31st ANNUAL BROOKLYN COLLEGE SCIENCE DAY

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AWARD CEREMONY – MAY 6, 2022 12PM

Poster Awards supplied by Dean Peter Tolias, School of Natural and Behavioral Sciences
We thank all the faculty and students who persisted in an historically difficult period for student research to produce the research presented here.

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BIOLOGY

BIO - 1 MAXIMIZING URBAN GREEN ROOF POTENTIAL THROUGH THE UNDERSTANDING OF THEIR MICROBIAL COMMUNITY COMPOSITION

Samia Ahmed, (UG), Theordore Muth, Brooklyn College. Grant #80210-07 25

Green roofs are potentially advantageous to urban communities because they address critical environmental concerns in cities including elevated temperatures, storm-water management, reduced biodiversity, and increasing pollution. Plant and soil-associated microbes have been linked to building resilience in green roof plants against these environmental stressors. However, factors impacting the microbial community composition and dynamics are not yet well understood. Samples for this study were collected from New York City 5 Borough Complex on Randall's Island. Two different types of green roof systems were sampled, including shallow, 2-inch, XeroFlor and deep, >6-inch raised roof beds. Green roof soil samples were collected from three different sides of the building to determine the effect of light and exposure on the microbiome community. Soil microbiome DNA was extracted, sequenced, and analyzed. Initial analyses of the results show that the green roof soils are dominated by Proteobacteria, Actinobacteria, and Acidobacteria phyla, which is typical of most soil types. A principal coordinates analysis showed that the bacterial communities from the two green roof systems were distinct with a greater Shannon diversity measurement found in the shallow green roof beds. Our data suggest that the South-facing green roof beds also had a greater Shannon's diversity measurement. We are continuing to analyze these data to gain additional insights into the factors that may influence green roof microbiome communities. Having a more thorough understanding of these green roof microbiomes will give the urban soils community and city planners improved strategies for maximizing the benefits of green roofs.

BIO – 2 NEURAL MECHANISMS OF SOUND SOURCE LOCALIZATION IN PLAINFIN MIDSHIPMAN

Henna Ali, (UG), Brooklyn College; Christine Liu, Brooklyn College; Kelsey Hom, Brooklyn College; Nick Lozier, University of Washington, Joe Sisneros, University of Washington, Paul Forlano, Brooklyn College

The ability to locate sound sources allows animals to detect prey, avoid predators, and reproduce. While the neural mechanisms of sound localization in mammalian and avian models are well studied, surprisingly little is known about sound localization mechanisms in other vertebrates, especially fish which represent the oldest extant group of vertebrates. Here we have begun to test methods to better understand how bony fish can discriminate directional sound information for sound source localization. In this study, we used a neuroethological model system, the plainfin midshipman fish, Porichthys notatus. Plainfin midshipman were used to test the relative importance of the saccule, utricle, and lagena (otolithic end organs of the inner ear) on the pattern of neural activation in the hindbrain when the inner ear is stimulated in a single direction using a shaker table apparatus. Using phosphorylated ribosomal S6 (pS6) as a measure of neural activity in the hindbrain, the effect of bilateral saccule removal was compared to an intact group and a no stimulus control group. Shortly after, the fish were sacrificed, and their brains were prepared for quantitative fluorescent immunohistochemistry. It was expected that the hindbrain auditory activity using the pS6 marker would be diminished with the removal of the saccule, but greater than the no stimulus control group. Surprisingly, we found that fish with their saccule removed showed greater activity compared to the other groups. This could be due to end-organ removal causing hyperactivity in the hindbrain from an imbalance of inhibitory circuitry. In addition,

females appeared to show greater activation across all conditions which supports a sex difference in auditory sensitivity in this species.

BIO – 3 SEROTONERGIC DIFFERENCES IN VOCAL MOTOR CIRCUITRY BETWEEN MALE ALTERNATIVE REPRODUCTIVE MORPH TYPES OF MIDSHIPMAN FISH

Anosha Arshad (G), Miky Timothy; Paul Forlano; Zach Ghahramani; Brooklyn College

The neurotransmitter serotonin is known to be a modulator of mood, motor patterning, homeostatic control, sensory processing, and social behaviors in vertebrates. Plainfin midshipman fish Porichthys notatus serve as insightful neuroethological models for understanding neural and hormonal mechanisms that guide vertebrate vocal behaviors. Midshipman fish exhibit alternative male reproductive phenotypes: Type Is, are larger in size, are territorial and defend a nest from which they vocally court females with a long duration advertisement call, or hum. Type IIs, are smaller in size and do not court females but instead engage in sneaker behavior, stealing fertilizations of type Is. Residing in the caudal hindbrain, the vocal motor nucleus (VMN) controls vocal muscles on the swim bladder, both of which are significantly larger in type I males. Previously, we demonstrated that type Is have greater serotonin input to the VMN compared to type IIs, consistent with serotonin's role in facilitation of vocal motor output in other vertebrates. Here we hypothesized that the source of differential serotonin may be derived from local cells within the VMN itself. Male midshipman were collected from nesting sites in Tomales Bay, CA. Brains were then processed for serotonin immunofluorescence (-ir) histochemistry. Serotonergic cells in the VMN of both morphs were imaged, counted and measured. Analyses showed that type I males have greater cell sizes, but type II males have higher –ir intensity ; no differences in the number of serotonin cells were found. These findings support the hypothesis that local cells are a source of greater serotonergic input in type I males and that serotonin is a direct modulator contributing to distinct reproductive behaviors in male midshipman fish.

BIO-4 A COMPUTATIONAL INVESTIGATION OF HISTONE-DEACYTELASE-6's ROLE IN OSTEOCLAST DISLODGMENT FROM BONE

Dhruva Chhabra (UG), Shaneen Singh, Brooklyn College

Human Bone constantly undergoes reconstruction via the actions of osteoclasts. This study focuses on the molecular mechanisms of osteoclast disengagement via the action of histone deacetylase 6 (HDAC6). Ras Homolog Family member A (RhoA) and Diaphanous-related formin-2 (mDia2) form a dimer (RhoA-mDia2) that allosterically activates HDAC6. Upon stimulation by RhoA-mDia2, HDAC6 targets alpha-tubulin, microtubule integrity subsequently diminishes, and the adherence of the osteoclast is weakened. Unlike other HDAC proteins, HDAC6 contains two deacetylase domains. This study focuses on RhoA-mDia2 stimulation of HDAC6, and the determination of which catalytic domain is the major player in the deacytelation process. Using computational tools, we have investigated the differential response of the first deacetylase domain (DD1) and the second deacetylase domain (DD2) to RhoA-mDia2 stimulation. We show that HDAC6 DD1 predominates the binding interface with alpha-tubulin before RhoA-mDia2 allosteric activation, and the pattern reverses once RhoA-mDia2 binds HDAC6. We also explored the pathways of HDAC6 inhibition by Cdc42 and Rac1, both of which promote podosome stability. Lastly, we compared DD1 and DD2 of HDAC6 with the HDAC10 deacetylase domain, the closest homologue that disfavors acetyl lysine hydrolysis. A comprehensive sequence analysis combined with analysis of binding interfaces, and in silico mutagenesis experiments all indicate greater similarity between HDAC10's deacetylase domain and HDAC6 DD1. We therefore speculate that DD1 may not be conducive to alpha-tubulin lysine-40 deacetylation in a similar manner as HDAC10. Combining all our

findings, we can reasonably conclude that HDAC6 DD2 preferentially attracts alpha-tubulin, whereas DD1 plays a regulatory function.

BIO-5 ANTIVIRAL ACTIVITY OF CENTRAL AMERICAN PLANT EXTRACTS AGAINST SEVERE ACUTE RESPIRATORY SYNDROME CORONAVIRUSES 2

Nadjet Cornejal (UG), MARC SCHOLAR, Brooklyn College**;** José Fernandez-Romero, Borough of Manhattan Community College. NIH Grant # 5T34GM008078-31

The COVID-19 pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has killed millions of people worldwide, and there is a need to investigate prophylactics or possible treatments to prevent/treat the infection caused by the virus. Naturally occurring compounds, isolated from medicinal plants, may provide bioactive molecules with the potential to inhibit SARS-CoV-2. We studied the antiviral activity of Central American plants used in traditional medicine: Theobroma cacao L., Eriobotrya japonica, Bourreria huanita, and Elettaria cardamomum. Ethanolic extraction of each plant was prepared from seeds, leaves, stems, or flowers. The cytotoxicity and antiviral activity were evaluated using XTT colorimetric assay and SARS CoV 2 pseudoviral model. The half-maximal cytotoxic concentration (CC50) and half-maximal effective concentration (EC50) were determined for each plant extract using GraphPad Prism version 9.3.1. The therapeutic index (TI = CC50/EC50) was also calculated for each plant extract. Most plant extracts showed none to moderate selective antiviral activity with TI values between 1 and 5.5. However, T. cacao beans extract had excellent antiviral activity against SARS-CoV-2 with a CC50 and EC50 of 425.1 and 19.7 µg/mL, respectively, resulting in a TI value of 22. Future studies will look at the phytochemical composition of this extract to identify potential active pharmaceutical ingredients.

BIO-6 THE EFFECT OF ANTHROPOGENIC NOISE ON DOPAMINE SYNTHESIS IN THE AUDITORY SYSTEM OF OPSANUS TAU (OYSTER TOADFISH)

Kelsey N. Hom (G), Rivka H. Hornbacher; Anosha Arshad, Alexus Lawrence, Paul Forlano, Brooklyn College

Aquatic animals are exposed to anthropogenic noise that can directly impact their behavior and physiology. The oyster toadfish (Opsanus tau) is an excellent model species to test the effect of anthropogenic noise on brain and behavior. Oyster toadfish are local to waters surrounding New York City, a large and noisy urban environment, and importantly use an acoustic call to attract mates and reproduce. A previous study showed that exposing oyster toadfish to ship engine noise caused a significant decrease in hearing sensitivity for at least three days. All vertebrates have auditory efferents, subtypes of neurons in the brain that regulate activity of the inner ear. Very little is known about the function of dopamine neurons that act as direct or indirect regulators of the inner ear. We hypothesized that oyster toadfish exposed to intense anthropogenic noise would experience changes in the synthesis of dopamine as measured by phosphorylated tyrosine hydroxylase (pTH), the rate-limiting enzyme in catecholaminergic synthesis, in neurons that directly or indirectly project to the saccular epithelium, the main end organ of hearing. We exposed oyster toadfish to continuous ship engine noise or ambient sound for 30 minutes and examined changes in pTH immunoreactivity (-ir) in the dopaminergic auditory efferent system. We found that the cholinergic auditory efferent nucleus in the hindbrain, an area that has direct inhibitory action on the saccule, showed significantly greater levels of pTH-ir innervation in the noise condition in comparison to the ambient control. Our results suggest that dopamine has a neuromodulatory (likely inhibitory) effect on activity of the inner ear in the presence of noise, in part, through modulation of the cholinergic efferent system.

BIO-7 INFLUENCE OF ENVIRONMENTAL STRESSORS ON DUCKWEED MICROBIOME COLONIZATION

John Lee (UG), Theodore Muth, Brooklyn College

Duckweed are floating aquatic plants that have the ability to remediate waste and chemical contaminants from freshwater sites. In order to fully realize the potential of water remediation by duckweeds, it is important to understand the relationship between major environmental stressors and the kinds of bacteria that colonize the duckweed in the presence of these pollutants. In this study, we collected duckweeds from Prospect Park in Brooklyn, NY (Spirodella polyrhiza and Lemna aequinoctialis). We cultured bacteria from the duckweeds in the lab and used these purified bacterial strains to create a synthetic microbiome. This sets up the necessary experimental conditions where we can test the effects of certain stressors and determine if the synthetic microbiome has a positive impact.
This study is a work in progress, and we still have steps to carry out. Initially, we will colonize sterile duckweed with each bacterial strain individually. We will grow the duckweeds colonized with bacterial strains individually to determine if they have a positive, negative, or neutral influence on the duckweed growth and health. At this point, we will choose the bacteria that were successful in promoting the duckweed's growth and plate them again with each stressor to see how the duckweed will grow (or not grow) in the presence of these pollutants. These results will show how stressors affect the bacterial colonization and health of duckweed. Following this, we will colonize duckweeds with the complete synthetic microbiome of 10-15 bacterial types and we will use next generation 16S rRNA sequencing to determine the colonization profile. These experiments will be important in finding ways to effectively use duckweed as a major source of remediation for our polluted waters.

