# 33rd ANNUAL BROOKLYN COLLEGE SCIENCE DAY

***Brooklyn College Science Day is sponsored by***
***NIH MARC/U-RISE, NIH BP-ENDURE, NIH SURGE, NSF LSAMP, NYS STEP and CSTEP,***
***and the office of the Dean of the School of Natural and Behavioral Sciences.***

## PROGRAM

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| **9:30 AM** | **POSTER SETUP (Student Center)** |
| **10:00 AM** | **STUDENT PRESENTATIONS AND JUDGING (2nd floor)** |
| **12:15 PM** | **LUNCH IN THE GOLD & MAROON ROOMS (6th floor)** |
| **12:30 PM** | **WELCOME AND REMARKS** |
| | **PRESENTATION OF AWARDS** |
| | **Highschool (HS) Division** |
| | **Undergraduate (UG) Division** |
| | **Graduate (GR) Division** |

**ALL ARE INVITED TO LUNCH IN THE GOLD & MAROON ROOMS**

**Thanks to the staff of the Brooklyn College Student Center and the office of Government and External Affairs for their assistance**

*Cover Photo from the research of Tony Wilson, Ph.D.*

**Seahorse by Undergraduate student Eliza Gonzalez**

## ANTH – 200 RECONSTRUCTING THE DIETS OF THE EARLIEST FOSSIL PRIMATES USING DENTAL TOPOGRAPHIC ANALYSIS

**Sydney Cardieri**[1] (UG), Stephen G. B. Chester[2], Jordan W. Crowell[1,2], Nidhi Mahadevan[1]
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This project was designed to understand the diets of the geologically oldest primates that lived soon after the extinction of the dinosaurs 66 million years ago, as represented by the species *Purgatorius janisae* and *P. mckeeveri*. Previous qualitative observations suggested a difference in diet between these two co-occurring species of *Purgatorius*. To test this hypothesis, 3D models of *Purgatorius* specimens were created from high-resolution micro-computed tomography scans and then analyzed via Dirichlet normal energy (DNE) to quantify their diets as numerical values. The same techniques were applied to modern mammal species (treeshrews and bush babies) with known diets to compare DNE values and ultimately infer the diet of each Purgatorius species. The qualitative observations indicate that there should be little overlap of the Purgatorius DNE values, thus denoting a difference in diet and lack of direct competition for access to food resources (e.g., fruits and insects). Overall, *Purgatorius* had lower DNE values than treeshrews and higher DNE values than bush babies. This suggests that *Purgatorius* was less insectivorous than treeshrews but more insectivorous than bush babies, meaning that *Purgatorius* was likely eating both fruits and insects. Among the species of *Purgatorius* examined, *P. janisae* was likely more insectivorous than *P. mckeeveri*, and there was little overlap of their DNE values. Therefore, the two species were indeed not in direct competition for food resources and occupied at least slightly different ecological niches, allowing for their coexistence. These results provide a greater understanding of the ecology of the earliest fossil primates that can be further developed through access to more data on Purgatorius species and other modern mammals.
*Supported by the Leakey Foundation General Research Grant to Stephen G. B. Chester.*

## BIO – 100 BRCT DOMAIN DYNAMICS: UNVEILING PROTEIN INTERACTIONS DRIVING BREAST CANCER PROGRESSION

**Kabir Khosla**[1], **Lena Cakulev**[1] (HS), Shaneen Singh[2]
[1]Millburn High School
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We are studying how proteins that interact with both BRCA1 and nucleolin regulate DNA repair pathways in breast cancer. Here, we present the computational analysis of two protein interactions that highlight the role of BRCT domains in mediating key interactions in breast cancer signaling. In the first study, we look at the interaction between the BRCA1-BARD1 dimer and Estrogen Receptor α (ERα). BRCA1 and BARD1 form a heterodimeric complex crucial for maintaining genomic stability through their involvement in DNA repair mechanisms. Both BRCA1 and BARD1 contain BRCT domains, known to mediate crucial protein-protein interactions. A negative feedback loop of ERα signaling suppresses the expression of BRCA1 and BARD1, compromising DNA repair processes and contributing to tumorigenesis. We study the role of the BRCT domain of BARD1 in the interaction between ERα and the BRCA1- BARD1 dimer and present a theoretical model of the ERα-BARD1 interaction. The second study investigates the interaction between the BRCA1 BRCT domain, crucial for transmitting signals within the DNA damage response network, and the FERM domain of Radixin (RDX), which links cellular membranes to the actin cytoskeleton. Using docking algorithms, we identified two potential scenarios between the BRCA1 BRCT and FERM domains. One suggests that the negative C-terminal of BRCA1 BRCT interacts with the highly positive F1/F3 cleft of FERM and another scenario which highlights the possibility of a direct binding of the C-terminal of BRCA1 BRCT with the F1 subdomain. The insights from this study in conjunction with information from existing literature can ultimately support analyses of the mechanism of interaction between the domains that may play a role in the metastasis of BRCA1 related breast cancer.

## BIO – 101 DETERMINING POSSIBLE ASSOCIATIONS BETWEEN PP1B AND NCL IN DIFFERENT CANCER TYPES

**Rebecca Yakobovich**[1], **Max Kogan**[1] (HS), Anjana Saxena[2]
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Nucleolin (NCL) is an abundant eukaryotic RNA-binding phosphoprotein (UniProtKB ID P19338) that primarily resides in the nucleolus. NCL is heavily post-translationally modified (PTM); PTM in NCL is pivotal for its localization and RNA-binding functions. NCL, a prognostic marker for proliferation, is often overexpressed in cancer and is a promising therapeutic target (Thongchot et al., 2023). NCL phosphorylation is important during the normal cell cycle and under certain disease conditions. NCL is heavily phosphorylated by CDK1 and CK2, influencing its functions, including the regulation of the cell cycle and cell proliferation (Xiao et al., 2014). Recent studies show that CK2 is a potential therapeutic target that may have anti-proliferation effects; with this kinase often being dysregulated in cancer cells, its inhibition can potentially suppress cancer cell proliferation and induce apoptosis (Borgo et al., 2021). PP1β (UniProtKB ID PPP1CB) is a type of serine-threonine phosphatase that is a key player in cellular recovery from stress while also promoting apoptosis in heavily damaged cells (Vaneynde et al., 2022). While NCL and PP1β are colocalized, the direct association between the two proteins is an understudied research topic (Barboule et al., 2005). The Cancer Genome Atlas Program (TCGA) was used to identify NCL and PP1β mutations in cancer genomic data cervical, endometrial, pancreatic, breast, bladder, bowel, CNS/brain, head/neck, kidney, lung, lymphoid, prostate, uterus, and skin cancer types. Our central hypothesis is to identify mutations that might have a functional impact and hence their role in tumorigenesis. We, therefore, focused on mutations that reside in the RNA-recognition motif (RRM) of

