which are presented here.

BIO – 16 FUNCTIONAL ANNOTATION OF SEC-14 DOMAIN OF ARABIDOPSIS

Shaneen Singh, PhD and **Mohammed Abbasi** (UN), Department of Biology, Brooklyn College-CUNY, Brooklyn, NY

The sec-14 domain is present in phosphatidyl transfer proteins, which play an integral role in intracellular vesicle flow and inositol lipid signaling, though the exact mechanisms are not well understood. It has been established that the domain has a hydrophobic cavity that has the ability to bind phospholipids, where the outer portion of the cavity has been shown to be able to form hydrogen bonds with the head. Only substitutes that resemble phospholipids have been used in experiments however, and the domain as it is found in yeast has been studied extensively. Our research seeks to expound on the binding properties of the sec-14 domain found in *Arabidopsis* via molecular modeling methods and to create a pipeline to improve the accuracy of modeling all of the sec-14 domains found in the plant.

BIO – 17 THE ROLE OF DNA SYNTHESIS IN *CULEX PIPIENS* MIDGUT DEVELOPMENT

Fayeann Crawford[1,2] (UN), **Inimfon Sandy**[1,3] (UN), James Nishiura, PhD[1], [1]Biology Department Brooklyn College, City University of New York; [2]Louis Stroke Alliance for Minority Participation; [3]Research Initiative for Scientific Enhancement (RISE)

Limiting populations of some mosquitoes is an effective means of controlling the spread of several mosquito vector borne diseases. *Culex Pipiens* (*C pipiens*), one of these populations, transmits West Nile and Easter Equine Encephalitis viruses from birds to humans. Present chemically based methods of mosquito control are not ecologically sound since chemical insecticides may affect many different invertebrate species. By studying midgut development in *C pipiens* we aspire to find bio-rational, efficient and ecologically sound methods for mosquito preservation and control.

Research shows that there are differences in the development of the midgut of *C pipiens* in comparison to other genera of mosquito. These include variances in the number and size of polythene cells present in the anterior midgut of first through third instar larvae. Current

research focuses on diploid cell division and its role in midgut development. Via incorporation of 5-Bromodeoxyuridine (BrdU), we look at the role of DNA replication in midgut development. Research thus far shows that in *C pipiens*, diploid cell are not actively replicating their DNA in the early larval instars. This knowledge will enhance our understanding of development and foster better control methods for this species.

BIO – 18 OBSERVING EFFECTS OF CYCLIC GUANOSINE MONOPHOSPHATE ON MELANIN PRODUCTION IN THE DEVELOPING AXOLOTL

Yuliya Gruber (UN), and Frank W. Grasso, Department of Psychology: BCR Lab, Brooklyn College-CUNY, Brooklyn, NY

Melanin is a pigment in the skin of vertebrates that among other effects, provides natural protection against cancer-causing ultraviolet rays. Cyclic Guanosine Monophosphate (cGMP) is a nucleotide that acts as a secondary messenger, and is known to effect the differentiation of developing melanin-producing skin cells. The objective of this study was to determine if cGMP inhibits the development of melanophores; the melanin producing cells in vertebrate skin. Samples of axolotl skin from animals exposed to and not exposed to exogenous cGMP during development were stained with the Gomori stain and examined with light microscopy. Comparing histological slides of axolotl skin treated with cGMP to untreated skin has allowed us to observe changes in melanin expression in the presence and absence of cGMP. The percent of skin area expressing melanin was assessed digitally using Adobe Photoshop Tools. The results show a significant decrease of melanin production in axolotls treated with cGMP compared with those left untreated. By inhibiting melanin production cGMP may interfere with the body's natural defenses against the harmful effects of ultraviolet rays.

BIO – 19 BACTERIA THAT HAVE BEEN SUBJECTED TO ULTRAVIOLET RADIATION WILL BE MORE SUSCEPTIBLE TO ANTIBIOTICS.

Travell Robinson (HS), Abraham Lincoln High School Brooklyn, NY

Ultraviolet kills bacteria depending on the time of exposure. This research project will determine if bacteria which grow after low levels of UV light exposure will be more or less susceptible to antibiotics.
After exposing pure bacterial cultures to just one minute of UV light they are inserted into broth then transferred to the surface of Petri dishes. Antibiotic disks are placed in the center of each dish. The same procedure is done for the same culture of bacteria that has not been exposed to UV light.
After incubation the diameter of the zones of inhibition is measured in millimeters. Antibiotics are 16.6% more effective on bacteria the have been exposed to UV radiation.

BIO – 20 IS WINE EFFECTIVE AS AN ANTIBACTERIAL AGENT?

Devinn Esberry and **Allison Shnayder** (HS), Abraham Lincoln High School, Brooklyn, NY

Alcoholic beverages have been known to act as a mild antiseptic. This research compares wine to antibiotics in regard to its antibacterial properties in vitro. Sterile broth containing a pure bacterial culture of either Serratia marcescens or Micrococcus luteus was transferred to the surface of a sterile swab. For each trial, an antibiotic disc was placed in the center of one of three Petri dishes. A blank disc soaked in wine was placed in the center of a second dish. A blank disc soaked with water (control) placed in the center of a third dish. The dishes were incubated at room temperature for 24-48 hours. The diameters of the zones of

inhibition were measured in millimeters.

Based on these studies, wine appears to function as an effective antibacterial agent. The fermentation process by which yeast enzymes break down the sugars in the wine-making process to produce enough alcohol to inhibit bacterial growth even in a rich culture.

BIO – 21 TREHALOSE REGULATION IN SEED GERMINATION

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Sugar Metabolism varies from plant to plant and from sugar to sugar. Scientific literature suggests that the sugar trehalose can have inhibitory effects on the germination and root elongation of the scientific model plant *Arabidopsis thaliana*. Trehalose is a disaccharide produced by a wide variety of bacteria, fungi, and in some invertebrate animals. Concentrations are generally low in higher plants such as *Arabidopsis*. Decreased expression of genes controlling sugar breakdown is shown to occur when exogenous trehalose concentrations become high in the absence of other metabolizable sugars. The goal of this experiment is to determine the effects, in vitro, of trehalose on the germination and growth rates of plants such as *Arabidopsis*, Alfalfa, and Clover. The plants were grown on MSR plant growth medium containing an 150mM concentration of trehalose alongside plates of glucose, sucrose, galactose, and maltose. Trehalose was shown to severely slow the rate of root growth for only the *Arabidopsis* plants. It is known that *Arabidopsis* lacks the gene for the production of trehalose-6-phosphate hydrolase and that mutants of *Arabidopsis thaliana* that expresses trehalose-6-phosphate are unaffected by the presence of high-concentration trehalose.