BIO-8 DUCKWEED MICROBIOME SOURCE

Ruth Medrano (UG) **MARC SCHOLAR,** Brooklyn College, Theodore Muth, Brooklyn College

The interaction of the microbial community with plants is an essential part as they benefit from each other such as in the case of duckweed (aquatic plant). Duckweed is a plant that facilitates the understanding and the study of microbial community interaction because it contains special characteristics such as the small size that makes it easier to keep it in the lab and rapid development as it grows. Duckweed serves as a model system to study the microbial community. Duckweed will be colonized by bacteria located in soil, dust, and leaf surface. Soil, dust, and leaf are the microbiome sources in this experiment. These sources contain a variety of bacteria. Duckweed is not expected to be a selective plant for microbiomes to colonize and interact with bacteria.

BIO-9 THE ROLE OF IGF2BP1, IGF2BP2, AND IGF2BP3 ON HERPES SIMPLEX VIRUS 1 (HSV-1) GENE EXPRESSION

Ebube Michael (UG) MARC SCHOLAR, Brooklyn College; Srinivas K. Puthankalam, New York University; Angus Wilson, New York University.

The Insulin-like growth factor 2 mRNA binding proteins 1, 2, and 3 (IGF2BP1/2/3) are RNA binding proteins that specifically recognize N6-methyladenosine (m6A) modifications in eukaryotic messenger RNA (mRNA). m6A is the most prevalent and abundant RNA modification eukaryotic mRNAs that contributes to various cellular processes, such as pre-mRNA splicing, stability, nuclear transport, and translation. IGF2BP1/2/3 are critical regulators of mRNA metabolism; they play roles in cancer, mRNA storage, stabilization, localization, and translation in an m6A-dependent manner.
Herpes simplex virus (HSV) infections cause painful lesions, viral encephalitis, and blindness. During

HSV-1 infection, there is noticeable relocalization of the cellular m6A machinery from the nucleus to the cytoplasm, suggesting a role of m6A in HSV-1 infection. We performed RNA interference to assess the effects of the knockdown of IGF2BP1/2/3 on HSV-1 gene expression using Normal Human Dermal Fibroblasts (NHDF). Real-time Quantitative Polymerase Chain Reaction (RT-qPCR) showed reduced expression of key Immediate-early (ICP27), early (ICP8), and late genes (VP22 and UL36) upon IGF2BP1, IGF2BP2, and IGF2BP3 knockdown (KD). Immunoblotting showed reduced expression of these viral genes at the translational level for IGF2BP1 KD cells but not IGF2BP3 and IGF2BP3 KD samples. Viral titration revealed a 12-fold decrease in viral titers upon IGF2BP1 KD.
Lastly, we examined the effects of IGF2BP1/2/3 knockdown on viral transcript stability following Actinomycin D treatment. Results show a reduction in transcript levels for ICP27, ICP8, and UL36 upon IGF2BP1 knockdown, suggesting a transcript-stabilizing role of IGF2BP1 during HSV-1 infection.

BIO-10 EXAMINING IMMUNE MEMORY IN SEAHORSES

Dvorah Nelson (UG), Anthony B. Wilson, Martin F. Flajnik, Yoko Ohta; Brooklyn College

The Major Histocompatibility Complex (MHC) is essential to the adaptive immune system of vertebrates. Despite its key role in presenting antigens to T cells, a mechanism required for specific immunity and immune memory, a number of vertebrate species have recently been discovered that lack components of the MHC system. Syngnathid fishes (seahorses and pipefish) show variation in the genetic structure of their MHC, but still mount a robust to the pathogens in their environment. These species represent a unique opportunity to study variation in the adaptive immune system and to analyze how MHC II loss influences immune memory. We are developing monoclonal antibodies for Syngnathid immunoglobulins using hybridomas generated from experimental immunizations of mice with seahorse serum. These tools will be used to measure the primary and secondary immune response in species with and without an intact MHC in an experimental test of immune memory in this unique evolutionary model of adaptive immunity.

BIO-11 UTILITY OF USING TRACKMATE TO TRACK LEMNA MINOR

Jacob Schlamowitz (UG) MARC SCHOLAR, Ruth Medrano, Theodore Muth; Brooklyn College

TrackMate, a tracking algorithm in the imaging software ImageJ, has been used extensively as a tool to track eukaryotic cells, bacteria, and small organisms such as C. elegans as they grow, move, and divide. However, its use in tracking larger objects has scarcely been investigated, and, as such, this research project was performed in order to test the utility of using TrackMate to track larger organisms. The organism we tracked was Lemna minor, a common duckweed species that has been shown to have the potential for bioremediation in polluted waters. A time-lapse camera was used to record L. minor and the videos were analyzed via TrackMate to track movement, divisions, and growth of the duckweeds. Duckweeds were grown in both black and clear boxes and placed against black and white backgrounds in order to find which combination yielded maximal contrast between the duckweed and its environment. It was found that objects that were lighter than the background by a large margin yielded the highest quality detection of objects in TrackMate, and this has been achieved by growing duckweed in a black box placed in a black background. The utility of using TrackMate to track large populations of duckweed is still being investigated; however, the detection algorithm combined with contrast adjustments of the image on imageJ has been used to successfully track smaller populations of duckweeds. This technique has a variety of applications that can be used in future experiments. These experiments include investigations on how the microbiome density of duckweed influences the rate of growth, how

microbiomes of an inoculated duckweed spread throughout a population of sterile duckweeds, as well as investigations of the health of specific duckweeds within a population.

BIO-12 SYMMETRIC FACIAL MOVEMENTS USING NERVE RECORDING AND STIMULATION IN A RAT MODEL OF FACIAL NERVE DAMAGE

Hanan Yafai (UG) BP-ENDURE SCHOLAR, Brooklyn College; Takisha Morancy, Stephanie Tominaga, Mark Stewart; SUNNY DOWNSTATE

The facial nerve can be damaged in different ways and, when damaged on one side of the face, the resulting asymmetric facial movements are very disturbing to the individuals with this damage. Nerve repairs such as grafting a different nerve in the face to contact facial muscles can be made, but these do not restore symmetrical movement. Our work intends to address this functional deficiency. The aim of this study is to use nerve signals from a rat's healthy facial nerve to drive stimulus pulses through a facial nerve that has undergone transection to test whether symmetric facial movement can be restored.
Using rat modal, the facial nerve was exposed on each side of the face by careful dissection. Each nerve was dissected to trace the nerve to its point of emergence from stylomastoid foramen on the skull. After the facial nerves had been exposed bilaterally electrodes were placed on each nerve to record activity.
To create facial nerve damage, the right side nerve was fully transected, paralyzing the right side of the face. Nerve recordings and video analysis showed facial paralysis and lack of vibrissae movement.
To achieve functional restoration of vibrissae motions, we used a window discriminator to identify action potentials from the intact facial nerve and used those action potentials to control a stimulator. On the intact side, episodes of kainic-acid-induced whisking activity. On the injured side, with nerve stimulation triggered by nerve activity recorded on the intact side, video-based quantitative analysis revealed synchronized whisker activity of matching amplitude, duration, and trajectory.
Our results demonstrated that a combined recording and stimulation approach could successfully restore symmetrical facial movements.

CHEMISTRY

CHEM-1 EFFECTS OF JADOMYCIN B DRUG TREATMENT ON PR50 OVEREXPRESSION IN YEAST

Gabriel Cruz (UG), Elizaveta Son, Rianna Segal, Samantha Cobos, Rania Frederic, Mariana Torrente; Brooklyn College

Amyotrophic Lateral Sclerosis (ALS), more commonly known as Lou Gehrig's Disease, is a fatal neurodegenerative disease. ALS is characterized by the degeneration of motor neurons, leading to muscle atrophy, loss of motor control in the limbs, and paralysis. Currently, there is no cure for ALS and there are minimal FDA approved treatments for ALS symptoms.
Various genes are associated with the development of ALS, notably chromosome 9 open reading frame 72, or C9orf72. Hexanucleotide repeat expansions in the C9orf72 gene are widely known as a common cause for ALS development. These hexanucleotide expansions lead to the aggregation of dipeptide repeats, causing inclusions in the motor neurons of ALS patients.
In our lab, we conduct experiments in a yeast model expressing PR50, or 50 repeats of the dipeptide Proline-Arginine. Growing this yeast on galactose media results in overexpression of PR50, and toxicity of the yeast. Through previous experimentation, it was found that overexpression of PR50 is associated with an increase of histone modification H3S10ph, or histone 3 serine 10 phosphorylation. Furthermore, it was found that through a knockdown of Ipl1, a kinase causing phosphorylation of H3S10, there is a decrease in toxicity of PR50 yeast. Histone modifications have various effects on genetic expression, and

as a result, they are good indicators of novel targets for therapeutics.
In previous literature, it was found that the drug Jadomycin B inhibits Ipl1. We observed drug treatment and if it reduced toxicity in yeast where PR50 was overexpressed. After observing a reduction in the toxicity of PR50 yeast through Ipl1 inhibition, we are able to link Ipl1 inhibition to changes in H3S10ph and effectively tie the histone landscape to toxic protein aggregates.

CHEM-2 THE PRESENCE OF (PR)50 IN HISTONE POST-TRANSLATIONAL MODIFICATIONS IN THE CONTEXT OF AMYOTROPHIC LATERAL SCLEROSIS/FRONTOTEMPORAL DEMENTIA

Rania Frederic (UG) MARC SCHOLAR, Brooklyn College; Angelina Grebe, Chaim Janani, Zahra Jamil, Samantha Cobos, Mariana Torrente; Brooklyn College

Amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease, is a neurodegenerative disease that affects voluntary muscle movement. Due to overlap in disease mechanisms, ALS is now thought to form a disease continuum with frontotemporal dementia (FTD), which destroys neurons in the frontal and temporal lobes of the brain. ALS/FTD is linked to many different genetic mutations, which makes it difficult to assign treatment for this incurable disease. A (G4C2) hexanucleotide repeat expansion (HRE) mutation in the C9orf72 gene accounts for the majority of familial ALS/FTD disease. Translation of this repeat forms various dipeptide repeat proteins, the most toxic being an aggregate-prone proline-arginine (PR) repeat. The exact role of these protein aggregates in disease pathology has yet to be elucidated, however several studies have found (PR)50 inclusions in ALS/FTD patient-derived tissue samples. Epigenetics focuses on heritable changes that are caused by the activation and deactivation of genes. One prominent epigenetic mechanism involves histone post-translational modifications (PTMs). Histone modifications impact gene expression and can include installation of groups such as phosphorylation and methylation. Dysregulation of histone PTM levels, such as increased trimethylation of lysine residues on histones H3 and H4, has also become a notable discovery in ALS/FTD patient samples. Through the use of the western blot technique, we probed for histone PTMs by using antibodies to identify changes associated with the presence of (PR)50 in yeast. We have noticed significant increases in H3S10ph as well as acetylation of varying lysine residues on histone H3. We hope our results lead to new therapeutic targets to treat ALS/FTD and other neurodegenerative diseases.