the central domain for NCL and functional domains of PP1β. Using the bioinformatics tool, PolyPhen-2, we then predicted the structural-functional relationship of NCL-mutations to assess their potential impact of amino acid changes on protein structure and function. Allelic variants versus potential mutations were distinguished using two prediction tools, HumDiv and HumVar, respectively. The mutations are categorized on a score ranging from zero as benign to one damaging, based on false positive rate (FPR) thresholds. While both proteins are not often mutated in cancer, identifying specific mutants that may be damaging for cancer types will allow scientists to understand the molecular mechanism of the disease and the effect these mutations may have on the survival of the patient.

### BIO – 201 BREAST CANCER BIOINFORMATICS: BRCT-REGION'S ROLE IN DYSREGULATED DNA REPAIR WITH A FOCUS ON NUCLEOLIN AND BRCA1

**Nitu Farhin**[1] (UG), Andy Lam[2], Anjana Saxena[1], Shaneen Singh[1]
[1]Brooklyn College
[2]Bronx High School of Science

Proteins that are essential to enable cells to sense and repair DNA damage, serve as essential contributors in maintaining genome integrity across cellular processes. Nucleolin (NCL), a RNA binding protein (RBP), and BRCA1, a tumor suppressor protein linked to breast and ovarian cancer susceptibility, are active in DNA damage detection and DNA repair pathways. Despite their co-localization in breast cancer, this collaboration underlying NCL and BRCA1 in genome repair is unexplored. In this study, we used in silico approaches to characterize the shared interactome of BRCA1 and NCL. Our analysis revealed 49 common proteins interacting with both BRCA1 and NCL, potentially influencing their functions. Our focus centered on BRCT-domain-containing proteins with documented roles in DNA repair and RNA binding. Moreover, we present predicted interaction scenarios and molecular insights into the interface between full-length NCL and five BRCT-containing proteins crucial for DNA repair: BRCA1, MDC1, NBN, PARP1, and TP53BP1. In addition to this, we used cancer mutational data from the Catalogue Of Somatic Mutations In Cancer (COSMIC) to overlay on aligned sequences of the BRCT regions of these proteins. With the mutational data and utilizing patient data from The Cancer Genome Atlas Program (TCGA), we aim to identify mutations that have contributed to cancer development found in patients. These in silico scenarios shed light on the intricate protein-protein interactions, laying the foundation for unraveling the collaborative roles of NCL-BRCA1 in DNA repair mechanisms. Understanding the molecular dynamics of common interacting proteins associated with NCL-BRCA1 will facilitate the identification of potential therapeutic targets in DNA repair pathways.

*Supported by the Tow Mentoring and Research Program, BCCC-CURE, Grey Foundation BCCC-CURE BCRA-related grant.*

### BIO – 202 EXPLORING SEX MARKER IDENTIFICATION OF THE LINED SEAHORSE (HIPPOCAMPUS ERECTUS)

**Eliza Gonzalez** (UG), Tony Wilson, Marisa Delliturri, Michael Magno, Sam Ocean, Dilfuza Kurbanova, Brooklyn College

Understanding mechanisms of sex determination in the lined seahorse is necessary for the development of conservation strategies as well as a better understanding of reproductive biology. This study assesses a sex marker identification protocol developed for *Hippocampus erectus*, commonly known as the lined seahorse, using a genome-wide genetic screen. In previous work, (Yang et al., 2023) identified an XY sex-determining system in *H. erectus* and validated a panel of sex-specific markers using an aquaculture population. We utilized the primers provided in the paper for the experiment, which were reportedly designed to target sex markers in *H. erectus*. We collected fin clippings from 29 seahorses, including females, males, and juveniles, and extracted their DNA for PCR amplification. In contrast to the findings

of Yang et al., we observed that the sex markers presumed to be male-specific were presenting positive results in all female, juvenile, and male seahorses. We suggest that inbreeding in the aquaculture population may be responsible for the (Yang et al., 2023) results and that higher levels of genetic variation and recombination in natural populations may limit the applicability of the sex markers. This is a hypothesis we plan to test using genome sequencing. Our results emphasize the need for meticulous protocol validation when using tools developed from inbred populations.
*Supported by NIH URISE GM149490.*

### BIO – 203 DECIPHERING THE INTERMOLECULAR NETWORKS OF NUCLEOLIN AND POLY (ADP-RIBOSE) POLYMERASE 1 IN BREAST CANCER

**Grela Jerliu** (UG), Shaneen Singh, Brooklyn College

MicroRNAs (miRNAs) are short non-coding RNA molecules involved in gene expression regulation, and RNA silencing, with dysregulation linked to cancer phenotypes. Our initial studies focused on six miRNAs (miRNA-15, miRNA-16, miRNA-21, miRNA-103, miRNA-221, and miRNA-222) implicated in breast cancer and regulated by nucleolin (NCL), an RNA-binding protein. NCL is overexpressed in many diseases, influencing various cellular processes including transcription, translation, and DNA repair. From our initial results of the miRNA target gene network predicted using the databases miRWalk, Diana Tools miRDB, miRmap, and Target Scan, we selected Poly(ADP-ribose) polymerase 1 (PARP1) because of its critical roles in cancer, including transcriptional control and DNA repair. Here we present results from our in silico studies, where we have characterized the interactome of PARP1, analyzed PARP1 isoforms with respect to their domain architecture, expression levels and mutations through ENSEMBLE, The Cancer Genome Atlas, and GEPIA2 specifically in the context of breast cancer. We also show predicted interaction scenarios of NCL and PARP1 using docking algorithms such as ClusPro, and HDOCK to understand the molecular mechanism of this interaction. These scenarios allow for the identification of specific regions and residues at the interaction interface. This study sets the stage for elucidating molecular networks governing gene expression regulation and identifying potential intervention strategies for cancer treatment.