We will be studying whether the T6P-hydrolase gene is present and expressed in Alfalfa and Clover and if it is the reason that their seeds are unaffected by high-concentration trehalose. We will use RT-PCR to examine gene-expression.

BIO – 22 MOLECULAR ANALYSIS OF FUSION DEFECTIVE MUTANTS IN *CHLAMYDOMONAS REINHARDTII*

Bertholin E. Pierre (GRAD) and Charlene L. Forest, PhD (mentor), Department of Biology, Brooklyn College of City University of New York, Brooklyn, NY

Reproduction is the main phenomenon that is responsible for the continuity of life on earth, and it is essentially based on gamete adhesion and fusion. The main goal of this study is to identify and analyze the genes that control gamete adhesion and fusion, using *Chlamydomonas reinhardtii* as a model. Certain mutants of *Chlamydomonas* are completely unable to form zygotes which are fundamental in the pathway of reproduction in multicellular organisms. In these experiments, an insertional fusion defective mutant previously isolated in *Chlamydomonas*, J1, has been analyzed in order to understand the genes responsible for gamete fusion. Microscopic observations show that the mutant studied in these experiments is unable to form zygotes when mated with its opposite mating type; it agglutinates, signals, and mating structures adhere, but they do not fuse. At present there is little information on genes/proteins required for gamete fusion. To know about the protein responsible for the gamete fusion defective in *Chlamydomonas*, Munevver Aksoy, a graduate student in Dr. Forest's lab has used TAIL-PCR to identify one of the sequences of the genes close to the insertion site that caused mutation. This isolated sequence can help identifying the protein involved in the gamete fusion defect in *Chlamydomonas*. Since these sequences was identified, Bacterial Artificial Chromosomals (BACs) containing the wild type version of the genes was obtained to complement the mutant. These BACs do not have any antibiotic

resistance gene, therefore cotransformation with an engineering plasmid, PHYG3, containing a gene coding for hygromycin resistance for *Chlamydomonas* is used. After transformation with the BACs and PHYG3, if the mutants regain the ability to fuse and form zygotes, we could conclude that we have identified a gene required for fertilization in this model.

Also, bioinformatics have been used as analysis tools to predict the topology, features, and transmembrane helices (TM helices) of the two proteins near the insertion site. Results from transmembrane topology prediction methods and other web servers have shown that these proteins are transmembrane proteins that contain a confident TM helix (hydrophobic) and a putative segment.

BIO – 23 ASSAYING FOR TOTAL PROTEIN RELEASE IN S. CEREVISIAE CELLS WITH DEFECTIVE CELL WALLS

Jesse Medina (UN), Marlyn Gonzalez and Peter Lipke, Department of Biology, Brooklyn College, Brooklyn, NY.

The incidence of fungal infections is on the rise as a consequence of the increasing number of patients suffering from immunodeficiencies. AIDS patients, patients undergoing cancer treatment and those who are receivers of organs transplants and implant devices are at most risk of systemic fungal infections that are often fatal. Infants and the elderly are also at risk. It follows that the increasing use of antifungal drugs combined with the small number of clinically available treatments are rapidly leading to the emergence of resistant strains. There is therefore a need to develop novel antifungal drugs that are preferentially of broad application and powerful enough to withstand the emergence of resistant strains. Desirable also is that new drugs be non-toxic to animal cells. The fungal cell wall is a preferred target for antifungal drug development because of its uniqueness to fungi and because its structure and function is highly conserved among many of the fungal species responsible for human disease.

In our lab a procedure was developed that can be used for high-throughput identification of genes involved in fungal cell wall development. In particular, this approach is designed to identify genes required for proper incorporation of adhesins to the fungal cell wall. Adhesins are glycoproteins that form the outermost layer of the fungal wall and play a critical role in mediating the adhesion of fungal cells to human epithelium. Genes used by the fungus to ensure proper functioning of adhesins are ideal drug targets because inhibition of their function would result in fungal cells that can not adhere to human skin. Fungal cells unable to adhere to skin would then loose their ability to become infectious. Application of the high-throughput approach developed in our lab has led to identification of genes which when deleted from the cell cause hyper release of a reporter cell wall glycoprotein into the growth medium when compared to normal wild type cells. The reporter protein is an adhesin-type glycoprotein tagged with the green fluorescent protein (GFP). Mutants that hyper secrete the reporter cell wall glycoprotein might do so because the gene that they are missing is involved in the anchoring of these proteins to the cell wall. It is also possible that the missing gene may play a different role in fungal wall development which when disturbed leads to general destabilization of the wall. The fungal wall works as permeable barrier that prevents leaking of intracellular components into the surrounding environment. Cells with severely damaged walls may be unable to efficiently retain intracellular protein and in cultures of such cells increased levels of total protein is expected in their growth medium. To test for total protein concentration in the growth medium of cells identified as hyper-secretors of our reporter cell wall protein we used two different assays: the Bradford assay and the Coomassie Plus assay. The Bradford method did not show the required sensitivity for our assay. The Coomassie plus assay showed more promising although it requires extensive concentration of the samples, which we accomplish by freeze-drying. Here we present total protein

concentration in growth media from mutants that hyper-secrete adhesin-like cell wall glycoproteins relative to wild type cells.