CHEM-3 PROBING THE TRANSITION STATE-TO-INTERMEDIATE CONTINUUM: MECHANISTIC DISTINCTION BETWEEN A DRY VS WET PEREPOXIDE IN THE SINGLET OXYGEN 'ENE' REACTION AT THE AIR–WATER INTERFACE

Shakeela Jabeen (G), Brooklyn College; Belaid Malek, Brooklyn College; Wenchao Lu, Queens College; Prabhu P. Mohapatra, Brooklyn College; Niluksha Walalawela, Brooklyn College; Jianbo Liu, Queens College; Brooklyn College.

Photoreactor and bubble reactors were used to provide mechanistic insight in which singlet oxygen is directionally trapped at the air–water interface. Singlet oxygen was generated either top-down (photochemically) by delivery as a gas to an air−water interface or bottom-up (chemically) by transport to the air−water interface as a solvated species. In both cases, reactions were carried out in the presence of 7-carbon (7C), 9-carbon (9C), or 11-carbon (11C) prenylsurfactants [(CH3)2C=CH(CH2)nSO3− Na+ (n = 4, 6, 8)]. The use of the photo- and bubble-reactors for generation of singlet oxygen in alkene surfactant oxidations led to the 'ene' reaction of singlet oxygen and formation of a secondary and tertiary hydroperoxide at the air–water interface. Density functional theory-calculated reaction potential energy surfaces were used to help rationalize the reaction phase dependence. The reactions in the gas phase are mediated by perepoxide transition states, which evolve to well-defined stationary structures in the

aqueous phase, with covalent C–O bonds and higher binding energy. The combined experimental and computational evidence points to a continuum of the perepoxide ranging from a transition state to an intermediate. The impact of the work goes beyond organic chemistry and is related to biologically relevant models of singlet oxygen at membrane or marine aerosol surfaces.

CHEM-4 ENHANCEMENT OF PHOTODYNAMIC ACTION IN THE PRESENCE OF NATURAL AND REPURPOSED DRUG ADJUVANTS

Lloyd Lappot (G), Brooklyn College; Shakeela Jabeen, Ryan O'Connor, Alexander Greer; Brooklyn College

The eradication of microbe and cancer cells via photosensitization reactions can be improved by adjuvant priming. Several natural compounds and repurposed drugs were reported to enhance photodynamic action. Here, we highlight our work as well as literature in the use of natural compound adjuvants (e.g., saponin A16, caspofungin, cholesterol, amino acids, and vitamins), repurposed drug adjuvants (itraconazole, miconazole, methotrexate, 5-fluorouracil, and capecitabine), and other compounds to improve on photodynamic outcomes. The mechanism by which these adjuvants enhance photodynamic outcome via dark-light and light-dark path will be presented.

CHEM-5 THE EFFECT OF OSTEOCALCIN ON GLUCOSE HOMEOSTASIS IN MICE MODELS

Paul Mastrokostas (UG), Terry L. Dowd, Brooklyn College

Osteocalcin has been known to play significant roles in bone mineral properties and strength. However, controversy exists over osteocalcin's role as a hormone in glucose homeostasis with studies showing conflicting reports of effects on glucose tolerance in osteocalcin knock-out (Ocn-/-) mice. In order to determine whether osteocalcin plays a role in glucose metabolism, glucose tolerance tests (GTT) and insulin tolerance tests (ITT) were performed on 9-month old male wild-type (Ocn+/+) and knockout (Ocn-/-) mice on a pure C57BL/6J background. For the GTT and ITT, mice were fasted for 5 hours during the day with access to water. GTT's were conducted by intraperitoneal injection of glucose (2 g/kg body weight) while ITT's were conducted by intraperitoneal injection of insulin (0.5 Units/kg body weight). Blood glucose was measured from a tail nick at 30 minute intervals for 120 minutes after injection for each test by using a glucometer and test strips. The GTT and ITT results were compared between Ocn+/+ and Ocn-/- mice. A significant main effect of osteocalcin was observed in the performance of GTT's with significantly greater average blood glucose measured for Ocn-/- at every time point except 15 minutes post-injection, indicating impaired glucose uptake. Additionally, a significant main effect of osteocalcin was observed in the performance of ITT's with significantly greater average blood glucose measured for Ocn-/- at every time point except 15 and 30 minutes post-injection, indicating insulin resistance. As a result, the data shows that osteocalcin plays a role in glucose metabolism in older male C57BL/6J mice. In humans, osteocalcin may also be involved in glucose tolerance in diabetes and could be a risk factor for the elderly where it is reduced.

CHEM-6 CHEMICAL MODULATION OF HISTONE MODIFICATIONS IN A YEAST ALS MODEL

Rianna Segal (UG); Mariana Torrente, Samantha N Cobos, Michael Kozlov; Brooklyn College

Amyotrophic lateral sclerosis (also known as ALS) is a neurodegenerative disease that primarily destroys motor neurons in the brain and spinal cord, leading to progressive deterioration of the skeletomuscular system. This disease typically begins in late-adulthood, characterized by an initial muscular weakness and delayed symptoms such as difficulty swallowing and/or breathing. The onset of ALS is mostly sporadic,

however genetics is thought to play a role as well. While genetics do not explain the pathology of ALS, examining the epigenetic mechanisms may provide insight. Prior work has established that mutations in certain genes, such as C9orf72, are associated with familial ALS cases. PR50 is a toxic dipeptide repeat sequence of proline and arginine produced by repeat associated non-AUG translation of the C9orf72 gene, and therefore in patients with ALS. Our unpublished data shows that this repeat sequence is linked to an increase in a post translational modification installed by Aurora B Kinase in human cells; H3S10ph. Barasertib is a commercially available kinase inhibitor for Aurora B kinase in humans that is believed to also be used for Ipl1 in yeast. Aurora B inhibitors such as Barasertib may be a possible ALS therapeutic by targeting specific histone PTM sites. Yeast was used as a model to study the molecular mechanism behind the rescue of PR50 after treatment with an Aurora B kinases inhibitor, Barasertib. Through Aurora B inhibition, we determined that at 4uM Barasertib, our yeast were rescued from PR50 toxicity, as well as a decrease in H3S10ph levels due to Ipl1 inhibition. This will lead to further possibilities of targeting ALS through Aurora B inhibition, and other neurodegenerative diseases.

CHEM-7 CHEMICAL MODULATION OF HISTONE PHOSPHORYLATION IN ALS MODELS

Elizaveta Son (UG), Mariana Torrente, Samantha Cobos, Seth Benet; Brooklyn College

Amyotrophic lateral sclerosis is an incurable neurodegenerative disease characterized by the loss of motor neurons in the spinal cord, brain, and brainstem. This leads to muscle atrophy, speech impediments, paralysis, and eventual death. Many gene mutations are associated with ALS, most notably mutations in the chromosome 9 open reading frame 72 (c9orf72) gene. This mutation results in the formation of dipeptide repeat proteins, one of which is PR50. PR50 was expressed in yeast cells, and we discovered that phosphorylation of serine 10 on histone H3 (H3S10ph) was significantly increased. We hypothesized that inhibition of kinases would restore normal levels of H3S10ph, which would suppress PR50 toxicity. Hesperadin inhibits Aurora B Kinase, a protein that phosphorylates H3S10. Hesperadin was shown to have no significant effects on the suppression of toxicity in yeast cells in the context of PR50 expression. But there are more Aurora B Kinase inhibitors available, showing potential for this direction in treatment search.

CHEM-8 MECHANISM OF CONFORMATIONAL FLEXIBILITY AT THE DISULFIDE BOND: ROLE OF SINGLET OXYGEN ADDITION AND ELIMINATION

Oliver Turque (G), Ryan O'Connor, Alexander Greer; Brooklyn College. Grant CHE-210052

A density functional theory study is presented that provides the evidence that singlet oxygen has a path to engage in reversible bonding with RS–SR to promote rotation about the S–S bond. Mechanistic detail provided by this study reveals a singlet oxygen-induced conformational easing process, which enables greater flexibility prior to departure of molecular oxygen. The role of singlet oxygen in greater conformational flexibility from reversible interactions with alkenes and polyenes has been studied to some extent but is seemingly overlooked with disulfides. Disulfides can allow for an addition of singlet oxygen to yield a persulfoxide [RSS(–+OO−)R] that in one path can lead to oxygen departure. Insight will be provided for conformation relaxation process about the S–S bond prior to this departure. Charge-transfer interactions of singlet oxygen with disulfides will also be discussed.

CHEM-9 MFP OXIDATION PREVENTION IN THE PRESENCE OF METALLIC IONS

Brando Wai (UG), Laura Juszczak; Brooklyn College

Mussel (Mytilus edulis) adhesion is of high interest because it functions under aqueous and high salt conditions. Six different mussel foot proteins (MFPs) have been isolated and sequenced (1). Recent works have analyzed the subtle differences in function of each MFP to ascertain their specific role in underwater adhesion and their adhesive strength. The MFPs with greatest adhesive strength are found to have a higher content of amino acids, 3,4-dihydroxyphenylalanine (DOPA) and lysine. The greater adhesive strength of these MPFs is due primarily to the complexation that occurs between DOPA and metallic substrates. The role of the lysine residues is not as clear. Another key ability of MFPs is the prevention of metal oxidation. This combination of MFP qualities suggests that they have application as a rust (Fe3+) protectant. Studies have shown that ion concentration can affect the adhesion of MFPs, and paradoxically, to increasing the rate of oxidation in metals (2). The effect of ions on the oxidation rate while in solution with MFPs is unknown. This research proposal outlines an experimental approach for clarifying the role of different mono and divalent metallic ions in MFP adhesion and the oxidation/reduction of adhesion substrates.

ENVIRONMENTAL SCIENCE

ENVIRONMENTAL SCIENCE-1 DEVELOPMENT OF SOIL SURVEY METHODS FOR URBAN AREAS

Kohinoor Begum (G), Brooklyn College; Zhongqi Cheng, Brooklyn College; Theodore Muth, Brooklyn College; Peter Groffman, Brooklyn College; Olga Vargas, USDA-Natural Resources Conservation Service; Donald Parizek, USDA-Natural Resources Conservation Service, Northeast Region, Donald Parizek, USDA-Natural Resources Conservation Service, Northeast Region. Grant: NRCS, USDA

Urban soils are the foundation of urban ecosystems and play a vital role in long-term urban sustainability and resiliency. Accurate soil surveys of urban areas should be done at high resolution since extensive human activities often result in urban soils being highly disturbed, and spatially variable. Conventional USDA-Natural Resources Conservation Service (NRCS) methods take considerable time for full characterization of collected soil samples. This limitation could be overcome by geophysical tools such as, ground-penetrating radar (GPR) and electromagnetic induction (EMI), which can image large areas in a relatively short time without excavating the soils. These tools can map subsurface features and predetermine the degree of heterogeneity, which can provide useful information for representative site selection. How well these geophysical data correlate with site characteristics, however, has not yet been well established. In this project approximately 14 soil series covering a wide range of soil conditions will be investigated across New York City. From 4 sites, bulk density samples and bulk samples were already collected for laboratory determination of dynamic soil properties like, pH, soluble salts, TOC, readily labile C and N using standard protocols in the NRCS Field and Lab Analysis. In addition, GPR and EMI will be used to identify vertical differences in texture, artifact content, thickness of layers, and depth to the water table or restrictive horizons at each site. The results will be compared with conventional methods to evaluate the feasibility of these new methods. Our findings and the soil survey methods developed will help soil practitioners and decision-makers in protecting, conserving, and managing urban soils for an ever-expanding world population.