### BIO – 204 DETERMINING HIGH RISK COMMUNITIES LACKING PARKINSON'S DISEASE RESOURCES: USING DESULFOVIBRIO BACTERIA AS A PREDICTIVE MODEL

**Tony K. Joseph**[1] (UG), Mark Genkin[1,2], Sidra Qureshi[1], Tamara Lee Goldstein[1], Hozifa Sowkat[1], John P. Joseph[1], Tatyana Yuzbashyan[3], Lawrence Markel[4], Theodore Muth[1], Qi He[1]
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Although an exact cause of Parkinson's disease (PD) has not been established, there are many theories that postulate possible factors and variables that accelerate the progression of PD. One of these factors include the gut bacterium, *Desulfovibrio* (DSV). While a link between the bacterium DSV and PD has been established, research regarding its clinical relevance has not been explored. This study aims to establish this correlation specifically within the New York area by assessing DSV concentrations across the city and comparing them to PD patient demographics. New York Public Health Databases will be used to retrieve PD nursing home beds available in all New York counties. This model will predict areas of New York suspected to have high PD patients and thus propose development of PD nursing homes in those high-risk communities.

**BIO – 205 BREAST CANCER AND DNA REPAIR PATHWAYS: EXPLORING MIR-21'S ROLE IN THE COMMON RNA BINDING PROTEIN INTERACTORS OF NCL AND BRCA1.**

**Yelyzaveta Khayman** (UG), Shaneen Singh, Brooklyn College

The nature of the relationship between nucleolin (NCL) and breast cancer gene 1 (BRCA1), remains unexplored but may be highly significant with respect to its dysregulation related to breast cancer. Understanding the molecular mechanism and common partners underlying this relationship may uncover promising targets for therapeutic intervention in breast cancer. Using GO annotations 49 proteins involved with BRCA1 and NCL have been identified and categorized in five categories in previous studies in the lab. This study focuses on the category of RNA binding proteins (RBPs) and includes the proteins HNRNPA1, HNRNPD, PABPC1, and TARDBP. Models of the RNA binding domains of RBPs were generated using SwissModel and evaluated using 5 different programs to identify the top models. Using RBPDB, we identified 3 potential RNA molecules that are known to interact with NCL and also predicted to interact with the four RBPs: miR-21, Bcl-2 mRNA, and VEGFA. RBPmap was used to predict their specific locations via RBP binding motifs. Here, we present the results for predicted interaction scenarios between the RBPs and mir-21. This study sets the stage for further exploration of the complex interplay between NCL, BRCA1, and RBPs, offering a more comprehensive understanding of the regulatory networks implicated in breast cancer biology.

**BIO – 206 MICROBIAL MODULATORS, ASSESSING THE BACTERIAL IMPACT ON GROWTH AND DEVELOPMENT OF L. MINOR: A COMPARATIVE STUDY**

**Paula A. Khrom** (UG), Ayesh Ali, Theodore Muth, Brooklyn College

Microplastics (< 5 mm) are considered freshwater pollutants of emerging concern. They are formed from the production and breakdown of multiple plastic sources which are used daily. These microplastics are not easily biodegradable and pose a threat to our environment. The capacity of *L. minor*, commonly named duckweed, to adsorb nanoparticles and microplastics has been extensively studied in recent years. In our study, we aim to investigate the influence of bacterial strains on the growth and development of duckweed. The bacterial strains were identified from the duckweed microbiome using Sanger sequencing of the 16S rRNA gene. Isolated strains are cultured in Tryptic Soy Broth (TSB) for a duration of 48 hours. After the incubation period, the cultures undergo several rinsing and centrifugation steps to purify the bacteria by removing media, byproducts, and debris. This process results in a pelleted form of the bacteria, allowing for controlled bacterial concentration. The bacterial concentration is quantified using spectrophotometry and altered accordingly to achieve an optical density of 0.1 (OD600). Based on these measurements, the determined concentration of bacteria is introduced to modified Hoagland's media containing 3-4 fronds of sterile duckweed; this setup initiates a 5-day incubation period. Following successful bacterial contamination, the duckweed are rinsed and relocated to a magenta box consisting of 100 mL of modified Hoagland's media. The progression of duckweed growth is monitored over a span of 10 days, by recording change in frond number through count, and surface area through image analysis. This methodical approach allows for a thorough evaluation of the potential growth-promoting or inhibiting effects of the bacterial strains on duckweed development.

**BIO – 207 RECOMBINANT DNA CLONING OF SEAHORSE IMMUNOGLOBULIN**

**Dilfuza Kurbanova** (UG), Anthony B. Wilson, Brooklyn College

Antibodies, also known as immunoglobulins, are an essential component of the adaptive immune system. The high specificity of antibodies has also made them very useful tools in molecular biology. We are using recombinant DNA technologies originally developed for producing human immunoglobulins to synthesize immunoglobulin in the seahorse (*Hippocampus abdominalis*). We generated specific regions of

immunoglobulin M using the polymerase chain reaction, and produced chemically competent cells for cloning PCR products and protein expression. We introduced the generated region into the pET30a vector and transformed it into chemically competent cells. We extracted the vector from E.coli Bl21 and sent the vector for sequencing. We will use sequencing results to confirm positive expression vector constructs and transform them to E. coli BL21DE3. We will use the obtained bacterial colonies with pET30a-IgM constructs for protein expression and purification.
*Supported by The Tow Mentoring Initiative.*

### BIO – 208 DESIGNING A SUCCESSFUL CAPTIVE BREEDING PROGRAM & UNDERSTANDING THE GENETIC DIVERSITY OF HIPPOCAMPUS ABDOMINALIS WITH GENETIC DATA

**Michael Magno** (UG), Anthony B. Wilson, Brooklyn College

Designing a successful captive breeding program is essential in maintaining the genetic diversity of laboratory animals. The aim of my work has been to develop a protocol for effectively breeding and rearing *Hippocampus abdominalis*, the focus of our labs research. In addition to developing the necessary infrastructure for this work, I am screening the genetic diversity of the breeding population, which will help to inform our breeding design. Our breeding population of 24 males and 23 females are themselves lab reared animals from a captive breeding facility located in Tasmania, Australia. In preparation for this project, the animals were weighed, tagged, and photographed in a standard orientation. During this time, fin clippings were obtained from all 47 animals for genetic analysis. Genomic DNA has been successfully extracted from these fin clips and will be used for DNA sequencing and Short Tandem Repeat (STR) genotyping. These data will be used to quantify the genetic diversity of our sample and to select animals for our captive breeding program.