HNS – 1 METHYL MERCURY CONTAMINATION IN SEAFOOD

Adrianne R. Cesar (HS), Brooklyn Technical High School, Brooklyn, NY

The study investigated the differences between levels of mercury content in fish and the variations between different species, and also investigates which of two human populations faces greater risks of mercury contamination as a result of consumption. Studies incorporating the measurements of mercury levels in fish, or effects of mercury on a particular population were observed in order to extract data that would lead to a conclusion. The specific effects faced by the two populations of concern were also taken note of to determine the severity of mercury contamination for each population. Of the noted species, it was found that the shark, snapper, and swordfish species maintained much higher levels of mercury, while others remained consistent with the majority of other fish. The severity of the effects faced by children who faced prenatal exposure to mercury was much greater than that of adults facing mercury exposure. The majority of observed effects were taken from tests for cognitive function, since they provide a variety of different results. This study suggests that it is possible to prevent the development of higher levels of mercury by abstaining from the consumption of certain fish species, and that prenatal exposure to mercury has a greater impact on the individual.

HNS – 2 FOOD SOURCES HEAVILY INFLUENCE EFFECTS OF LOW-FAT DIETS ON FAT ACCUMULATION

Kirsten A. Mimberg (UN), Ann Glassman, Nel Trasybule, Bushra Liaqat, Kathleen Axen, Kenneth Axen, Department of Health and Nutrition Sciences, Brooklyn College-CUNY, Brooklyn, NY

Although it is believed low-fat, sugar-free diets do not promote body fat accumulation, this conflicts with our observations. Consequently, we compared the effects of two low-fat diets which were fed to male Sprague-Dawley rats ad-libitum for 8 weeks. Diet A (%calories = 60% C, 12% F, 28% P) used only cornstarch, whereas Diet B (60% C, 15% F, 25% P) used maltodextrin 10 in addition to cornstarch as a carbohydrate source. The ratio of saturated:monounsaturated:polyunsaturated fat was similar between diets, though different oils were used. Casein (protein source) and adequate vitamins and minerals were used in both diets.

Group A initially had high food intakes (FI) that were maintained through week 8. Group B initially had higher FI than Group A, but progressively decreased consumption through week 8. Overall, the FI difference between the two groups was negligible. Though body weights were similar between groups, pattern of weight gain differed. Group A maintained consistent weight gain during the study, while Group B initially gained rapidly but the rate drastically declined. The pattern of weight gain is consistent with the FI pattern. Rats fed Diet B had significantly more retroperitoneal (intra-abdominal) and subcutaneous fat than Group A. These findings are not due to the relative amounts of fat, carbohydrate, and protein because these were consistent between diets. The greater fat accumulation in Group B may be attributed to the easy absorption of maltodextrin 10 or the trans fats of hydrogenated coconut oil. Food sources are more important than most people believe.

HNS – 3 WEIGHT LOSS DIET COMPOSITION AND EFFECT ON BODY FAT CONTENT AND DISTRIBUTION

Nel Trasybule (UN), Marianna Harper, Irene Ling, Kirsten Mimberg, Ann Glassman, Bushra Laiqat, and Kathleen Axen, Ph.D., Department of Health and Nutrition, Brooklyn College-CUNY, Brooklyn, NY

Obesity is a worldwide epidemic associated with metabolic disease. Loss of body fat is an effective method of lowering this risk. We addressed the effect of four calorie matched weight reducing diets on body fat and fat distribution.

Weight-matched male Sprague Dawley rats were assigned to either a control (C, N=12) group, fed a standard low fat diet or the obese group (N=32) fed a high fat (HF, 15% carb, 60% fat, 25% protein) diet ad libitum. At week 8, the HF group was split into four weight matched energy restricted groups: 1) VLC-HF received a very low-carbohydrate , high-fat diet (5% carb, 60% fat, 25% protein); 2) VLC-HP received a very low-carbohydrate, high-protein diet (5% carb, 45% fat , 35% protein); 3) HC rats received a high carbohydrate diet (60% carb, 15% fat, 25%); 4) and HF-R rats continued on the HF diet but with energy restriction.

Results showed that all the diets achieved weight loss. Although food intake was calorie matched, body weight varied with diet composition with results indicating the higher the protein content, the higher the body weight (BW) and body fat. HP rats had the largest fat pads while the HC rats had the smallest fat pads and BW. The data revealed that the HC diet is best suited for weight loss not only in reducing body weight but also in minimizing body fat while the HP group consuming the popular low-carbohydrate, high-protein diet retained fat.

HNS – 4 THE INFLUENCE OF PREVENTIVE HEALTH CARE VISITS ON STD TRANSMISSION AMONG YOUNG ADULTS, 2006-2007

Amika K.McBurnie (HS), Brooklyn Technical High School, Brooklyn, NY

Adolescent health care professionals play an important role in adolescent reproductive health, offering an opportunity to provide counseling about responsible sexuality and condom use allowing teens to become more informed about STD and pregnancy prevention. The purpose of this study is to examine the influence of preventive health care visits on trends of STD transmission or a delay in sexual debut among adolescents, specifically among minorities and the economically disadvantaged. The Youth Risk Behavior Surveillance (YRBSS) and STD Surveillance 2006 survey were analyzed for trends in STD transmission among adolescents exclusive to Caucasians, Non-Hispanic Blacks and Hispanics. Data for the most recent preventive health care visits and discussions about STDs, or pregnancy prevention were assessed by the form of a questionnaire.

The majority of participants were sexually experienced and engaged in a preventive health care visit within the recent year before their participation in the survey. Among female participants, those who were 17 or older and African-American were more likely to have this discussion with their health care professional. Additionally those that had preventive health care visits were less likely to engage in risky behavior.Many health professionals miss opportunities to inform adolescents about sexual intercourse, pregnancy and STD prevention during health care visits. Males, minorities and the economically disadvantaged need to have preventive health care visits more frequently because of their increased STD risk. Health care professionals should also focus on reaching out and providing their services to adolescents who generally would not be able to afford healthcare.

HNS – 5 CAN SHORT TERM EXPOSURE TO ULTRAVIOLET RADIATION BE EFFECTIVE IN REDUCING BACTERIAL CONTAMINATION ON THE SURFACE OF FOOD?
Tony Li (HS), Abraham Lincoln High School, Brooklyn, NY

Contamination of food has become a serious health problem. Many cases of food poisoning have been reported in recent years. This project was designed to determine if exposure to low doses of ultraviolet light would sanitize food for safe consumption.