HEALTH AND NUTRITION STUDIES

HNS-1 HIGH PSYCHOLOGICAL DISTRESS AND LOW SOCIAL SUPPORT EXPLAIN 10-YEAR CVD RISK IN US-BORN BUT NOT FOREIGN-BORN NEW YORKERS: NEW YORK CITY HEALTH AND NUTRITION EXAMINATION SURVEY (NYC HANES) 2013-2014

Maria Farag (UG), Margrethe F. Horlyck-Romanovsky, Brooklyn College

The aims of the study were to
• compare 10-year CVD risk between US-born and foreign-born New Yorkers
• determine the effects of psychological distress and social support on CVD risk and how they differ by nativity and gender.
Using NYC HANES 2013-2014, we estimated the Framingham Heart Study's 10-year CVD risk score based on age, BMI, diabetes, hypertension, and smoking. Chi-square analyses compared the prevalence of health-related characteristics between US-born and foreign-born New Yorkers. Multivariate linear regression estimated CVD risk stratified by nativity and gender; predictor variables included serious psychological distress (SPD), moderate-to-severe depression, and social support. Among the US-born (42 years, 50.8% female) and foreign-born (46 years, 54.4% female), the prevalence of high CVD risk was 32% and 44% respectively. Compared to married/partnered people, single people had lower CVD risk while widowed/separated people had higher CVD risk. CVD risk of US-born males with SPD was 7.5 points higher compared to those without SPD. US-born females with low social support had an average CVD risk that was 2 points higher than counterparts with high social support. US-born Asians (B= -4.3, $P<0.05$) had lower CVD risk than US-born Whites. Among the foreign-born, CVD risk was not explained by SPD or social support. Nevertheless, Black women (B= 7.6, $P<0.05$) had higher CVD risk compared to White women. Stress and lack of social support appear to increase CVD risk only among US-born New Yorkers. CVD risk of US-born men is more influenced by mental health while social networks may be more relevant to cardiovascular health among US-born women. CVD risk of foreign-born New Yorkers is partly explained by socioeconomic status and race especially among women.

HNS-2 BACTERA EXPRESSION AND PROTIEN PURIFICATION OF ABHD5

Cassandra Felix (UG) MARC SCHOLAR, Brooklyn College; Mark Hachicho, Jasmine Williams, Jorge Matias Caviglia, Brooklyn College

ABHD5 is a protein important in regulating hydrolysis of triacylglycerol (TAG) by activating adipose triglyceride lipase (ATGL). Mutations that inactivate ABHD5 cause an accumulation of triacylglycerol (TAG). With an increased presence of ABHD5, there is an increase in the activity of ATGL. Therefore, ABHD5 is proposed to be a co-enzyme that promotes the activation of PNPLA2/ATGL. Much uncertainty exists regarding the mechanisms of ABHD5. However, it is hypothesized that ABHD5 is itself an enzyme. To study the function, ABHD5 is expressed in Escherichia Coli cell cultures. Secondly, an SDS-PAGE is used to separate protein samples by the molecular weight, followed by an Immunoblot/Immunodetection used to detect the presence of ABHD5. In the next step, ABHD5 will be purified by Immobilized Metal Affinity Chromatography (IMAC) for functional assays. This project aims to assess the optimal conditions of protein purification and data that would contribute to determining the physiologic and biochemical functions of ABHD5.

HNS-3 EXPRESSION AND PURIFICATION OF THE LIPASE ATGL/PNPLA2

Mark Hachicho (UG) MARC SCHOLAR, Brooklyn College; Cassandra Felix, Jasmine Williams, Jorge Matias Caviglia; Brooklyn College

Lipolysis is characterized as a metabolic process where triacylglycerols (TAGs), primarily stored in adipose tissue, break down via hydrolysis into the products glycerol and free fatty acids (FFAs). The enzyme adipose triglyceride lipase (ATGL), also referred to by its respective coding gene patatin-like phospholipase-domain containing 2 (PNPLA2), catalyzes the initial step in adipose triglyceride lipolysis. Mutations that inactivate ATGL/PNPLA2 cause an increase in TAG and a decrease in diacylglycerols (DAGs) and FFAs. It is proposed that ATGL works synergistically with co-enzyme ABHD5, and the overarching goal of this project is to understand their function and role in triacylglycerol lipolysis.
We created a construct of ATGL/PNPLA2 with a polyhistidine-tag, we expressed PNPLA2 in-vitro with E. coli and verified production using gel electrophoresis and western blotting. We intend to move forward with purifying PNPLA2 with immobilized metal affinity chromatography (IMAC) to utilize in functional assays.

HSN-4 ASSOCIATION OF DIETARY PATTERNS WITH OBESITY IN THE CHINESE POPULATION: A SYSTEMATIC REVIEW

Karen Jiang (UG), Xinyin Jiang, Lee Ann Fullington; Brooklyn College

Recent studies characterize dietary patterns in different populations using posteriori factorial analysis and associate them with differential risks of chronic diseases. However, there is substantial heterogeneity in the dietary patterns identified and thus their relationship with diseases. This systematic review attempts to summarize how dietary patterns are associated with obesity in the Chinese populations amid the drastic nutrition transition the nation undergoes during rapid economic development.
We searched for articles from Jan 2000 and June 30, 2021 in PubMed, CINAHL, and Scopus with keywords focusing on the Chinese population: “China” and “Chinese” for the population, and, for the exposures, the keywords including “diet quality”, “nutrition survey”, and “dietary index”.
From the 2556 articles searched, 23 articles were selected. We found that the traditional Chinese dietary pattern was associated with a lower risk of obesity in most of the studies while there were inconsistent results for other dietary patterns including Western and high protein diets and their impact on weight status.
In conclusion, the traditional Chinese dietary pattern characterized with vegetables, rice, and meat was associated with lower risk of obesity. The heterogeneity in characterizing dietary patterns contributes to the inconsistency of how they are associated with obesity in the Chinese population. Future studies should also consider the changes in Chinese diets and the varied diets based on the different regions in China.

HNS-5 ANALYSIS OF LIPID IN CELLS DEFICIENT IN ABHD5

Magie Lenis (G), Jorge Matias Caviglia, Brooklyn College

ABHD5 is a protein essential for the hydrolysis of triacyclglycerols (TAG). Patients with genetic mutations that inactivate ABHD5 accumulate TAG in liver, muscle, and skin, causing neutral lipid storage disease with ichthyosis (NLSDI), a condition which leads to a dry and scaly appearance of the skin. ABHD5 has been proposed to activate adipose triglyceride lipase (ATLG), the main lipase of TAG, thereby enhancing the hydrolysis of TAG into diacylglycerols (DAG). However, the mechanism by which ABHD5 activates ATGL has not been determined. We propose that ABHD5 catalyzes a reaction which converts the 1,3-DAG

produced by ATGL into sn-1,2(2,3)-DAG. ABHD5, by using as substrate 1,3-DAG, which is the product of ATGL, would relieve product inhibition of ATGL, thereby activating TAG lipolysis. If our hypothesis is correct, ABHD5 loss-of-function mutations would lead to increased 1,3-DAG and decreased sn-1,2(2,3)-DAG. To study the function of ABHD5 in lipid metabolism, we are developing a method to measure 1,3-DAG and sn-1,2(2,3)-DAG. We used cultured skin fibroblasts from a patient with an inactivating mutation in ABHD5; normal skin fibroblasts (WS-1) served as our controls. After adequate proliferation, the cells were harvested, and their lipids were extracted using the Bligh and Dyer method. Lipids were separated by thin layer chromatography (TLC) on silica gel-coated plates with chloroform and acetone (96:4, v/v) as the development solvents to ensure DAG separation. Standards for sn-1,2-DAG and 1,3-DAG were used to identify and recover the DAG isomers from the samples. Following recovery, DAG isomers were derivatized using dansyl chloride to produce fluorescently labeled molecules to increase detection sensitivity, which will allow us to determine amounts of each isomer.

MATHEMATICS

MATH-1 NETWORK RECONSTRUCTION AND VERTEX CENTRALITY MEASURES

Vadym Cherniavskyi (U), Gabriel Dennis, Sandra Kingan; Brooklyn College

Many real-world phenomena have been modeled as networks. A network (graph) consists of a set of vertices and pairs of unordered vertices called edges or links. For example, a social network of people where the vertices are people, and the edges are relationships. A vertex centrality measure assigns a number to every vertex of the graph with the goal of ranking vertices. For example, the degree of a vertex is a straightforward measure of importance in the sense that a person who knows many people is important. There are a few other measures of centrality such as betweenness centrality, eigenvector centrality, and PageRank which is Google's algorithm for determining the importance of a webpage.
We adopt an approach to vertex centrality based on the deck of vertex deletions. It is motivated by the Vertex Reconstruction Conjecture, which asks whether a graph G with n vertices can be reconstructed from its deck of vertex deleted subgraphs.
We measure the impact of vertex v by removing it and considering the subgraph G-v. Then various parameters can be calculated for G and compared with the corresponding parameters for G-v. When this is done for all the vertices, we get a ranking, thereby obtaining a centrality measure.
We examined the largest eigenvalue of the adjacency matrix of the graph. This parameter is a key quantity in the study of processes such as a virus spreading on a graph, synchronization of coupled oscillators, stability of couplings in the brain, etc. The inverse of the largest eigenvalue is the epidemic threshold in a non-linear dynamical system model of viruses spreading on a graph. We present the results of our investigation into the largest eigenvalue of a graph. This is joint work with Gabriel Dennis and Professor Sandra Kingan is our faculty advisor.

PHYSICS

PHYS-1 CHARACTERIZATION OF ELECTROSPUN POLYMER/MOF FIBERS

Fariha Ahmed (UG), Brooklyn College; Tawhid Pranto, Hunter College, Domenec Paterno, Brooklyn College, Sophia Suarez, Brooklyn College. Award # 2034643

The development of materials with better nanofiltration properties is one of the current research objectives worldwide. It has been shown that composite polymer/metal organic frameworks (MOFs) made into thin films and multilayered fibrous materials have filtration properties. However, these

properties depend on several factors including the MOF type and concentration, the polymer type and concentration, and the method of synthesis. With regards to the method, electrospinning has been shown to create the most reproducible structural morphology and corresponding properties compared to casting and similar methods. Because of this, we have electrospun various polymer fibers and polymer/MOF fibers and characterized them using 1H and 13C Nuclear Magnetic Resonance (NMR) spectroscopy. The main objectives are to characterize the various interactions (MOF-polymer, polymer-polymer, etc.) as they are affected by the investigative variables (MOF characteristics, polymer characteristics, etc.) to determine how to control and enhance the local electric field gradients (EFGs) and their alignments. This is the first step in our efforts to develop better nanofiltration materials.

PHYS-2 THE EFFECTS OF DEEO ULTRAVIOLET LIGHT ON DNA/CHROMOSOMES OF GROWING PLANTS.

Jack R. Edelman (G), Nikesh Maharjan, Nikesh Maharjan, Mim Nakarmi, Brooklyn College

Growing root tips of the garden onion Allium cepa were irradiated with ultraviolet light for 60 seconds using a Safe and Healthy Disinfecting ultraviolet lamp, modelMO2PK, Inner CodeSHUV2-MO1 in order to assess chromosome (DNA) damage in the form of chromosome aberrations over the next cell cycle. Twenty four hours later root tips were fixed in Carnoy's Solution (Ethanol:Acetic Acid, 3:1) and macerated in 2% pectinase solution to remove the cell walls. Root tips were then stained for several hours in Aceto-Orcein, then squashed on microscope slides under plastic cover-slips. Some root tips were further exposed to deep UV light of wavelengths in the range of 400-200 nm for several minutes in order to assess additional chromosome damage after staining. Aberrations searched for were chromosome gaps, breaks, exchanges, pulverizations, stickiness and other anomalies. Results may indicate the effects of deep UV light on cells undergoing cell division (mitosis), and, by extension, the dangers of ozone depletion in our current/future planetary environment, due to air pollution by chlorofluoro carbons (CFCs) and other pollutants known to destroy the ozone layer.