### BIO – 209 TEMPORAL PRODUCTION AND LOCALIZATION PATTERNS OF RICKETTSIA PARKERI SECRETED EFFECTORS: INSIGHTS INTO HOST-PATHOGEN INTERACTIONS AT THE CELLULAR LEVEL

**Abigail Meyer**[1] (UG), Hannah Margolis[2], Rebecca Lamason[2]
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Global infectious disease catastrophies are poised to become a defining characteristic of the 21st century. With increasing temperatures due to climate change lengthening the breeding season of disease vectors, zoonotic pathogens, such as spotted fever group rickettsiae, are an emerging concern. During their infectious lifecycle, Rickettsia use secreted proteins called effectors to hijack host cell processes, enabling activities that would be otherwise unattainable with their streamlined genomes. To date, a small handful of these effectors have been identified and even fewer have known functions. In an effort to close this knowledge gap, the Lamason Laboratory previously conducted a proteomics screen which revealed three novel effectors, termed Secreted rickettsia factors (Srfs) C, D, and F. To gain insights into their functions, we performed an immunofluorescence timecourse assay to map the timing of effector translation onto the rickettsial lifecycle. Image analysis revealed that SrfD production levels increased steadily over time. In contrast, SrfC was only produced at timepoints following entry and vacuole escape, while production of SrfF ceased at 24 hours post-infection, suggesting involvement in early lifecycle processes. These findings provide initial insights into the times these effectors may function during rickettsial infection.
*Supported by NIH MARC GM008078.*

### BIO – 210 INVESTIGATING THE POTENTIAL OF AVIATION FUELS TO INDUCE ALPHA-SYNUCLEIN MISFOLDING

**Mubasshir Mumtaz**[1] (UG), Shaneen Singh[1], Chitra Narayanan[2]
[1]Brooklyn College
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Parkinson's disease is a common neurodegenerative movement disorder characterized by the death of dopamine-producing neurons in the brain. The exact cause of Parkinson's remains unclear, though it is thought to involve a combination of genetic and environmental factors. Alpha-synuclein (a-syn) is a protein that plays a central role in the pathology of Parkinson's disease, as its misfolding and accumulation contributes to neuronal death and disruption of cellular functions. Our overall aim is to explore the potential of various ligands, particularly aviation fuels, to induce the misfolding of a-syn. By understanding the binding interactions between a-syn and these ligands, we seek to identify new environmental factors that may contribute to the disease's etiology. Utilizing AutoDockTools and other docking algorithms, we are conducting molecular docking simulations to compare the binding interactions of aviation fuels and control molecules known to induce a-syn aggregation. The study is currently in progress, and here we present our efforts focused on optimizing docking simulations for accurate interaction predictions.

### BIO – 211 IDENTIFYING ANATOMICAL SITES OF BLOOD CELL FORMATION IN H. ABDOMINALIS AND S. FUSCUS

**Najib Y. Nasution** (UG), Anthony B. Wilson, Brooklyn College

The Syngnathidae family, consisting of seahorses, pipefishes, and seadragons, are of interest due to their difference in structure of the adaptive immune system. While seahorses (*Hippocampus spp.*) have a fully intact adaptive immune system, pipefishes (*Syngnathus spp.*) lack functional major histocompatibility complex class II (MHC II) and CD4, key components of the adaptive immune system that allow T Helper cells to activate and help differentiate B cells into plasma and memory B cells, which promote antibody production and allow a more efficient response to secondary infection. Immunization experiments will allow us to compare humoral immunity and immune memory within these two genera. This project aims to identify sites of primary and secondary hematopoiesis, or blood cell formation, of seahorses and pipefishes. Immunoglobin M (IgM) will be used as the target protein to determine sites of hematopoiesis across different organs of both genera. Immunohistochemistry (IHC) and in situ hybridization (ISH) will show the presence and localization of IgM and IgM production within the tissues of different organs. The results of these two techniques will provide us with evidence to determine the sites of primary and secondary hematopoiesis, which would serve as a baseline for future projects regarding the comparison of humoral immunity and immune memory.

### BIO – 212 EXAMINING THE IMPACT OF MICROPLASTIC CONTAMINATION ON DUCKWEED MICROBIOME RECRUITMENT

**Humaira Nfn** (UG), Theodore Muth, Brooklyn College

Aquatic ecosystems are increasingly challenged by microplastic contamination, threatening water quality and the ecological balance. *Lemna minor*, commonly known as duckweed, shows promise in remediation of microplastics due to its associated microbial community. However, the impact of microplastics on microbial colonization dynamics remains unclear. This study aimed to investigate bacterial strain preferences within the duckweed microbiome in the presence of microplastics. Specifically, we explored whether bacterial strains exhibited selective preferences for duckweed, microplastics, or colonized both substrates indiscriminately. Using a composite culture of 13 bacterial strains isolated from the duckweed

microbiome, we conducted experiments under four conditions: duckweed only, microplastics only, duckweed and microplastics together, and a control without either substrate. Additional controls tested duckweed and microplastics individually without adding the composite culture. DNA extraction and sequencing revealed potential preferences among strains, with some favoring duckweed while others colonized microplastics. These findings highlight the complex interactions between microbial communities and environmental pollutants, emphasizing the need for further research to mitigate microplastic impacts on aquatic ecosystems. Further investigation into the functions of bacteria that preferentially colonize duckweed, even in the presence of microplastics, may provide insight into whether they play a unique role in duckweed bioremediation efforts.

### BIO – 213 HYBRIDIZATION OF EUROPEAN PIPEFISH AS A SOURCE OF EVOLUTIONARY NOVELTY

**Nikita Samuel Ocean** (UG), Tony Wilson, Brooklyn College

Hybridization is an integral part of the evolutionary process and can impact diversity in both plants and animals. The Mediterranean Sea is known to be one of the major hubs of marine biodiversity, and a location in which evolutionary lineages from the Atlantic, Black Sea, and Red Sea can exchange genetic information. A variety of forms of Syngnathus pipefish cooccur in the Mediterranean, and several of these species have been suggested to have a hybrid origin. Recent developments in the field of genetic sequencing have allowed us to carry out a genome-wide genetic screen of the six pipefish species. These data provide enhanced statistical power to infer the timing, direction and extent of interspecific hybridization in this system.