A variety of foods were tested (lettuce, spinach, tofu, meat) for the presence of bacteria. A sterile swab was rubbed on food samples and transferred to the agar in sterile Petri dishes (control group). Other samples of the same food were placed in a sanitizing cabinet containing ultraviolet light for three to fifteen minutes. The radiated food sample was rubbed on the swap transferred to another sterile Petri dish containing sterile agar (experimental group).

The Petri dish from the control and experimental groups were incubated for 24-28 hours at room temperature.

All food samples showed light or zero bacterial growth after being radiated with ultraviolet light for an average of 8 minutes. In general, bacteria taken from food samples without being put in the ultraviolet light cabinet had moderate growth after incubation. Ground beef however, is not able to be decontaminated with UV light. Since UV light has very little penetrating power, the rays can kill the bacteria only when they make direct contact with the particles carrying the organisms.

HNS – 6 HOW EFFECTIVE IS ANTIBACTERIAL SOAP COMPARED TO ANTIBIOTICS IN ERADICATING BACTERIAL GROWTH?
Nigora Raufova (HS), Abraham Lincoln High School, Brooklyn, NY

Antibacterial soap is now widely used as a cleanser instead of regular soap. This research project compares the antibacterial properties of antibacterial soap to regular soap and antibiotics.

Pure bacterial cultures grown in sterile broth (Bacillus subtilis, Serratia marsescens, and Micrococuss luteus) were spread onto the surface of sterile agar in petri dishes. Each trial consisted of 4 petri dishes containing a bacterial culture. An antibiotic disk was placed in the center of one dish. The center of the second dish contained a blank disc soaked in antibacterial soap, a third dish contained a blank disc soaked in regular soap, and a fourth dish contained a blank disc soaked in water (control). The dishes were incubated at room temperature for 24-48 hours. Using a millimeter ruler, the zones of inhibition were measured and compared. For all the trials, the average zones of inhibition were 16 mm for the antibiotics, 30 mm for the regular soap, and 33 mm for the antibacterial soap.

This research showed that antibacterial soap rivals antibiotics in eradicating bacterial growth. Regular soap is also effective in removing bacteria. However, unlike regular soap, antibacterial soap, contains triclosan which, functions as an antibiotic. The excessive use of antibacterial soap may cause bacterial resistance. In time, stronger, resistant bacteria will evolve which will become much harder to eradicate. The relative strengths of antibacterial soaps, regular soap and antibiotics were determined by comparing the zones of inhibition in millimeters around each disk.

HNS – 7 IS YOUR TOOTHBRUSH DIRTY?

Christopher Woskoska (HS), Department of Biology, Franklin Delano Roosevelt High School, Brooklyn, NY

The goal of this experiment is to see if a toothbrush collects bacteria in the bathroom. It would be nasty is your toothbrush did have bacteria on it considering that it goes in our mouth. The initial idea was to determine if bacteria in your bathroom was bad enough to get us sick. However, since your toothbrush is in the bathroom it's a fair experiment. Also, are the bacteria in the bathroom really that harmful?

To test this experiment we will leave 10 toothbrushes in the bathroom in different spots. (Not everyone has the same bathroom arrangement) Then everyday for the next 2 weeks we will have to use these toothbrushes as it was our own because these toothbrushes have to be used as if they were anyone's toothbrush. Next, after 2 weeks we rub the toothbrushes on agar plates. The agar plates will be placed in a warm area for bacteria to grow. Once the bacteria grow or not we could determine if our toothbrushes act as a filter for collecting bacteria.

ENV SCI - 1 AMBIENT CARBON DIOXIDE LEVELS IN HIGH SCHOOL CLASSROOMS: A CAUSE FOR CONCERN?

Ezra Ashkenazie (HS), Magen David Celia Esses High School, Brooklyn, NY

Atmospheric carbon dioxide has achieved prominence. Studies in structures documented that CO_2 builds up from a lack of adequate ventilation and is linked to lethargy and drowsiness.

Schools constructed following the energy "crisis" of the 1970's were designed to reduce heat loss to the external environment.
CO_2 levels were monitored in classrooms in a Brooklyn NY high school which opened in 1988. Initial tests revealed high CO_2 levels. Repeat measurements with CO_2 detection tubes, yielded readings higher than those taken with the infrared sensor.
Control measurements in other schools were far below the experimental results. Further testing will be performed to justify the need for retrofitting the school based on this research.

ENV SCI – 2 THE EFFECT OF ACID RAIN ON PLANT GROWTH

Absar Alam (HS), Department of Biology, Franklin Delano Roosevelt High School, Brooklyn, NY

The goal of this study is to test the effects of acidity in the environment, and soil on the growth of a radish. To mimic acidic environments, we used a solution of vinegar and water, as for the control, we used distilled water. This experiment was conducted for 6 weeks, and in those 6 weeks, the growth was charted in cm to compare, the groups that received the vinegar solution to the control group, which received water. Once the results are taken, we will know for sure that acidity effects the growth of plants. Previous research done on this topic was done by Robert Angus Smith, whose results show that acid rain is not good for soil conditions, therefore not good for plants. He conducted these experiments in Glasgow, England, where his results show that there are over 109 grains of sulfuric acid per gallon of rainwater.

ENV SCI – 3 HOW DOES CARBON MONOXIDE AFFECT PLANTS?

Anastasia Buraminskaya (HS), Department of Biology, Franklin Delano Roosevelt High School, Brooklyn, NY

According to statistics, cigarette consumption in the United States rose from an average of 54 cigarettes per person per year in 1900s cigarette consumption had declined to 2000 per person per year. Today less than one fourth of all adults smoke cigarettes. The purpose of this project is to show how Carbon Monoxide or the gas that is released from a cigarette affects plants. Carbon Monoxide is a very damaging product therefore it will interfere with the plant's growing rate. To accomplish this experiment take two identical plants, place one in a container containing Carbon Monoxide and use the other plant for comparison. For this experiment, the materials you will need are two identical plants, soil, 14 cigarettes, fish tank, and water. By the end of this experiment, the growth of the plant that received Carbon Monoxide slowed down as supposed to the plant that was used as a comparison. From the results that were obtained from the experiment, it may be concluded that the hypothesis was fully supported and that Carbon Monoxide slows down the growth rate of plants. This research certainly offers some economical and environmental advantages. For example, there will be less pollution and if this research could persuade people to quit smoking, the people would be able to save money.