PHYS-3 FABRICATION OF ULTRA-SHARP PLATINUM-IRIDIUM TIPS FOR SCANNING TUNNELING MICROSCOPY

Owen Henry (G), Mark Pena,Jacob Kinnaman, Mim Nakarmi, Brooklyn College

General optical microscopes allow scientists to see objects normally invisible to the naked eye, normally magnifying objects from 40X to 400X, which roughly translates to roughly 100 micrometers. This level of magnification is suitable for observing biological objects at the cellular level, but inadequate for anything smaller. If one needs to study the atomic structure of a material, the level of magnification needs to observe objects around 0.1 nm. To accomplish this, scientists turn to the scanning tunneling microscope (STM). An STM functions by leveraging a curious property of quantum mechanics known as quantum tunneling. A sharp, charged probe is moved close enough to a surface that a tunneling current flows. From here, both the position of the probe and current is measured, and the surface is mapped by a computer by scanning the probe current on the surface. The scope of this experiment is to study different methods for the fabrication of Platinum-Iridium (Pt-IR) tips for the use of scanning tunneling microscopy to study the atomic geometry of a Highly Oriented Pyrolytic Graphite (HOPG) sample. The two manufacturing methods being used were mechanical shearing/separation, and electro-chemical etching utilizing a concentrated saline solution of acetone, calcium chloride (CaCl2), and (H2O). The ability to fabricate these tips with consistent accuracy and sharpness opens the door to cheaper and more abundant supplies of usable STM probes, aiding researchers in fields such as material science and nanotechnology. In this work we present surface morphology of HOPG and other samples using the tips prepared.

PHYS-4 INVESTIGATING THE TEMPERATURE DEPENDENCE OF CARRIER DENSITY AND MOBILITY OF LIGHTLY-DOPED SILICON SAMPLE

Zachary T. Landers (UG), Brooklyn College, Justin Rivera, Tahir Zogaj, Mim Nakarmi, Brooklyn College

This experiment explores the electrical transport properties of condensed matter. Electrical transport deals with the flow of electrical charges, including their number density and their ability to move through matter. In this work we measured the carrier density and mobility of a lightly-doped silicon sample at different temperatures. We worked with the TeachSpin Condensed Matter Physics (CMP) apparatus. In the room temperature measurement, we obtained carrier concentration of 5.5 x 1017 cm-3 and mobility of 249.6 cm2/Vs. The vacuum system & liquid nitrogen (LN2) in this apparatus allowed us to take measurements of resistivity and Hall voltage at temperatures ranging from 80 to 320 K. Semiconductor diode temperature sensor was calibrated for the measurement of temperature. We also designed an amplifier which we used to measure the small Hall Voltage in the sample. We will discuss the temperature dependent behaviors of the carrier concentration and mobility of the sample. From the temperature dependent carrier concentration thermal activation energy of the dopant can be determined.

PHYS-5 MEASUREMENT OF SPIN-LATTICE AND SPIN-SPIN RELAXATION TIME OF HEAVY MINERAL OIL, COPPER SULFATE, DISTILLED WATER, AND DILUTED HONEY SAMPLES

Gurneet Signh, **Johnson Lin (UG)**, Sarah B. King, Mim Nakarmi, Brooklyn College

Pulsed nuclear magnetic resonance (PNMR) spectroscopy is an analytical technique used in science to determine the physical, chemical, and biological properties of matter. This is a common practice in modern medicine to perform non-invasive diagnostics of the human body. The purpose of this research is to study and investigate the spin-lattice and spin-spin relaxation times of different samples such as heavy mineral oil, copper sulfate solution, distilled water, and diluted honey, and compare them with known values. Using TeachSpin PSA-1 consisting of an oscilloscope, spectrometer, and magnet, the spin-lattice and spin-spin relaxation time were determined using techniques of two pulse-zero crossings, free induction decay, and multiple pulse-spin echoes. The spin lattice relaxation time (T1) is measured to be 13.4171ms, 14.1384ms, 28.4211ms for 100 mM, 50 mM and 25 mM solutions, respectively. Similarly, spin-spin relaxation time (T2) is measured to be 7.5237ms, 8.5207ms, 25.8465 ms for 100 mM, 50 mM and 25 mM solutions, respectively The spin-lattice and spin-spin relaxation time of copper sulfate decreased exponentially with increasing concentration. We will also discuss the results of other samples such as heavy mineral oil, distilled water and diluted honey.

PHYS-6 OBSERVING ABSORPTION SPECTRUM OF RUBIDIUM WITH DIODE LASER SPECTROSCOPY

Ada Maldonado (UG), Jacob Flickinger, Ariel Rukhlis, Mim Nakarmi, Brooklyn College

The goal of this project is to observe the absorption line spectrum of the rubidium gas using TeachSpin's "Diode Laser Spectroscopy". The gas absorbs light from a laser beam, produced by a semiconductor diode while passing through a rubidium cell. The wavelength is tuned over the temperature and current of the diode and the line width which is extremely sensitive to optimal feedback is tuned from the diffraction grating. We found the optimal setting for the cell temperature is 52℃. We also optimized the physical grating, beam attenuation, and the current through the diode, to which we apply a ramp function to scan over a range of frequencies. In order to isolate the absorption spectrum from the ramp, we split the laser beam using a beam splitter before its arrival at the cell and subtracted the

non-absorbing beam from the absorbing beam at detectors. This allows us to observe the expected Doppler broadened absorption spectrum with four absorption dips, which represents the transition energy of the rubidium atom. From these results, there are two isotopes Rb-85 and Rb-87 each having separate transitions frequencies that follow the typical absorption spectrum for a rubidium atom. We will also discuss the spectrum observed by the pump-probe technique to overcome Doppler broadening and achieve precise values for the spectral lines by experimenting with saturated absorption spectroscopy.

PHYS-7 MULTI-NUCLEAR (1H and 13C) MAGNETIC RESONANCE (NMR) OF ELECTROSPUN POLYMER/MOF FIBERS

Tawhid Pranto (G), Fariha Ahmed, Domenec Paterno, Sophia Suarez, Brooklyn College. Award # 2034643

The benefits of better nanofiltration materials extends beyond applications in personal protective equipment, and includes others such as water membrane treatments, nanoreactors, and chemical catalysis. Currently, the use of nanoscale multilayered composite polymers integrated with metal organic frameworks (MOFs) offers one of the best solutions. In general, polymers comprised of nanoparticles offer greater interfacial areas with decreasing separation between nanoparticles. They are tunable with dependencies on the characteristic of the nanoparticles (size, shape, etc.), and the polymer (molecular weight, crystallinity, etc.). Additional tuning can be accomplished through the resulting composite's characteristics (component concentrations, polymer-nanoparticle interactions). Due to the various tuning parameters, fundamental studies on their filtration mechanism and properties are needed.
In our work, we have prepared electrospun polymers and polymer/MOF fibers as the baseline for the investigation into their electrostatic filtration properties. Polymers studied include polypolyvinylpyrrolidone (PVP), polyacrylonitrile (PAN) and polyvinyl chloride (PVC), and the MOF incorporated is ZIF-8. Multinuclear (1H and 13C) magnetic resonance (NMR) spectra will provide information about the local interactions between the various polymers, as well as between the MOFs and the polymers. Preliminary results show the addition of ZIF-8 increases the crystalline component in the MOF-free spectrum, while decreasing its more mobile component. These results and others will be discussed fully in our presentation.
The work at B.C. was supported by the National Science Foundation, Solid State and Materials Chemistry Program, Division of Materials Research, RAPID award # 2034643.

PHYS-8 - CLIMATE-CHANGE AND ITS SOCIAL IMPACT ON PAKISTAN

Muhammad Siddique (G), Brooklyn College, Micha Tomkiewicz, Brooklyn College

According to German Watch, Pakistan has been ranked in top ten of the countries most affected by climate change in the past 20 years.
Disequilibrium brought about by climatic variability, manifests in the form of social and political unrest. Proper mitigation can prevent the country from severe consequences, being caused by human activities such as burning of fossil fuels, deforestation, and farming.
Databases are being analyzed to forecast climate changes in future decades.
Although the link between political structure and climate changes is ill-defined. Climate change creates social and economic stress and is mitigable if policy frameworks are flexible enough to change the national narrative of climate change adaptation and asset conservation.
Pakistan has signed the various agreements and committed to UN and regional climate goals. Country is trying to comply with commitments while working on coal projects, on parallel. Social and political

stresses brought about by climate change are deeply tied to the existing social structure, political configuration, and historical context of the country.
This work will highlight the mitigation needed at grassroot level towards this subtle and severe climatic issue.

PHYS-9 OPTICAL STUDY OF GALLIUM NITRIDE USING DEEP UV PHOTOLUMINESCENCE SPECTROSCOPY

Mario Sugrim (UG), Kevin Ramsaroop, Hunter Sullivan, Jack Nobleman, Nikesh Maharjan, Mim Nakarmi, Brooklyn College

The band structure of wurtzite gallium nitride (GaN) enables its versatility in light emitting diode manufacturing and other optical industries. In this study, the band structure has been probed using photoluminescence (PL) spectroscopy. PL was measured at different temperatures, ranging from 10 K to 285 K, in order to understand the effect of temperature on the band structure. Excitation lasers of 266 nm and 200 nm were used separately at these temperature ranges. Using the 266 nm excitation laser, the main emission peak was observed at 3.47 eV at 10 K. As the temperature of the sample increased, significant redshifting was observed; the main energy peak occurring at 3.42 eV at a temperature of 285 K. Line width broadening was also observed associated with the increasing temperature. Each significant peak was tracked during the temperature changes and fitted to the Varshni equation in order to determine their respective α and β constants. Using the varshni equation fitting and the temperature dependence, a free exciton, a donor bound exciton, and a phonon replica were identified; occurring at 3.49 eV, 3.46 eV, and 3.41 eV respectively at 10 K. We will also discuss the effect of excitation by laser wavelength 200 nm (6.2 eV), which has energy much higher than the bandgap of GaN, on the PL spectra.

PSYCHOLOGY

PSYC-1 CONCEPTUALIZATION OF PARENTAL INVESTMENT IN PSYCHOLOGY

Michela C. Arlia (UG), Brooklyn College, Yana Kuchirko, Brooklyn College, Michelle Spiegel, University of California Irvine

Over the past 50 years, scholars have increasingly paid attention to the role of parents in shaping children's development in ways that promotes school success. Early conceptualization of parental investment centered on biological facets of development, focusing on the relation between gender differences in parental mating behavior and investment in offspring. Current conceptualizations focus predominantly on the time, activities, and money parents spend on children's educational resources to promote their cultural, social, and economic capital. These trends suggest that how scholars conceptualize parental investment may have shifted over time. Moreover, understanding parenting behaviors through the lens of economic terms suggests a shift in cultural understanding of parent-child relationships. There is a gap in prior research on understanding how conceptualizations of parental investment have shaped in line with changing trends of thought. The aim of this project is to: examine how the concept of parental investment changed over time. I coded 244 articles found within PsychInfo that had "parental investment" in the title. The articles ranged from the late 1970s through present day, and highlighted seven main theorists in parental investment and their contribution to the theories. By analyzing the ratio of all individual theorists mentioned within the articles over time, we get a glimpse into how the term "parental investment" has been theorized across the decades. I hypothesize that Trivers' original findings have continued to influence how scholars conceptualize parental investment research over time, with other investment theorists such as Gary S. Becker and Rand Conger increasing in citations due to growing influence of economics on psychological thought.

PSYC-2 A WITHIN-SUBJECT PARADIGM FOR EXPLORING THE NERUAL MECHANISMS OF LATENT INHIBITION THROUGH TASTE AVERSION

Adelle Ayash (UG), Brooklyn College; Norman Tu, Brooklyn College; Mia Kang, Graduate Center Guillem Esber, Brooklyn College

Latent inhibition is a learning phenomenon implicated in creativity and schizophrenia. In LI, which is a commonly used paradigm, a cue that is repeatedly exposed without consequences shows a subsequent retardation in learning when it is paired with a relevant outcome. Another commonly used paradigm is taste aversion learning which is a biological tendency in which an organism learns after a single experience to avoid a food with a certain taste, if eating it is followed by illness. While theoretical and neurobiological advances have been made in understanding LI and taste aversion, experiments of within-subject designs studying the techniques are few and far between. This is a pity for within-subject designs that aid us in furthering our knowledge in neuroscience techniques. In our experiment, we tested for LI by pre-exposing select rats to one flavored pellet, being chocolate, and other rats to another flavor of pellet, being sucrose. Using counterbalancing techniques within our design we injected the rats with LiCl to cause illness in order to possibly create an aversion to pellet flavor they ingested prior. Our hope was that the preexposure to the pellet flavor would cause a retardation in learning the aversion, also known as LI. Our results displayed such an outcome and the rats indeed ate more of their pre exposed flavor even after the taste aversion techniques were applied. The implications of these results are critical in furthering our knowledge of neuroscience and in refining neuroscience techniques.