*Supported by the Tow Project.*

### BIO – 214 EXPLORING THE EFFECT OF CHEMOTHERAPY ON VASCULOGENESIS IN 3D CULTURED "RESET" VASCULAR ENDOTHELIAL CELLS SYSTEM

**Malcom Reid**[1] (UG), Ying Liu[,2]
[1]Brooklyn College
[2]Weill Cornell Medical College

Among the factors that affect the therapeutic efficacy of chemotherapy, blood vessels directly connecting with the cancer tissues have been reported to be essential to cancer cell growth and metastasis from a primary site to other organs. Dr. Rafii's group has developed a novel method to recreate the interaction between tumor cells and endothelial cells (ECs), which constitute the inner cellular lining of blood vessels. By transiently overexpressing the ETS variant 2-transcription factor (ETV2) in adult human umbilical vein endothelial cells (HUVECs), the "Reset" Vascular Endothelial Cells (R-VECs) can self-assemble into interconnected vasculature networks with tumoroid in a 3D matrix, enabling stable transportation of human blood or chemotherapy drugs within a microfluidic device (Palikuqi et al., 2020).

In this study, we employed 3D cultured R-VECs to investigate the effect of several chemotherapy drugs on vasculogenesis, the process by which blood vessels are formed de novo. We found that chemotherapy drugs (FOLFIRI, Taxol) or anti-angiogenesis drugs (Bevacizumab, Ramucirumab) do not affect vasculogenesis, although perfusing these anti-angiogenesis resulted in more rapid vasculature dissociation. Intriguingly, the synergistic block of chromatin regulators EZH2 and histone deacetylases (HDAC) completely inhibits vasculogenesis, suggesting that epigenetic conversion plays an essential role during this process. Our method not only allows us to evaluate the therapeutic efficacy of anti-blood vessel drugs but also helps to assess the side effects on blood vessels for anti-tumor drugs. This tumor-

blood vessel cell co-culture system also provides a platform to study the crosstalk between cancer tissues and blood vessels in patients.
*Supported by NIH URISE GM149490.*

**BIO – 215 INTEGRATION OF ILASTIK, TRACKMATE, AND STARDIST SOFTWARE FOR TRACKING AND ANALYZING LEMNA MINOR**

**Jacob Schlamowitz** (UG), Theodore Muth, Brooklyn College

*Lemna minor* is a duckweed species that has been shown to have bioremediation potential due to its microbiome, making the study of its microbiome lucrative in finding ways to remove pollution from water. However, many questions remain unanswered, such as how artificial duckweed microbiomes that enhance its natural bioremediation potential affect its growth and how duckweed microbiomes transfer to neighboring duckweeds and offspring. To help answer these questions, we devised a novel procedure to track and find the area of individual duckweeds within a population over time using a time-lapse camera and various imaging software. We developed a custom segmentation, object classification, and tracking algorithm that separates individual duckweeds by identifying their borders using the machine learning software lastik. The output of these algorithms generated a grayscale 8-bit set of images where only the duckweed is shown. We then used the deep learning algorithm StarDist to identify the outline of each duckweed in the grayscale time-lapse. We used this in conjunction with TrackMate to track each duckweed and its area throughout the time-lapse. However, anomalies in the data persist, such as StarDist missing sections of individual duckweeds and TrackMate and our custom lastik tracking algorithm losing the IDs of individual duckweeds when the population is rapidly moving in the growth chamber. The project is still ongoing, and we are currently improving our custom algorithms in lastik and generating a new custom algorithm within StarDist to deal with the remaining tracking anomalies. Through perfecting this technique, we plan to continue to investigate how the microbiomes of duckweed spread to others and how artificial microbiomes influence the growth of duckweeds.

**BIO – 216 LAMP ANALYSIS AND APPLICATION IN BIOREMEDIATION OF SOIL POLLUTION**

**Michael Sher** (UG), Theodore Muth, Brooklyn College

LAMP (loop-mediated isothermal amplification) is a novel DNA amplification technique that allows for the rapid and accurate detection of genomic sequences. In this project we build upon the current knowledge of LAMP as it is used for bacterial identification. Moreover, we incorporate LAMP into the analysis of bacterial growth within polluted soils to work toward simplifying the in-field application of LAMP. We specifically focus on the bacteria *P. fluorescence*, as it contains the ALK.B gene. This gene encodes for a metabolic pathway that breaks down alkanes, which can be found in pollutants like industrial oil. In this project we have been able to successfully identify purified bacteria using LAMP and reach a detection limit of 84 CFU/reaction, which is similar to results obtained in previous research on the topic. Furthermore, our results showed that the detection limit is decreased to about 6,000 CFU/reaction when LAMP is tested on bacteria from inoculated soil. Currently we are utilizing LAMP to test for the growth of *P. fluorescence* within soil that was contaminated with motor oil. We hope our research gives further insight into how pollutants affect the growth of *P. fluorescence* and how the bacteria could be used in bioremediation efforts.

**BIO – 272 PARENTAL ANALYSIS IN THE NORTHERN PIPEFISH (SYNGNATHUS FUSCUS)**

**Mellisa Ramnath** (UG), Tony Wilson, Brooklyn College

The Northern pipefish, *Syngnathus fuscus*, is a northwest Atlantic species of fish belonging to the family Syngnathidae (pipefish, seahorses and seadragons), known for their unique characteristic of male pregnancy. The male holds and fertilizes eggs transferred by the female in a specialized pouch. *S. fuscus* has been observed to mate monogamously throughout the mating season (April to October) unlike other members of the family Syngnathidae. Our aim of this study is to determine the rate of multiple mating when access to mates is not limited. In designed experimental tanks, one male is placed with two females allowing the male a chance to mate polygamously. Behavioral analyses of the reproductive behavior and molecular analyses of the broods are then performed to confirm whether the male mated polygamously or monogamously.

### BIO – 274 DETERMINING SPECIES OF VIBRIO PRESENT IN HEALTHY SEAHORSES

**Katrine Kazakova** (UG), Tony Wilson, Brooklyn College

Who knew one of the most uncomfortable and potentially deadly food borne infections could be brewing in the stomachs of unsuspecting seahorses? Vibrio bacterial species are ubiquitous inhabitants of marine environments, playing vital roles in nutrient cycling, microbial communities and carbon cycling. Though among them, friend turns to foe as certain pathogenic strains pose significant threats to syngnathids and even humans. Vibrio in syngnathids can be compared to E.coli in humans – both being commensal bacterium until pathogenic strains cause havoc. Through exposure to contaminated seafood or seawater, certain Vibrios are known to cause gastrointestinal illnesses in humans with symptoms ranging from diarrhea to life-threatening conditions such as cholera and septicemia. However, eradicating either bacteria from population is highly unfeasible, therefore treating and preventing are the best course of action.