ENV SCI – 4 IS THE COPEPOD POPULATION AFFECTED BY THE SEASONAL CHANGES

Lana Mashiyakhova (HS), Department of Biology, Franklin Delano Roosevelt High School, Brooklyn, NY

Are there any copepods in the autumn, in the kitchen faucet of Parkville Avenue, in the kitchen faucet of Borough Park, and in Shore Road beach? That is the problem. The hypothesis is that there are copepods found in the water during the autumn season. The materials for this project are microscopes, slides, bottle/zipper bag, an eye dropper, and cotton. The method is to put a small piece of cotton on top of the faucet filter of each kitchen for a week. Repeat it and then research the cottons for copepods with a microscope. For the results, there were no copepods. In conclusion the results did not match the hypothesis. Copepods are non-kosher, phytoplanktons that live in the water. They are found in seas, beaches, rivers, and in the kitchen faucets of the Jewish neighborhoods. The person that actually found the copepods in the Jewish neighborhood' faucet was not a scientist. It was a rabbi. The rabbis were disappointed because New York has the most purified water. They go through six nauplius stages that are separated by moults, the shredding of cuticle in arthropods, in the late summer and fall. Temperature is important to the copepods because it affects their growth, reproduction, behavior, and distribution. The thermal environment that copepods inhabit ranges from 0 degrees Celsius to 16 degrees Celsius.

PHYSICS – 1 EFFECTS OF CU^{2++} ION CONCENTRATION IN PULSED NMR
Peter Lesser, PhD, **David Adams** and **Alison Cichowski** (UN), Department of Physics, Brooklyn College-CUNY, Brooklyn, NY

We used pulsed Nuclear Magnetic Resonance to observe the effects of paramagnetic Cu^{2++} ion concentration on the spin-lattice relaxation time (T_1) and spin-spin relaxation time (T_2) for varying concentrations of copper sulfate. Using pulsed NMR in a constant magnetic field we had determined to be 3543.088 ± .012 Gauss, our experiment produced a T_1 of 0.473 ± .005 ms and a T_2 of 0.381 ± .012 ms for a fully saturated solution at 24.5°C. For a 5% solution we found a T_1 of 10.4 ± 0.2 ms and a T_2 of 9.92 ± .05 ms. Various other concentrations of $CuSO_4$ were also tested and we observed a strong dependence of relaxation times on ion concentration as predicted by the model. However, we found that at low concentrations the T_1 determinations no longer fit a logarithmic plot but were clearly deviating by some consistent pattern as the ion concentration was reduced.

PHYSICS – 2 INVESTIGATION OF AN AMERICIUM-BERYLLIUM NEUTRON EMITTER
Tal Plushnick and **Benjamin Pisciotta** (UN), and Peter Lesser, PhD, Department of Physics, Brooklyn College, Brooklyn, NY

Readers should be aware of the structure of nuclei and sources of radiation. Brooklyn College students conduct experiments on activated aluminum as part of Core Physics lab. The goal of the lab is to detect the two minute half-life of aluminum-28. Until recently the Al-28 was created using neutrons emitted by a plutonium-beryllium source, which created Al-28 from stable Al-27 via slow neutron capture. When a new americium-beryllium source was purchased, an additional, longer, half-life was detected. The goal of this experiment was to determine the source of the new half-life. The hypothesis was that the americium source was producing more fast neutrons leading to new isotopes.
Aluminum discs were bombarded by neutrons, and the emission lines produced by the activated aluminum recorded using a high resolution intrinsic germanium detector. Paraffin blocks were interposed between the aluminum sample and americium source to thermalize neutrons, and the variation in emission lines observed.
As paraffin was introduced, the lines for the various isotopes fell at different rates, with those suspected of being created by neutron capture falling gradually, and those created via (n,p) reactions dropping sharply. The longer half-life was attributable to Mg-27 which was being created by fast neutrons. Understanding ones equipment is of paramount importance in any laboratory. A greater knowledge of this radioactive source will improve the results of future experiments as well as allowing for new ones.

PHYSICS - 3 IMAGING NANOWIRES USING ATOMIC FORCE MICROSCOPY AND SCANNING ELECTRON MICROSCOPY
Jeffry Herrera (UN), Julius Nasser, Mohammed Alomeri, Philip Madnick, and Mim Nakarmi, Department of Physics, Brooklyn College of the City University of New York, Brooklyn, NY

Optical microscope is sufficient to observe the objects in micrometer scale. Resolution of the optical microscope is limited to about 0.2 micrometer due to the diffraction of visible light. The optical microscope thus may not be used to image the objects in nanometer scale such as Nanowires. Atomic force microscopy (AFM) and Electron Microscopy (SEM) are widely used imaging techniques in nano-science and technology. AFM uses a cantilever with a sharp tip which is scanned across the surface to form the image. SEM uses scanning electron beam to form the image. We have used both the AFM

and SEM to image the Nanowires as a part of advanced physics laboratory course. Images are taken at different magnifications. Comparison of the images is presented using both techniques.

CIS- 1 ACADEMIC ADVISEMENT WEBSITE

Peter Onyebuchi (UN), Department of Mathematics and Computer Science, Kingsborough Community College, Brooklyn, NY

The Academic Advisement Website is designed to show students status toward the completion of their degree in Computer Information System. The goal of my research is to design a user interface that will indicate courses taken and additional courses that may be needed to complete their degree requirements. This research will be made possible with the help of Professors Bassen and Garber.

The first part of the project will be to provide desired algorithms for the actions of the user in their control of the website. The project will make extensive use of the java programming language. The system will undergo rigorous testing prior to its online implementation.