PSYC-3 CAN PSYCHOPHYSIOLOGY PREDICT THE STRESS RESPONSE TO COVID-19?

Elisheva Dusowitz (UG), Touro University, Liat Kofler, Brooklyn College, Yu Gao, Brooklyn College. Award #: 2050755

Introduction: In response to COVID-19, individuals had different stress and health reactions to the public health efforts to control the virus, including quarantining and social isolation. Research shows that psychophysiology may serve as a marker in predicting psychological and behavioral responses to traumatic events such as COVID-19. We aim to investigate if lower heart rate variability (HRV) and heart rate (HR), reflecting poor emotion regulation and high susceptibility to environmental influences, may be associated with poor psychological and mental health outcomes during the pandemic.
Methods: A group of adolescents (N = 33, 55% female) from Brooklyn, NY, participated in the study. Their HRV and HR were recorded during a 2-minute rest period in our laboratory when they were 13-16 years old. Three months after the pandemic's rise, 27 of the participants consented (aged 15-17 years) to complete surveys via Qualtrics to assess their depression, anxiety, somatization symptoms, and negative affect.
Results: HR was positively associated with negative affect ($r=0.379$, $p < 0.05$). No other significant correlations were found.
Conclusion: While psychophysiology has shown to predict the stress response to COVID-19, our study only provided partial support to this proposition. The limitations and implications of these findings will be discussed.

PSYC-4 THE GOOD, THE BAD, AND THE TASTY: HOW THE COVID-19 PANDEMIC SHAPED THE FOOD CHOICES OF CUNY UNDERGRADUATES

Arielle N .Edwards (UG), Brooklyn College, Tanzina Ahmed - Cuny Kingsborough Community College, Jacob Shane, Brooklyn College, Rositsa T. Ilieva -CUNY Graduate School of Public Health and Health Policy, Stacia Reader -CUNY Bronx Community College, Charmaine Aleong -CUNY Bronx Community College, Ho Yan Wong - Columbia University

Introduction: Food insecurity -- defined as inadequate “access at all times to enough healthy, affordable, and culturally appropriate food to lead a healthy lifestyle” (USDA, 2018) -- was a major issue facing college students even before the pandemic. This study investigated how the pandemic affected CUNY college students’ access to food and shaped their food behaviors.
Methods: We collected data via an online survey from 434 undergraduate students attending three CUNY colleges between the Fall 2021 and Spring 2022 semesters. Values analysis helped us comprehend and highlight important changes that had (or had not) occurred due to the COVID-19 outbreak.
Results: Two major categories of codes were created to apply to the set of narratives: positive change and negative change brought on because of the COVID-19 pandemic. Positive change denotes when participants expressed beneficial impacts driven by the pandemic, with one common example being the development of cooking skills. Negative change conveys troublesome issues that arose in students' lives during the pandemic, including the frequent mention of financial problems.
Conclusion: Students experienced many changes -- both positive and negative -- in how they bought, used, and ate food over the course of the COVID-19 pandemic. These results can guide our institution’s efforts to support food-insecure students.

PSYC-5 EMOTION REGULATION IN FACE-TO-FACE AND COMPUTER MEDIATED COMMUNICATION.

Yisroel Fishman (UG), Cheryl Carmichael; Brooklyn College. Award # 2050755

Emotion regulation (ER) is crucial to well-being. Much of ER takes place interpersonally, making our social network vital to ER success. People increasingly rely on mediated communication (text, phone, video chat, email). However, existing literature does not examine differences in mode of communication for interpersonal emotion regulation (IER) attempts, or the effectiveness of IER attempts as a function of communication mode. Computer mediated communication (CMC) is less able to convey nonverbal cues (facial expression, vocal tone, etc.) contrasted with FtF communication.
This project examines frequency of IER attempts made via FtF and CMC, and whether there are differences in ability to effectively regulate emotions as a function of communication mode. In a seven week longitudinal study 221 undergraduates reported on seven different types of interpersonal emotion regulation attempts (calming anxiety, cheering sadness, calming anger, savoring happiness, amplifying anger, reducing guilt, reducing embarrassment) with their social network (romantic partner, family, friends, etc.) and noted the mode of communication for each (in-person, text-message, phone, video chat, email).
Participants most frequently made IER attempts via text message and least frequently via email. Only in-person IER attempts were associated with better personal well-being outcomes. IER attempts made via text were the least effective in satisfying participants’ ER needs. Across all modes of communication, the effectiveness of the social network was positively associated with personal and relational well-being outcomes. The effectiveness of one’s romantic partner was especially strongly associated with relational well-being outcomes. There were no gender differences in any of these patterns.

PSYC-6 A REVIEW OF BEHAVIORAL MANAGEMENT PROGRAMMING IN SUMMER CAMPS

Frayda Cohen (G), Concordia College, Elisabeth Kac, Hofstra University, Jennifer Drake, Brooklyn College, Laura Rabin, Brooklyn College, Faigy Mandelbaum, Hofstra University

Summer camp attendance aids healthy child development and is associated with improved physical, psychological, and social-emotional functioning1-3. Over 14 million people attend summer camp annually, a number that is increasing over time4. Camp attendance is associated with an improvement in identity, social skills, values, independence, and peer relationships2-4. Despite camp benefits, there is a lack of summer camp mental health programming that needs to be addressed. Overnight camp staff are

generally unequipped to deal with campers' mental health-related behavioral challenges5. Furthermore, camp mental health workers typically deal with individual camper issues via crisis management, without providing evidence-based intervention or management strategies to camp staff. According to a search of the PsycInfo and EBSCO databases, there are no published evidence-based behavioral management programs that have been implemented in a camp setting. Current programs are either geared towards behavioral management in kids with medical difficulties10 or implemented as standalone programs for children with specific diagnoses1-4, 11-16. Covid-19 has made the necessity of boosting behavioral management programming in camp settings even more pressing as child and adolescent mental health issues have increased greatly during the pandemic 17. This study will review camp behavioral management-related literature and outline a proposal to comprehensively assess the needs of camp directors in managing child behavior at their camps.

PSYC-7 MATERNAL WELLBEING AND SOCIOECONOMIC BACKGROUNDS SHAPING CHILDREN'S SOCIO-EMOTIONAL DEVELOPMENT

Osamuede Guobadi (UG), Brooklyn College, Yana Kuchirko, Brooklyn College. Award # 2050755

Extant literature finds robust relations between parental socioeconomic status (SES) and children's social and emotional skills. Specifically, studies find that children growing up with more modest socioeconomic standings have shown higher sensitivity to social situations and emotion regulation. Most prior research examined parental SES by measuring education levels and income. However, there are other factors that mediate this relation, such as the stress caused by living in conditions of scarcity. In this study, I examine parental mental health and worry about making ends meet in relation to children's social-emotional development. Specifically, I ask whether maternal mental health and maternal concern about making ends meet shape children's social-emotional skills. Approximately 178 mothers from different ethnic backgrounds (Mexican, Chinese, Dominican, and African American) and their 4-year-old children visited the laboratory, where mothers were interviewed about their children's development (hyperactivity, e.g. fidgeting, attention deficit, difficulty being still; and social skills: stubbornness, irritability, emotional outbursts) and reported on their 1) mental health (e.g., depression); and 2) concerns about making ends meet (economically). Linear regressions and t-tests showed that maternal mental well-being (specifically in mothers who showed signs of depression) had significantly contributed to their children's hyperactivity and social skills. This study furthers the conversation between researchers and community officials to address how one's socioeconomic circumstances can shape children's development.

PSYC-8 NEURAL BASIS OF REWARD TIMING PREDICTION ERRORS IN PAVLOVIAN LEARNING

Munassar (Noah) Hussein (UG), BP ENDURE SCHOLAR, Andrew Delamater**,** Dan Siegel; Brooklyn College

Through simple Pavlovian learning, it is well documented that animals will form new associations between environmental stimuli and food rewards to the extent that the rewards are surprising when they occur, i.e., when there is a "reward prediction error." These prediction errors are often described in terms of a mismatch between actual and anticipated reward values, but the reward's size, type, and time of occurrence are other features that may be important. Our current study investigates the role of time prediction errors in rats with a focus on its underlying neurobiological substrates. We trained 12 rats for 28 days to expect food rewards at different times from stimulus onset in the presence of different predictive cues. During a test session, these relations were maintained for some rats, but they were switched for others to induce time prediction errors. Shortly after the test session, we extracted the rats' brains and then stained for phosphorylated ribosomal protein s6 which is expressed in recently activated

neurons. Preliminary results with a small sample size suggested that the switch group had a significant increase in the number of activated cells in the basolateral amygdala and a reduction in activated cells in the central amygdala as well as in the nucleus accumbens shell. Furthermore, we observed that a high portion of the dopamine neurons were projecting to neurons that were activated within the basolateral amygdala. A replication experiment is ongoing to assess the reliability of these preliminary findings.

PSYC-9 PARENTS' GENDERED CONSTRUCTION OF CHILDHOOD

Onyekachi Wendy Ibe (UG), Brooklyn College, Yana Kuchirko, Psychology dept. Brooklyn College.
Award # 2050755

According to Merriam Webster, a child is a person at the age between infancy and puberty. In the psychological literature, society describes children as being emotionally and physically immature and vulnerable compared to adults, which leads to low autonomy and dependency. Being a child is based on a variety of factors such as history, culture, etc. Beliefs about children are also gendered. Most developmental psychology takes notions of childhood for granted, constructing it as a universal phase of life. Studying childhood and how it is gendered will help us develop new methods for listening to children's voices that will enable both children and adults to cross barriers based on age, experience, and stereotyping that impede communication. There is little research on how parents perceive what it means to be a child and how those beliefs may vary by their children's gender. Parents (N=93) of children between the ages of 3-8 filled out an online survey, where they reported demographic information, along with the first three words they associate with the term "childhood." We coded Parents' open-ended responses for themes using the grounded theory method (Strauss & Corbin, 1987). We coded responses based on whether they 1) signified children versus phase of life called childhood; 2) characteristics of children/childhood based on common themes. Results showed that parents emphasized a variety of qualities of childhood, and their responses varied by child gender. We discussed Findings concerning mothers' orientation to children and "childhood" via cultural and developmental beliefs.

PSYC-10 TRY AND FORGET THIS IMAGE: THE ROLE OF STIMULUS DURATION IN DIRECTED FORGETTING FOR NATURAL SCENES

Patrick Ihejirika (UG), MARC SCHOLAR Brooklyn College**,** Matthew Crump, Brooklyn College

How useful would it be for you to selectively forget events that you choose to forget? Directed forgetting research is a tool used to investigate limitations on deliberate forgetting abilities. In a directed forgetting task people encode individual items and are instructed (cued) to either remember or forget them. A directed forgetting effect is observed when performance on a memory test is higher for remember-cued items than forget-cued items. Directed forgetting effects have been reproduced numerous times, and are commonly demonstrated in tasks using lists of words as the items to be remembered and forgotten (Epstein, 1969). Much less is known about directed forgetting for more memorable stimuli like images, pictures, and visual scenes. Ahmad, Tan & Hockley showed that a weak directed forgetting effect can in fact be observed for image stimuli (2019).

This poster investigates a general memory strength hypothesis of directed forgetting for pictures. According to this hypothesis, pictures are difficult to intentionally forget because they are encoded so well that attempts to forget the information are ineffective. I propose that weakening the encoding strength of images could allow intentional forgetting processes to operate more effectively, causing an increased directed forgetting effect.