This noninvasive protocol emphasizes fecal sample collection, preparation, and incubation techniques. Fecal pellets will be collected with a simple siphon. Thereafter the samples will be cultured in an APW (Alkaline Peptone Solution), an alkaline medium supporting growth of Vibrio bacteria while inhibiting the growth of competing microorganisms due to its high alkalinity, and nutrient rich peptones. The protocol integrates both phenotypic identification through colony characteristics growth on TCBS (Thio-Suflate Bile Salts Agar) plates and molecular methods such as PCR testing.

We will better identify the pathogenicity of Vibrio strains in aquatic ecosystems, allowing us to treat symptoms and develop curated strategies for disease management, antibiotic resistance surveillance, and even vaccinations. Archived stocks of genetically distinct vibrios will also be prepared and used downstream for tests in antibiotic resistance. Ultimately, the plan is to test the effectiveness of a Vibrio vaccine in syngnathids to revolutionize aquaculture and human health implications.

**CHEM – 217 IN VITRO EVALUATION OF PLATINUM-GOLD COMPOUNDS AS POTENTIAL CHEMOTHERAPEUTICS AND TARGETED AGENTS FOR OVARIAN CANCER AND STUDY THEIR INTERACTIONS WITH DNA QUADRUPLEXES.**

**Fatima Aftab**[1] (UG), Riccardo Bonsignore[2], Javier Lopez[1], Maria Contel[1]
[1]Brooklyn College
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Cancer chemotherapy is limited by intrinsic and acquired resistance of tumors to treatment, and lack of selectivity that leads to off-site toxicity and serious side effects. Despite multiple advances in cancer targeted therapies, Platinum(II)-based drugs such as FDA-approved cisplatin, carboplatin, and oxaliplatin are widely used as chemotherapeutics. However, these drugs have a limited spectrum of activity and are limited by lack of selectivity and appearance of resistance. Pt (IV) compounds are an attractive approach to improve stability and bioavailability of platinum drugs due to its octahedral geometry which allows for the attachment of two extra ligands in the axial position that can then be selectively released after reduction. The solubility, activity, and selectivity of the Pt(IV) compounds may be improved by choosing moieties with well-known anticancer effects and/or targeting vectors, such as Gold (Au) moieties. Therefore, our modified drug Pt (IV) - Au (I) will be evaluated in vitro as a potential chemotherapeutic and targeted agent for ovarian cancer since we hypothesize that the presence of two different biologically active metallodrugs (Pt IV and Au I) on the same molecule may improve the pharmacological profile due to synergistic. To understand its mode of interaction, its ability to bind and stabilize G-quadruplex DNA will be tested. G-quadruplex structures have been identified in biologically significant genomic loci, notably in telomeres and thus they play a pivotal role in cancer progression and development, with their drug-induced stabilization emerging as a potential novel anticancer strategy.

**CHEM – 218 CONTEXTUALIZING THE ROLE OF THE HISTONE METHYLTRANSFERASE SET2 IN C9ORF72-ALS PATHOLOGY**

**Kaitlyn Chan**[1] (UG), Samantha N. Cobo[2], Mariana P. Torrente[1]
[1]Brooklyn College
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Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disorder associated with motor neuron deterioration. A hexanucleotide (GGGGCC) repeat expansion (HRE) in chromosome 9 open reading frame 72 (c9orf72) is a common genetic cause of ALS. Transcription and translation of the HRE can result in the formation of PRn (proline and arginine) dipeptide repeat proteins, which are neurotoxic and linked to protein aggregate formation in the cytoplasm of motor neurons. While genetics provide a baseline understanding of ALS pathology, epigenetics have vast potential in studying the onset and treatment of ALS. A key epigenetic mechanism involves the post-translational modification of histone proteins. Previous studies have found increased trimethylation of lysine residues on Histones H3 and H4 in the frontal cortices and cerebella of c9orf72-ALS patients. As such, we question the role of histone-modifying enzymes in the context of c9orf72-ALS pathology. Set2 is one such enzyme, a histone methyltransferase that controls two epigenetic marks—the di- and trimethylation of lysine 36 on Histone H3 (H3K36me2, H3K36me3). Here, we exploit a Saccharomyces cerevisiae model of (PR)50 proteinopathy. Set2 deletion (ΔSet2) strains were transformed with either ccdb (control) or (PR)50 plasmids. Deletion of Set2 ameliorated the growth defect unique to (PR)50 overexpression in yeast compared to controls in a growth assay, hinting that Set2 may be involved in (PR)50 toxicity. Western blots probing for H3K36me2 and H3K36me3 levels in the ΔSet2 strains showed that H3K36me2 levels were decreased whereas H3K36me3 levels were increased in (PR)50 yeast relative to control strains. In addition, western blots probing for the mono-, di-, and trimethylation of lysine 4 on Histone H3 (H3K4me1, H3K4me2, H3K4me3) were performed

to assess whether Set2 is indirectly involved in these epigenetic marks through histone crosstalk. Analysis of these blots suggest that there is no significant difference in H3K4me1, H3K4me2, or H3K4me3 levels between the (PR)50 and ccdb strains. Such findings cast new light on the role of Set2 in c9orf72-ALS pathology and its potential as a therapeutic target.

### CHEM – 219 CALCULATIONS OF ELECTRON DISTRIBUTION IN M+YW CROSSLINK FOUND IN THE KATG ENZYME OF MYCOBACTERIUM TUBERCULOSIS: ANALYSIS OF NATURAL CHARGE VERSUS ELECTRON FLOW

**Ryan Chen** (UG), Andrzej Jarzecki, Brooklyn College

The catalase-peroxidase enzyme KatG is a heme-dependent protein critical for the virulence of Mycobacterium tuberculosis (Mtb). Its catalase function is essential for the pathogen to attend to oxidative stress from hydrogen peroxide in infected host cells, including human cells. The catalase activity of KatG is distinct and extremely efficient due to the presence of a highly unusual protein-derived cofactor, the Met255+-Tyr229-Trp107 crosslink (M+YW) covalent triad. This M+YW covalent triad is one of the most complicated protein-derived cofactors crosslinked by covalent bonds from three amino acid residues. The mechanism by which M+YW is formed and enables the catalase activity of KatG remains poorly understood. Also, the discovery of a new transitional form, M+YW-OOH, with an indole nitrogen-linked hydroperoxyl, deepens the mystery. Chemical characterization of both states should provide the first line of molecular understanding of its stability and reactivity. To conquer this challenge, we launch theoretical DFT studies to calculate the electron distribution of M+YW and its structural variants. However, this gives rise to the issue of comparing electronic data between variants that differ in formal charge. This study presents a resolution through the conversion of natural charge data into a view of electron flow. As an educational model, we examine the case of CO and CO+ through the lens of changes in electron density and electron flow. Then, we apply it to M+YW and its structural variants.