CIS – 2 GENERALIZING THE TWO-DIMENSIONAL SUDOKU PUZZLE TO THREE-DIMENSIONS

Tiffany A. Lambert (UN) and Paula Whitlock, PhD, Department of Computer Information Science, Brooklyn College-CUNY, Brooklyn

The well-known puzzle Sudoku, or Number Place, can easily be defined as follows

1. Each row of cells contains the integers 1 through n^2 exactly once.
2. Each column of cells contains the integers 1 through n^2 exactly once.
3. Each n x n square of cells contains the integers 1 through n^2 exactly once.

It has been shown that to find a solution to the puzzle in the general case is a NP-complete problem; that is, a solution cannot be necessarily found in polynomial time. The examples most people are familiar with are called logic-solvable because a logical reasoning approach will lead to a solution. But there exists puzzles whose solution can be found by guessing a random approach or brute force iteration through all possible combinations. These puzzles are solved through computer programs that use an optimization, genetic algorithm, simulated annealing or a brute force tree pruning algorithm.

The challenge is to generalize the puzzle to a three-dimensional analogous puzzle. There are many open questions and methods of approach. The first widely publicized attempt was by Dion Church, who designed a puzzle on three faces of a cube. This, of course, can be projected onto a two-dimensional puzzle. This approach can extend to all faces of the cube and still be represented in two-dimensions. Some of the questions are:
   a) How do the faces relate to each other?
   b) Are there special rules for edges?
   c) Should bands around the cube obey the same rules as the faces and magic squares on each face?
Then once this simple case has had its rules decided, there is sill the question of solution and complexity. Is it still NP-complete? Will the techniques developed for the 2-D case be applicable here? Or will it be necessary to develop a new approach. Will there be classes of puzzles such as logic-solvable and non logic-solvable? This promises to be an exciting and thought-provoking project.

CIS – 3 LASER RANGE FINDER DEMONSTRATION PROJECT
Sam Sirotnikov and **Shadman Torofder** (HS) James Madison High School, Brooklyn, NY.

Objective- to construct a cheap, sufficient device, which ultimately finds the distance between the device itself and the desired target.
Design- the use of Java to program a Logitech Quick Cam and a laser pointer in such a way that it will ultimately will be able to output the distance between 2 points
Settings- Pace University, Computer Science Lab
Analysis – Through the use of several Java methods and imports (e.g. java.awt;, java.io*.) , a program was constructed which communicates with both the user and the Logitech Quick Cam and is able to accurately output the distance between the camera itself and the end point of the laser beam. Such devices have been created, however they are relatively expensive (over $150), our device is considerably cost sufficient (under $25).

Pace University has currently built a robot called ADAPT (a mobile robot that implicates robot cognition and strives to attain human-level performance). However, its sonar is fairly in accurate in measuring not only the distance between the robot and the desired object, but also in detecting the degree of curvature of a certain object. We have created a device, which can potentially correct the robot's setbacks. The "Java Powered Range Finder" was created with the intention to not only be very precise but also cost efficient. The device includes a web cam with a laser pointer attached to the top, at an angle of 8 degrees. In short, the camera captures an image of the laser's beam and displays the captured image to the Java program created for the device. The program then interacts with the user and goes through certain trigonometric calculations in order to precisely calculate the distance between the camera and the desired object. This information is vital to ADAPT due to the fact that the robot can use this data in order to slow down or come to a complete halt before coming too close to any object. In addition, if our device were to run in a continuous manner, the shape of an object can be detected by plotting the data attained from the device. Other implications include installing the device to cars and or security cameras in order to perform certain tasks with greater accuracy.

CHEM – 1 SYSTEMATIC AND STATISTICAL ERROR ON TWO-DEMINSIONAL FREE ENERGY SURFACES

Mark N. Kobrak* and **Julius A. Nasser** # (UN), Department of Chemistry, Department of Mathematics, and Department of Physics, Brooklyn College-CUNY, Brooklyn, NY

A common technique for numerical calculation of free energies involves estimation of the probability density along a given coordinate from a set of configurations generated via simulation. The process requires discretization of one or more reaction coordinates to generate a histogram from which the continuous probability density is inferred. [1]We find that the finite size of the areas used to construct the two-dimensional histogram leads to quantifiable systematic error. The width and height of the histogram determines the statistical error in the free energy, and the choice for the appropriate area is driven by the need to balance the two sources of error. We present formalism for the construction of the optimal histogram for a given system.

CHEM – 2 THE RELATIONSHIP BETWEEN IONIC STRUCTURE AND VISCOSITY IN ROOM-TEMPERATURE IONIC LIQUIDS

Hualin Li (UN), Murfat Ibrahim, Ismail Agberemi and Mark N. Kobrak, Department of Chemistry, Brooklyn College and the Graduate Center of the City University of New York, 2900 Bedford Ave., Brooklyn, NY

We investigate the relationship between ionic structure and viscosity in room-temperature ionic liquids. We build on earlier theoretical work and derive an ionic property we call the charge lever moment (CLM). We use electronic structure calculations to determine the CLM for ions in typical ionic liquids and demonstrate a correlation between this property and the experimental viscosities of ionic liquids. We also explore the importance of ionic rigidity to viscosity.

CHEM – 3 SIMULATIONS OF SINGLET OXYGEN RELEASE FROM A NOVEL "JUMP ROPE" NAPHTHALENE ENDOPEROXIDE

Alvaro Castillo (GRAD) and Alexander Greer, City University of New York, Brooklyn College, Brooklyn, NY.

There are, to be sure, few computational studies that focus on interactions of singlet oxygen with compounds containing 10 or more carbon atoms. Owing to its multiconfigurational character, reactions of $^1O_2$ are difficult to compute and often require couple cluster or quadratic configuration interaction calculations. Resource constraints come into play for such computations with medium-sized organic compounds. The problem is exacerbated with large-sized biological molecules and proteins. *Yet there is recent growth of $^1O_2$ topics, which seem to be out of reach of theoreticians*. For example, understanding the diffusion of $^1O_2$ across a cell membrane, the singlet oxygenation of the cell membrane, or the emergence of $^1O_2$ from an enzyme pocket from a protective response to stress in plants. The aim of this poster is about progress that needs to be made between computational theory and satisfactorily predicting a reaction of $^1O_2$ with a larger-sized molecule, in this case a "jump rope" 1,4-polymethylene-naphthalene endoperoxide. We describe an effort to understand

how singlet oxygen dissociates from this jump rope endoperoxide through a computational study. B3LYP/6-311+G(d)//AM1 and ONIOM(B3LYP/6-311+G(d):AM1) calculations permit us to disentangle the energetics of $^1O_2$ release from the rope skipping action of the polymethylene group. Thus, valuable predictions can be made to guide synthetic chemists and biochemists. The challenges of computing and understanding $^1O_2$ movement across an environment bearing a rotating chain are discussed.