My experiments used the same general procedures as Ahmad, Tan, and Hockley (2019). In two

experiments (n=45 each), I reduced encoding strength by manipulating stimulus duration during encoding (2000 ms [original amount], 1000ms, or 500 ms per picture). I predicted that greater directed forgetting would be observed as stimulus duration decreased. I discuss the results of my two experiments in relation to the general memory strength hypothesis.

PSYC-11 COGNITIVE EMPATHY AND ITS RELATION TO OBJECTIVE COGNITIVE TEST PERFORMANCE IN OLDER ADULTS ALONG THE ALZHEIMER'S DISEASE CONTINUUM

Odelia Johnson (UG), BP ENDURE SCHOLAR, Brooklyn College, Laura Rabin, Lillian Behm, University of Nebraska Medical Center, Janelle Beadle, University of Nebraska at Omaha

Introduction. Empathy forms the basis of many social encounters and is essential for understanding others' intentions and behaviors and reacting appropriately. The cognitive component of empathy (i.e., understanding others thoughts and feelings) has been studied in Alzheimer's disease, with evidence of impairment being related to deficits in memory and executive functioning. However, research has not determined whether this finding holds for older adults across the cognitive continuum. Methods. Participants included healthy controls (HC, n = 8), and those with subjective cognitive decline (SCD, n = 11), mild cognitive impairment (MCI, n = 7) and mild Alzheimer's disease (n=1). Ages ranged from 61-90 years (M = 75.2, SD = 8.4). The Social Faux Pas Task (Slessor et al., 2007) was used to assess empathy. Participants read scenarios about characters engaged in a situation where someone says or does something socially inappropriate—and answered questions related to what social faux pas committed. Results. Accuracy scores on the Social Faux Pas Task correlated with scores on the Montreal Cognitive Assessment (MoCA), $r(25)=0.62$, $p < .001$, Repeatable Battery for the Assessment of Neuropsychological Status delayed list and story recall tasks, $r(24)=0.53$, $p< .01$ and $r(24)=0.41$, $p< 0.05$, respectively, and Trail Making Test, $r(23) = -0.56$, $p<0.01$. Conclusion. Greater cognitive empathy was associated with better global cognitive functioning and memory and executive functioning. Those with global and specific cognitive deficits may lack the ability to accurately detect emotions of others and rely more on inhibitory mechanisms (less affected by neurocognitive impairments). Results have important implications for everyday social functioning and the design of effective interventions.

PSYC-12 IMPORTANCE OF RESEARCH INTEGRITY IN A RESEARCH EXPERIENCE FOR UNDERGRADUATES (REU) PROGRAM

Elisabeth Kac (UG), Brooklyn College of CUNY and Hofstra University; Erin E. Reilly, UCSF; Frayda Cohen, Concordia College; Jennifer E. Drake Brooklyn College ; Laura Rabin, Brooklyn College; Faigy Mandelbaum Brooklyn College . Award # 2050755

There is a pressing need for undergraduates to learn research ethics so that they are better equipped to maintain research integrity and respond appropriately to ethical problems1-3. Students have admitted to participating in unethical behaviors if they did not know the proper procedure for reporting an ethical violation3,4. Ten cohorts (n=108) of NSF-funded Research Experience for Undergraduates (REU) students completed a research-focused ethics course. Students' ethical perceptions of research protocols were assessed before and after the course. Students were demographically diverse: Caucasian/White (38.9%), Asian/Pacific Islander (18.5%), African American/Black (20.4%), Hispanic/Latino (13.0%), Middle Eastern/North African (6.5%), and Other (2.8%), ages 18 to 45 (M=24.5, SD=5.63), 75.0% female, 23.1% male, 0.9% LGBT-Q, 0.9% Other, and approximately 50% were first-generation college students. The ethics training was comprised of CITI training and 10 ethics modules. A paired-samples t-test demonstrated a significant increase in students' confidence in their knowledge of research ethics from pre- (M = 2.82, SD = 0.87) to post-test (M = 3.74, SD = 0.54), $t(86) = 9.76$, $p \leq .001$, $d = 1.05$. Additionally, REU students felt better equipped to address research integrity issues. This was seen by students'

responses to the following question, I know what to do if I suspect a breach of research integrity, which significantly increased from pre- (M = 4.47, SD = 1.93) to post ethics training (M = 5.05, SD = 1.36), t(85) = 2.21, p = .03, d = 0.24.

PSYC-13 SPECIFIC AND GENERAL INCENTIVE MOTIVATIONAL EFFECTS OF PAVLOVIAN CUES ON INSTRUMENTAL BEHAVIOR: EFFECTS OF EXTINCTION

Anisa Kaloshi (UG), Dan Siegel, Andrew Delamater; Brooklyn College. Award # 2050755

Pavlovian conditioning is a process that has been shown to result in reward-predictive cues acquiring incentive motivational properties. For example, such cues can energize instrumental responses trained separately with that same or a different reward as that predicted by the cue. These phenomena have been termed, respectively, outcome-specific or outcome-general "Pavlovian-to-Instrumental Transfer" (PIT). Previous studies conducted in our laboratory aimed to assess the temporal expression of both outcome-specific and general PIT effects and whether these effects might be influenced differentially by a Pavlovian extinction treatment. We observed that (a) outcome-specific PIT was expressed earlier in the CS than general PIT, and (b) both types of PIT effects were enhanced when the cues were tested following extinction. The purpose of the present study is to determine if these effects could be replicated. Preliminary data, so far, resembles our earlier findings but we have not yet performed the critical PIT tests.

PSYC-14 GENDER DIFFERENCES IN DISAFFILIATION FROM ORTHODOX JUDAISM: AN EXPLORATORY ANALYSIS

Yehudis Keller (G), Brooklyn College, Rona Miles, Brooklyn College, Alla Chavarga, Brooklyn College; Estee Hirsch, Adelphi University; Pesach Eisen, Brooklyn College

Psychological research on religious disaffiliation is becoming prevalent as more individuals exit their religious groups and practices. In Orthodox Judaism, gender laws and norms dictate the way that men and women live differently from each other, however no research to date has examined gender specifically in the context of disaffiliation from Orthodox Judaism. Our study analyzed data describing the personal experiences of individuals raised as Orthodox Jews who either disaffiliated from the practice (N=387) or continued practicing according to the rules of religion (N=343) through the lens of gender disparities. We hypothesized that certain experiences for those raised in the community would be different for men, women, and non-cisgender individuals, and that gender disparities may also be found between those who remained affiliated and those who had disaffiliated. We found that women experienced parental conflict and discrimination from the community significantly more than men, while men experienced poor secular education and permanent expulsion from Jewish schools significantly more than women. Non-cisgender individuals experienced many of the negative factors to a higher degree than both men and women. When further analyzed by affiliation status, we found that there were greater disparities between the experiences of affiliated and disaffiliated women, than there were between men. These self-reported findings highlight the importance of addressing the impact of gender when researching the differences in experience among those who leave or remain in the practice of Orthodox Judaism.

PSYC-15 DO CHANGES IN HAIR CELL MITOCHONDRIA PARALLEL SEASONAL INCREASES IN AUDITORY SENSITIVITY IN THE INNER EAR?

Alexus Lawrence (UG), BP ENDURE SCHOLAR, Brooklyn College; Jonathan Perelmuter, Brooklyn College; Paul Forlano, Brooklyn College

Female Plain fin midshipman fish experience seasonal, hormone-driven changes in auditory sensitivity at the level of the inner ear that enhances the ability to locate the advertisement calls of males during the summer breeding season. Changes in auditory sensitivity have been linked to an increase of hair cell density, increase in potassium channel expression and most recently, to a decrease in dopamine innervation in the inner ear. In this study, transmission electron microscopy (TEM) was used to measure seasonal changes in synapses and subcellular structures in the saccular epithelium of the inner ear. Interestingly, in the reproductive season an increase in number of ribbon synapses in hair cells was found. Therefore, we hypothesize to see a parallel increase in mitochondria with the energetic needs of increased neurotransmission in the reproductive state. In this study, we will test this hypothesis by measuring the volume of mitochondria within the hair cells from TEM micrographs taken from the inner ear of midshipman females in reproductive and non-reproductive states.

PSYC-16 THE EFFECT OF NARCISSISTIC PERSONALITY TRAITS ON RETALIATORY BEHAVIOR AFTER BEING SOCIALLY EXCLUDED

Abigail Ovitsh (UG), Yu Gao, Brooklyn College, Liat Kofler, The Graduate Center CUNY

Social exclusion is a distressing experience that can often lead to retaliatory or aggressive behavior for some individuals more than others. Previous research has found that people who are higher in narcissistic traits are more likely to take social rejection personally and react more strongly to it. The purpose of this study was to examine whether narcissistic personality traits can moderate an individual's likelihood of engaging in retaliatory aggression after being socially excluded from a group. To index an individual's degree of narcissistic personality traits, participants (aged 18-30 years) completed validated personality questionnaires, such as the NPI (Narcissistic Personality Index) and DTDD (Dark Triad Dirty Dozen). They were then randomly assigned to one of two groups: the exclusion group played a virtual boll-tossing game with two other players that was meant to stimulate an experience of ostracism, whereas the inclusion group played a similar game but got a fair share of the ball. To measure behavioral reactions to rejection, participants were given the opportunity to retaliate against their excluder(s) using the Voodoo doll task. We hypothesized that the exclusion group would be more likely to retaliate than the inclusion group, and such effect would be moderated by narcissistic traits, such that those who score higher on narcissism scores would be more likely to retaliate than those with lower narcissism scores. Results expand on prior literature examining aggressive behavior following social exclusion to include potential personality traits as a moderator for retaliation.

PSYC-17 MULTIFACTED EXPRESSION OF COMFRORT AND DISCOMFORT IN TEACHERS' NARRATIVES ABOUT RACE AND RACISM

Rosena Petit Homme (UG), Yana Kuchirko, Dinorah Hudson, Brooklyn College

Discussions about race and racism are widely thought of as being uncomfortable. Prior work has focused on the various emotions people express and experience to topics about racism. Not only can the topic bring up harsh emotions such as anger, guilt, shame, denial and more, it can also bring up feelings of discomfort as well. (Cheryl Matias, Feeling White 2016). Discussions about race in the classroom has been increasingly emphasized. Most teachers, being new to these certain racial simulating environments, find it challenging when conversations revolving around race arises, creating a distance between not only them and their students but also to their colleges, friends and people in their personal lives. The aim of this study is as follows: how are comfort and discomfort expressed when teachers are recounting their conversations about race with others? 33 ethnically diverse Prek-12 teachers

participated in 2 semi-structured interviews on zoom. The first interview focused on their background and experiences with race. The second interview focused on how race shaped them and their pedagogy. The interviews were video-recorded, transcribed, and later coded based on ways that participants expressed comfort and discomfort through: 1) language; 2) affect/emotions; 3) actions, and 4) body language. Findings showed how most teachers expressed comfort through their actions expressed in their stories. When dealing with discomfort, it was expressed through their emotions as they spoke and shared their experiences. While a majority of the participants were comfortable with discussing race, results suggest how ones race does not affect their comfort level when discussing race. The teachers expressed comfort when discussing their actions but their emotions demonstrated the opposite.