### CHEM – 220 ENVIRONMENTAL EXPOSURES IN NEURODEGENERATIVE DISEASE: EFFECTS OF COPPER ON POST-TRANSLATIONAL HISTONE MODIFICATIONS IN S. CEREVISIAE MODELS

**Rania Frederic** (UG), William Villasi, Boyan Zheng, Samantha Cobos, Mariana P. Torrente, Brooklyn College

Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease associated with motor neuron deterioration and loss of voluntary muscle movement. Due to their similar mechanisms, ALS forms a disease continuum with frontotemporal dementia (FTD), which is connected t0 the death of neuronal cells in the frontal lobe of the brain. ALS/FTD is associated with certain epigenetic changes, which are modifications in heritable traits and gene expression that do not change the DNA genetic code. We are focusing on post-translational histone modifications, or the addition of chemical groups on histone tails, like methylation and phosphorylation, that impact gene expression and are linked to ALS/FTD in yeast and human models of the disease. There has been a link between exposure to environmental toxins and an increased risk of ALS. The goal of this work is to determine the effects of heavy metal toxins on the post-translational histone modification landscape in yeast. After exposing yeast to heavy metals, specifically copper chloride, we perform western blots to quantitate post-translational histone modifications including H3K36me3, H3K79me3, H3K9ac, and H4K16ac. Findings can reveal epigenetic channels where environmental exposure correlate to ALS/FTD and create new methods for disease prevention.

### CHEM – 221 UNCOVERING THE ROLE OF THE HISTONE ACETYLTRANSFERASE GCN5 IN A YEAST ALS/FTD MODEL.

**Daniel Gorelik** (UG), Chaim Janani, Samantha N. Cobos, Mariana P. Torrente, Brooklyn College

Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Dementia are neurodegenerative diseases affecting neurons. Currently there is no cure for ALS/FTD. ALS/FTD is associated with chromosome 9 open reading frame 72 (C9orf72). Hexanucleotide repeat expansion G4C2 in the C9orf72 gene is the most common genetic mutation in ALS/FTD. These expansions create dipeptide repeat proteins, which aggregate in the neurons of ALS/FTD patients. Most ALS/FTD cases are sporadic, meaning they arise with no family history of the disease. As genetics alone do not explain ALS/FTD, the disease might have an epigenetic component. Post translational modification (PTM) of histones is an epigenetic mechanism where chemical moieties are added and removed from histones. PTMs are involved in control of gene expression and research has linked them to many diseases, including ALS/FTD.

Exploiting a yeast ALS/FTD model overexpressing the dipeptide repeat protein PR50 (50 repeats of Proline-Arginine) under galactose-inducible expression, we found that overexpression of PR50 is associated with increases in acetylation levels of Histone H3 on Lysine 9 (H3K9ac) and Histone H3 on Lysine 27 (H3K27ac). Both modifications are written by the histone acetyltransferase general control non-depressible 5 (Gcn5). Since Gcn5 is highly conserved in humans and yeast, it is a promising therapeutic target. We engineered yeast cells overexpressing PR50 in which the Gcn5 gene is knocked out. By assessing the levels of H3K9ac, H3K27ac and the toxicity of PR50 in context of Gcn5 deletion, we hope to establish how, if at all, Gcn5 is involved in ALS/FTD. From this, we can identify histone PTMs which can be modulated with epigenetic drugs to combat ALS/FTD.

### CHEM – 222 PHOTOPHYSICAL STUDIES OF BENZOFLUORENONE ISOMERS AND G-QUADRUPLEX DNA INTERACTIONS

**Fatma Zehra Gulluce** (UG), Lesley Davenport, Brooklyn College

The binding of small molecules to stabilize the folded four-stranded intramolecular conformation of DNA G-quadruplex structures located within telomeric DNA has been shown to inhibit telomerase activity, an enzyme associated with tumorigenesis. We are currently exploring three positional isomers, benzo[a]fluorenone (BFa), benzo[b]fluorenone (BFb), and benzo[c]fluorenone (Fc), as potential quadruplex interactive agents (QIAs) that stabilize the folded G-quadruplex conformation. Previous equilibrium microdialysis studies in our laboratory suggest selective binding of BFa and BFb for the folded DNA-quadruplex structures over traditional duplex-DNA structures, although the binding site remains unknown. To address this issue, we propose to use sensitive fluorescence spectral signals to provide insights into the nature of the quadruplex binding sites for the varying BF-isomers. The positional isomers, derived from the parent 9-fluorenone (9-FL), exhibit fluorescent spectral and intensity sensitivities to both polarity and hydrogen bonding within their immediate environment (solvatochromic behavior). In the current study, the photophysical behavior of the BF-isomers in protic solvents of varying polarities has been investigated to provide important insights into the nature of the binding environments for the BF isomers when bound to quadruplexed DNA. Our initial solvent data suggest that BFb and BFc share similar fluorescence signal sensitivities to the environment, in contrast, these differences may relate to altered deactivation pathways from the known closely lying singlet and triplet excited states. The result of our data providing insight into the DNA G- quadruplex binding sites for the varying BF isomers will be discussed.

*Supported by NIH URISE GM149490.*

### CHEM – 223 TESTING DEVELOPED POLYMERIC NANOPARTICLES STABILIZED BY SELF ASSEMBLED MITOCHONDRIA-TARGETING PEPTIDES ON OVARIAN CANCER CELLS