CHEM – 4 DEVELOPING A SPECTROSCOPIC DRUG SCREENING METHOD FOR ALZHEIMER'S DISEASE

Igho Oghenevwairhe (UN) and Laura J. Juszczak, Department of Chemistry, Brooklyn College, Brooklyn, NY

Alzheimer's disease is caused by the effects of amyloid beta (abeta) peptide oligomerization in the brain, leading to neurodegeneration and loss of memory. In order to study the effect of a patent pending Alzheimer's disease dissolution drug on abeta, the transgenic animal model, *Caenorhabditis elegans*, a soil nematode, is used. Wild type (CL802) and abeta-producing mutant (CL4176; Link et al. 2003) strains of *C. elegans* are available through the *C. elegans* Genetics Center, University of Minnesota.
While this research ultimately seeks to test the effectiveness of the drug on abeta oligomerization, our first goal is to successfully grow the animal model in mass quantity, and ensure that they produce the abeta protein at the desired temperature. A beta expression is induced in the CL4176 strain by raising the growth temperature to 23C for 36 hours. Following this achievement, an *in vivo* fluorescence assay for abeta will be utilized to detect the efficacy of the drug in binding the temperature-induced abeta oligomers (Chen and Glabe 2006, Link et al. 2001).

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CHEM – 5 COMPARISON OF CYSTEINE PROTEASES VS. SERINE PROTEASES IN THE ABILITY TO CATALYZE THE OLIGOMERIZATION OF L-METHIONINE ETHYL ESTER HYDROCHLORIDE

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Protease-catalyzed oligomerization of L-methionine ethyl ester hydrochloride was conducted in a highly concentrated phosphate buffer at 40° C. Papain, a cysteine protease, and α-chymotrypsin, a serine protease, were the proteases used for the reactions. The reactions were conducted for three hours in a parallel synthesizer and afterwards, the product was centrifuged to remove the supernatants. The dominant role of the phosphate buffer in reactions was its control of pH. Analysis of the product was carried out using H NMR and MALDI-TOF. Overall, L-oligomethionine was obtained in better yields using the cysteine protease, papain, than the serine protease, α-chymotrypsin. MALDI-TOF spectra of

precipitated products showed abundant signals at DP 8, indicating an octamer was formed during the reactions. These signals were corroborated by H NMR analysis. Using pH 5,6, and 7, L-oligomethionine synthesis at 40°C, using papain, led to yields of 25%, 64%, and 67%, respectively; using α-chymotrypsin, the yields reached 3%, 10%, and 62%, respectively. High product yields were observed at higher pH levels. Generally speaking, the degree of polymerization was greater for α-chymotrypsin-catalyzed oligomerizations than papain-catalyzed oligomerizations. The findings of this study differ sharply from those reported in the previous literature. The L-oligomethionine formed in the reactions has the potential to be used for medical and cosmetic purposes.

CHEM – 6 THE OPTIMAL PRODUCTION OF METHYL ACETATE USING A MICRO REACTOR
Alex Kitayev (HS), James Madison High School, Brooklyn, NY.

The purpose of this experiment was to find the optimal condition for producing methyl acetate. Methyl acetate is made by the esterification of methanol and acetic acid with an addition of a catalyst, sulfuric acid. Several runs were carried out under different conditions. Different catalyst amounts were tried with different temperatures and different pump settings to find the ideal conditions in which the yield of methyl acetate would be the highest. Using the conversion rate of methanol, the production rate of methyl acetate was determined. The optimal settings for producing the maximum conversion of methanol to methyl acetate was 1.0mL catalyst at 40°C at a pump setting of 15%/35%, which produced a yield of 87.6%.

CHEM – 7 GREENER OXIDATION REACTIONS BY HOMOGENOUS GOLD CATALYSIS
Syeda Nabila Tabassum (HS) and Maria Contel, PhD, Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY

Global warming is a growing problem today, and there is a great need to find ways to prevent it. "Going green" has been one of the solutions to this dilemma. Gold catalysis is in the field of green chemistry. Green chemistry focuses on reducing pollution and hazardous substances at its source. The main idea behind green chemistry is to be "benign by design". The objective of this research was to design a catalyst that would be more "green", by being less hazardous, energy preserving, and efficient.
Gold was the base of all the catalysts created. It was an alternative to the traditional toxic materials used as catalysts. These catalysts proved to be highly efficient and selective for oxidation reactions.

The results have shown gold's potential as an excellent homogeneous catalyst. These catalysts can be used by petrochemical industries, which need them for the synthesis of higher valued chemicals from raw materials. Gold catalysts will potentially decrease the amount of hazardous emissions that go into the atmosphere, as well increase the amount of substance produced. It is overall a very "green" and therefore safe alternative to the other catalysts used, such as mercury. It is anticipated that the research will provide enough information to continue with the study of gold's potential as a catalyst in reactions.

CHEM – 8 SINGLET OXYGEN CHEMISTRY A WATER/POROUS GLASS INTERFACE

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Chemistry and Material Science and Engineering, Johns Hopkins University, Baltimore, MD

We describe our study of singlet oxygen photochemically generated at a water-solid interface, and how singlet oxygen then diffuses into the aqueous medium. The heterogeneous system shown here could have application in ridding wastewater of E. coll. Collaborations with Ruomei Gao and Harry Gafney revealed that singlet oxygen is generated cleanly in aqueous solution upon irradiation of a heterogeneous complex, meso-tetra(N-methyl-4-pyridyl)porphine adsorbed onto porous Vycor glass (PVG). Despite the effectiveness of this and other heterogeneous systems to generate singlet oxygen, little is known about the dynamics of oxygen quenching at solid-water interfaces. For example, how does the oxygen encounter the excited heterogeneous sensitizer? What mechanism (static or dynamic) converts ground-state oxygen into singlet oxygen, which then escapes into the surrounding aqueous solution? Our recent work with Jovan Giaimuccio and Jerry Meyer led us to conclude that O2 quenching at the glass-water interface differs from O2 quenching at the glass-gas interface. An assessment of the quenching of the oxygen could help in the design of other heterogeneous systems that attempt to control the exact mode of generation of singlet oxygen in water.