PSYC-18 DIGIT RATIO AS A SEXUALLY DIMORPHIC MEASURE OF FETAL PROGRAMMING: ASSOCIATIONS WITH PSYCHOPATHIC TRAITS AND AGGRESSION

Eliza Popa (UG), Brooklyn College (REU) & John Jay College, Yu Gao, Brooklyn College, Liat Kofler, Brooklyn College

The womb is a critical time period of development and stress exposure in-utero can produce sex-dependent psychoendocrinological effects. Digit ratio of the index and ring fingers (2D:4D) has been used as an indicator of prenatal testosterone exposure. Prior work suggests that the effects of prenatal testosterone exposure on 2D:4D and behavioral outcomes may differ between the sexes due to the opposing hormonal responses to prenatal stress. The current study relates 2D:4D to psychopathic traits and considers sexual dimorphism. It was expected that in girls, high prenatal stress would be associated with low 2D:4D and high reactive psychopathic traits and aggression, whereas in boys, high prenatal stress would be associated with high 2D:4D and proactive psychopathic traits and aggression. Girls (n = 135) and boys (n =120) ages 9 to 12 years participated in the study. Digit lengths of each participant were measured from both hands. Children and their caregivers reported on the child's psychopathic traits using the Antisocial Process Screening Device (APSD; Frick and Hare, 2001). Caregivers also reported on the child's aggression using the Child Behavior Checklist (CBCL; Achenbach, 1991) and retrospectively reported prenatal stress. As expected, results showed that in girls, low 2D:4D was associated with high impulsivity ($r = -0.229$, $p < 0.05$) and high aggression ($r = -0.220$, $p < 0.05$). In boys, 2D:4D was positively associated with narcissism ($r = 0.203$, $p <0.05$) and prenatal stress ($r = 0.261$, $p <0.01$). The findings demonstrate the complex nature of using prenatal endocrinopathy in a sex-dependent manner, and suggests that 2D:4D may be a consistent measure in revealing sex differences in psychopathic and aggressive behavior.

PSYC-19 FAMILY ENVIRONMENT IN RELATION TO SCHIZOTYPY DIMENSIONS AMONG COLLEGE STUDENTS FOLLOWING THE COVID-19 PANDEMIC ONSET

Levi Satter (UG), Brooklyn College, Christopher Liong, Brooklyn College & The Graduate Center of CUNY, Deborah Walder, Brooklyn College & The Graduate Center of CUNY. NIH Grant 5T34GM008078-31

Schizotypy is a multidimensional personality construct characterized by positive, negative, and disorganized dimensions, and predisposes for psychosis risk. Schizotypy aids the understanding of psychosis risk by circumventing illness confounds such as hospitalization and medication effects. Family environment is predictive of symptom severity and psychosis relapse. One study showed individually relevant expressed anger and relationship stress within a household was predictive of increased positive schizotypy. Schizotypy dimension severity has been shown to be sexually differentiated, though no studies to date have examined sex as a potential moderator of the relationship of family environment with schizotypy. In the current study 2,092 undergraduate students (female = 1,507, male = 585) at an

urban, public university completed a broad online survey that assessed schizotypy (total, positive, negative, and disorganized dimensions) using the Schizotypal Personality Questionnaire (SPQ) and family environment using the Family Attitudes Scale (FAS). FAS significantly positively correlated with overall SPQ and all SPQ dimensions ($p < .001$). Its relationship was strongest with disorganized SPQ ($r = .368$) and lowest with positive SPQ ($r = .254$). Positive SPQ was higher among females than males ($p < .001$), whereas negative ($p = .195$), disorganized ($p = .065$), and total SPQ ($p = .679$) did not significantly differ by self-identified sex. Self-identified sex did not moderate the relationship between FAS and schizotypy. Our findings bolster prior literature and a dimensional model of psychosis risk that is sexually dimorphic. Future research examining the relationship of specific family stressors may further elucidate the role of the family environment on schizotypy dimensionality.

PSYC-20 RESTING RESPIRATORY SINUS ARRHYTHMIA AS A MODERATOR BETWEEN EARLY MALTREATMENT AND LATER PSYCHOPATHY/ANTISOCIAL BEHAVIOR IN CHILDREN AND ADOLESCENTS

Juhi A. Thomas (UG), Brooklyn College, Yu Gao

It is known that early child maltreatment influences later psychopathy/antisocial behavior, but not all who were maltreated in childhood develop these traits. This study strives to find what moderates this relationship and allows some children a normal development, while others develop psychopathy/antisocial behavior. Emotion regulation is commonly observed as this missing link, and resting respiratory sinus arrhythmia (RSA) is used to objectively measure emotion regulation. It is hypothesized that resting RSA may moderate the effects of early child maltreatment on the appearance of later psychopathy/antisocial behavior outcomes. This study is the subset of a longitudinal study. During Time 1 (T1), 115 child participants from 7 to 10 years old completed cognitive/emotional tasks and resting RSA values were recorded. Also during T1, the level of child maltreatment was measured using the Conflict Tactics Scale: Parent about Child Version (CTSPC). During Time 3 (T3), when the children were 12 to 16 years old, psychopathy/antisocial behavior was measured using various questionnaires, giving callous-unemotional (CU) traits, narcissism, impulsivity, aggression, and delinquency values. Resting RSA was a moderator between early parental verbal aggression towards the child at T1 and later impulsivity at T3, such that high parental verbal aggression at T1 was associated with higher child impulsivity at T3, but only in those with low resting RSA. In addition, high T1 parental verbal aggression towards the child was associated with higher child aggression, delinquency, and CU traits at T3, and lower resting RSA at T1 was associated with higher child aggression at T3. These results reveal that emotion regulation can influence the development of psychopathy/antisocial behavior.

PSYC-21 LGBTQ+ IDENTITY AND RELIGIOUS DISAFFILIATION FROM ORTHODOX JUDAISM

Gennady Vulakh (UG), Brooklyn College, Rona Miles, PsyD Brooklyn College, Alla Chavarga, Brooklyn College

Religious disaffiliation among LGBTQ+ individuals is a topic of interest as they have been found to disaffiliate at higher rates than their straight counterparts. We are interested in exploring whether LGBTQ+ individuals who disaffiliated from Orthodox Judaism reported LGBTQ+ identity as a reason for disaffiliation, and if they were more likely to report an increased quality of life (QoL) following disaffiliation in comparison to straight disaffiliates. To gather data, we used an online survey which included relevant demographic questions, two open-ended questions asking participants to identify triggers and causes for disaffiliation, and a question regarding QoL change following disaffiliation. In total, out of 115 LGBTQ+ disaffiliated participants who answered the questions regarding triggers and causes of disaffiliating, 18 (15.6%) reported that their sexuality or attitudes towards sexual minorities

was a reason for disaffiliating. A total of 317 respondents answered the QoL question. There was no significant difference between the number of LGBTQ+ and straight respondents who reported an increase in QoL following disaffiliation. While a majority of our sample did not identify sexuality as a trigger or cause for disaffiliation, it is still a reported reason for some LGBTQ+ Orthodox Jews. Our QoL finding of no significant difference may be due to our sample being from a population that was already given social support (through Footsteps). We suggest that more qualitative studies explore the QoL of LGBTQ+ disaffiliated Orthodox Jews, and the role their LGBTQ+ identity plays in disaffiliation.

PSYC-22 ACADEMIC STRESS IN UNDERGRADUATE STUDENTS IN RELATION TO SOCIODEMOGRAPHIC VARIABLES

Jessica L. Wang (UG), Adelphi University, Kathryn M. Fasano, Anjali Krishnan, Rona T. Miles, Brooklyn College, Laura A. Rabin, Brooklyn College

The primary goal of this study was to investigate academic stress in relation to year in school and mental health literacy (MHL) among diverse undergraduate college students. Rising rates of mental health disorders in this vulnerable group, especially during the COVID-19 pandemic, have resulted in increased levels of academic stress (Rabin et al., 2021; Schwartz et al., 2021). Knowledge of MHL (i.e., risk factors, clinical symptoms, and effective treatments for various psychological disorders) can be an important component to a comprehensive interventional approach. Based on previous studies, academic stress levels are expected to vary by class year and gender. Some previous research has also found that MHL mediates stress levels, and varies by class year, with higher class years displaying increased MHL (Miles et al., 2020). In a preliminary analysis, participants were 61 undergraduate students (80.3% female; 57% first and second year students) who completed an in-person academic stress questionnaire that inquired about students' experience of three domains of self-perceived academic stress over the past year (instructor-, performance-, and assessment-related). Students also completed a multiple-choice assessment of MHL. Bivariate correlations and ANOVAs were conducted to test associations between class year and stress. Preliminary analyses showed that scores between academic stress domains were significantly correlated with each other but not with class year or gender. Further analysis of these demographic factors and the mediating role of MHL will be evaluated as the dataset expands. We hope that our findings will have implications for future educational and psychological interventions that aim to both reduce academic stress and enhance MHL in college-aged students.

PSYC-23 OUT OF TOUCH: REDUCED AFFECTIONATE TOUCH MEDIATES THE LINK BETWEEN ATTACHMENT AVOIDANCE AND ATTENUATED SEXUAL INTIMACY

Carly A. Wolfer (G), Graduate Center, CUNY; Cheryl L. Carmichael, Brooklyn College, CUNY

Sexual intimacy is vital to relationship satisfaction and wellbeing. However, people high in attachment avoidance experience lower levels of intimacy and satisfaction. This research explores an important behavioral mechanism responsible for these effects: affectionate touch. We assessed attachment orientation; enjoyment, frequency, and importance of affectionate touch; and sexual intimacy in coupled college students (N=115 individuals, Study 1) and cohabitating committed partners (N=66 mixed-gender dyads, Study 2). Both studies demonstrate that the negative effect of attachment avoidance on sexual intimacy is mediated by reduced affectionate touch, even when constraining effects of attachment anxiety. Study 1 showed a negative indirect effect of avoidance on sexual intimacy through reduced touch ($b = -.35$, $SE = .09$, CI: -.52, -.17, $p < .01$). An APIM analysis of Study 2 showed that, for both males ($b = -.13$, $SE = .05$, CI: -.21, -.06, $p < .01$) and females ($b = -.23$, $SE = .09$, CI: -.39, -.11, $p < .01$), one's own

avoidance predicted one's own lower sexual intimacy indirectly through one's own reduced touch. Three significant cross-partner effects also emerged: 1) a female partner's avoidance is associated with her male partner's reduced affectionate touch ($b = -.40$, $SE = .15$, $p < .01$); 2) a male partner's avoidance is associated with his female partner's reduced sexual intimacy ($b = -.35$, $SE = .18$ $p < .05$); and 3) a female partner's anxiety is associated with her male partner's increased sexual intimacy ($b = .25$, $SE = .17$ $p < .05$). Further research with prospective design is encouraged to supplement these cross-sectional findings that point to the power of affectionate touch as a buffer against negative relationship outcomes associated with attachment avoidance.

PSYC-24 NEUROPSYCHOLOGICAL TESTING AND METACOGNITIVE ACCURACY IN HEALTHY PARTICIPANTS

Eylem yildirim (UG), Brooklyn College, Casey m. Imperio, Elizabeth f. Chua

Metacognitive accuracy describes the relationship between someone's confidence when performing a task and the exact level of performance on the task. Previous research has shown that the frontal lobe plays a crucial role in metacognition. The majority of this research uses neuroimaging in healthy, young participants, or neuropsychological testing in patients with neurological or psychiatric disorders. In this study, we test whether specific neuropsychological tests of frontal and temporal function also predict metacognitive performance on a memory task in healthy participants. To test this, participants first completed an episodic memory/metamemory task online (N=47). They were given 100 proverbs paired with famous names. First, they were asked to rate their familiarity with the proverb and the name, as well as make an association between the pair. After studying 100 proverb-name pairs, participants attempted to recall the name associated with the proverb, made a feeling-of-knowing judgment, and then completed a recognition task. After completing the memory and metamemory task, participants completed several standard neuropsychological tests online, including Matrix Reasoning, Trail Making Test (Part A and B), Verbal Paired Associates, Digit Symbol Matching, Visual Paired Associates, and Choice Reaction Time. Analyses showed that the participants with faster processing speeds on the Trail A test had better metamemory accuracy. In addition, the proportion of correct trials on the Visual Paired Associates test predicted metamemory accuracy. These results suggest that some standardized neuropsychological tests related to frontal and temporal lobe function can predict metamemory accuracy in healthy participants.