CHEM – 9 RATE OF REACTIONS BETWEEN SODIUM THIOSULFATE PENTAHYDRATE AND HYDROGEN PERIOXIDE

Amara Abid (HS), Midwood High School at Brooklyn College , Brooklyn , NY

Chemical reactions occur around a human being all the time. They occur inside and outside the body. In fact, metaphorically speaking, the human body is a complex chemical factory that constantly undergoes chemical reactions in order to function properly. The rates at which these reactions take place are dependent upon many variables. In this experiment the key factors being tested were surface area-particle size, temperature, concentration, and catalyst. The problem being tested was being factored out of those four would have the greatest influence on the rate of reaction between Sodium thiosulfate pentahydrate and hydrogen peroxide (chemical equation: $NA_2S_2O_3(aq) + 4H_2O_2(aq) \rightarrow Na_2SO_4(aq) + H_2SO_4(aq) + 3H_2O(l)$). In order to successfully conduct these experiments a stock solution has to be prepared which consisted of distilled water, sodium thiosulfate pentahydrate, sodium acetate trihydrate and sodium hydroxide. We have found that the reaction rate between Sodium thiosulfate pentahydrate and hydrogen peroxide increased the greatest amount with increasing temperature. The catalyst had the second greatest increase in reaction time; concentration came out to be third and surface area fourth. This was because the number of collisions between the reactants was greatest during rising temperature than it was for any other factor.

CHEM – 10 THE BINDING MODE OF BIOLOGICALLY ACTIVE RUTHENIUM-CHLOROQUINE COMPLEXES TO DNA INVESTIGATED BY VISCOSITY MEASUREMENTS

Dalanda Jalloh (UN) and Roberto Sanchez-Delgado, Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY 11210

Malaria is widespread in many tropical and subtropical regions of the world and causes one to three million deaths annually. The disease is caused by a protozoan parasite of the genus Plasmodium. Chloroquine is the most widely administered anti-malarial drug, but resistant strains of P. falciparum have emerged and improved chemotherapies are needed. Ruthenium-chloroquine complexes have shown improved biological activity against resistant strains of P. falciparum. The interaction of these Ruthenium-chloroquine complexes with DNA is being investigated to establish whether DNA binding plays a role in the anti-malarial mechanism. We have studied the interaction of six ruthenium-chloroquine complexes with DNA through viscosity experiments, in order to further probe the exact mode of interaction. The experimental data indicate that the viscosity of DNA solutions increases with addition of the complexes, which suggests that the preferred mode of binding to DNA is intercalation as opposed to covalent bonding.

CHEM – 11 HYDROGENATION OF QUINOLINE BY RUTHENIUM NANOPARTICLES IMMOBILIZED ON POLY(4-VINYLPYRIDINE)

Nataliya Machalaba (UN) Roberto A. Sanchez-Delgado, Department of Chemistry, Brooklyn College-CUNY, Brooklyn, NY 11210

A catalyst composed of ruthenium nanoparticles immobilized on poly(4-vinyl pyridine) was prepared by $NaBH_4$ reduction of $RuCl_3 \cdot 3H_2O$ in methanol in the presence of the polymer. TEM measurements show the size of the ruthenium nanoparticles to be about 2 nm. This material catalyzes the selective hydrogenation of quinoline to 1,2,3,4-tetrahydroquinoline. The catalytic activity increases with increasing temperature, hydrogen pressure up to 40 bar H_2, solvent polarity, and with the addition of acids and bases (acetic acid and triethylamine) suggesting an ionic mechanism.

CHEM – 12 CHARACTERIZATION OF NADH "OXIDASE" ACTIVITY OF BURKHOLDERIA PSEUDOMALLEI CATALASE-PEROXIDASE (KATG)

James Pannell (UN) and Richard Magliozzo, PhD, Department of Chemistry, Brooklyn College, Brooklyn, NY.

Mycobacterium tuberculosis Kat G, Mtb KatG, is a heme protein with catalase and peroxidase activities. This enzyme is responsible for activation of isoniazid (INH). INH is one of the main drugs used to treat tuberculosis. The study of KatG is important because of the widespread resistance to INH mostly due to mutations in this enzyme.

Bp KatG is isolated from the bacteria Burkholderia pseudomallei. In addition to catalase and peroxidase activity Bp KatG is also believed to have NADH "oxidase" activity. The function and mechanism of this reaction is unknown. My research shows that the NADH "oxidase" activity is heme dependent (contrary to previous reports). After addition of excess cyanide to Bp Kat G, the heme iron will be saturated and catalytically inactive. Under these

conditions the enzyme shows a significant decrease in NADH "oxidase" activity. Therefore, the heme, in Bp Kat G, is believed to have an important function in this reaction.
Results obtained during investigation of NADH "oxidase" activity show that it may simply be a peroxidase reaction. Adding increasing amounts of NADH, while measuring peroxidase activity decreases the peroxidase activity measured using another substrate. This demonstrates that there is competition between NADH and the peroxidase substrate, o-dianisidine. Furthermore, competition occurred between other peroxidase substrates (ascorbate) and NADH while measuring NADH "oxidase" activity. This is evidence that NADH is a peroxidase substrate. Based on these results, the reported "oxidase" activity is really "peroxidase" activity. Bp KatG is a complex enzyme and these experiments help further the knowledge of this interesting protein.

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The names of main authors are underlined

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LEGEND:

BIO – Biology
CHEM – Chemistry
CIS – Computer Science
ENV SCI – Environmental Sciences
HNS – Health and Nutrition Science
PSY – Psychology
SCAS – Speech Communication & Arts Sciences