**Yelyzaveta Kurchak** (UG), Maxier Acosta Santiago, Sylwia Dragulska, Aneta Mieszawska, Brooklyn College

Ovarian cancer (OvCA) is one of the deadliest female tract malignancies. In the U.S., 70% of all patients will present with advanced stages of a disease. About 70% of all patients present with advanced stages of the disease. With the 5-year survival rate that has been unchanged for the past four decades, the recurrence rate remains around 30%. Platinum based drugs such as cisplatin, oxaliplatin, and carboplatin are mainly used in cancer therapy treatments, including ovarian, testicular, and bladder cancer. The biggest issue with using platinum based drugs is the severe side effects and acquired resistance to the treatment. Nanopharmaceuticals have been applied in clinics and many are Food and Drug Administration (FDA) approved for systematic, oral, or topical administration. Nanoparticles (NPs) have a potential in cancer therapy as a drug delivery system. By encapsulating the drug molecule, NPs increase its effectiveness and decrease its side effects. Doxil is one of the examples of nanoparticles used in cancer therapy. It is a liposomal formulation of doxorubicin used for the treatment of HIV-associated Kaposi's sarcoma. Developing a nanoparticle with biodegradable and biocompatible features that has both active targeting and drug-loading capability is challenging. The Mieszawska team has developed NPs consisting of FDA-approved poly(lactic-co-glycolic) acid (PLGA) core that is stabilized with the 6-chain peptide in the process of self-assembly at room temperature. The nanoparticle presented in this report encapsulates cisplatin drug that is commonly used in chemotherapy, and a mitochondria-targeting TPP-KFF peptide coating.
*Supported by NIH U-RISE GM149490.*

**CHEM – 224 OSTEOCALCIN: ENHANCING GLUCOSE TOLERANCE, INSULIN SENSITIVITY, AND SECRETION IN 9.5 MONTH MALE MICE**

**Lawrence Mitelberg** (UG), Naif Hassan, Malak Abdelrasoul, Terry L. Dowd, Brooklyn College

The role of osteocalcin, a bone protein, in glucose homeostasis is controversial. Osteocalcin deficient mice (Ocn-/-), on a mixed 129/BL6J background, showed glucose intolerance, insulin resistance and reduced insulin secretion at 1-6 mos. In contrast, Ocn-/- mice on C3H/BL6 (5-6 mos.) and C57BL/6N (5 and 9 mos.) backgrounds found no effect on glucose metabolism. To resolve this, we conducted glucose tolerance tests (GTT) and insulin tolerance tests (ITT) on 5 hour fasted Ocn-/- mice (6 and 9.5 mos.) on a pure C57BL/6 J background. Glucose (2 g/kg BW) (GTT) or insulin (0.5 U/kg BW) (ITT) were administered with blood glucose measured with time. No effect was observed at 6 mos. but 9.5 mos. Ocn-/- mice showed significantly higher glucose levels, for GTT and ITT, indicating both glucose intolerance and insulin resistance. Glucose stimulated insulin secretion was conducted to assess insulin secretion by injecting 3 kg glucose /BW, after a 12-hour fast, with blood insulin concentrations measured at various time points thereafter. The 9.5 mos Ocn-/- mice showed significantly diminished insulin secretion. Additionally, administration of recombinant mouse osteocalcin to Ocn-/- mice lowered glucose levels. Our findings confirm osteocalcin's role in glucose metabolism, insulin sensitivity, and secretion in older male mice on a C57BL/6J background. Discrepancies from prior reports may stem from differences in background, age, or experimental protocols. The delayed onset of the effect highlights the importance of genetic background on phenotype. These results may be important for elderly and diabetic humans where osteocalcin is reduced.

**CHEM – 225 EFFECT OF THE KINASE INHIBITOR BARASERTIB ON PHOSPHORYLATION OF HISTONE H3 AND CELL DEATH IN YEAST FTD/ALS MODELS.**

**Maisha M. Sheikh** (UG), Mariana P. Torrente, Brooklyn College

Amyotrophic lateral sclerosis (ALS) and frontotemporal dementia (FTD) are neurodegenerative diseases that result from neuron cell damage. The gene, chromosome 9 open reading frame 72 (C9orf72) is associated with familial ALS/FTD in that the hexanucleotide repeat expansions in this gene leads to aggregation of toxic dipeptide repeats. One field of research focuses on the role of epigenetic mechanisms on the onset of ALS/FTD, specifically as it relates to histone post-translational modifications (PTMs). Histones are proteins that form complexes with DNA, and they can control the DNA expression via PTMs, such as phosphorylation and methylation. Exploiting yeast mimicking C9 FTD/ALS mutations, previous work has tied increases in H3S10ph -- installed by Ipl1/Aurora B kinase -- to FTD/ALS. The goal of this study is to assess whether the drug Barasertib will promote recovery of cell growth in this model. Barasertib is a kinase inhibitor that can target Ipl1, the yeast equivalent of Aurora B Kinase. To do so, we are treating disease and control Saccharomyces cerevisiae with different concentrations of Barasertib (4uM, 10 uM, 20 uM) and assessing levels of H3S10ph in treated versus non-treated yeast. This is important as decreased levels of phosphorylation would indicate that the inhibition of Ipl1 is responsible for this change. It also suggests that Barasertib can be a therapeutic agent for patients with ALS/FTD since its effects impact H3S10ph, which was found to be a marker in diseased yeast models, and this can potentially translate to humans.

### CHEM – 226 PLATINUM(IV)-AU(I) COMPOUNDS CONTAINING THE CARBOPLATIN CORE AS POTENTIAL OVARIAN CANCER CHEMOTHERAPEUTICS

**Rebecca Turay**[1] (UG), Ama Panvilawaththe, Fatima Aftab, Maria Contel, Brooklyn College

Platinum(IV) compounds are an appealing alternative to traditional platinum(II) FDA-approved cancer treatments. This preference arises from their enhanced stability in biological environments and increased bioavailability. Pt(IV) compounds can be reduced in
the cellular milieu to square-planar d8 Pt(II) species by reducing agents such as Ascorbic Acid or Glutathione. The octahedral configuration of Pt(IV) allows for the attachment of two additional ligands in the axial position, which are subsequently released upon reduction. The selection of moieties with established anticancer properties and/or targeting vectors, can potentially enhance their pharmacological profile. Examples of Pt(IV) compounds containing FDA-approved Pt cores and bioactive ligands like biotin, glucose, arginyl-glycyl-aspartic acid RGD peptides, glutathione-S-transferase GST, histone deacetylases HDAC, norepinephrine reuptake NERI, or cyclooxygenase COX inhibitors have been reported. More recently Pt(IV) containing a second bioactive metallic fragment have been reported, including work from our laboratory on Pt(IV)-Au(I) derivatives. The reported compounds were active against a small panel of cancer cell lines, and highly active in TNBC 2D and 3D (spheroid) models. Here, we will report on our synthetic efforts to incorporate carboplatin as the Pt metal core in novel Pt(IV)-Au(I) compounds. Moreover, we will provide preliminary
data on their activity against ovarian (A2780) and ovarian cisplatin-resistant (A2780cis) cell lines.
*Supported by NIH URISE GM149490.*

### CHEM – 227 ENVIRONMENTAL EXPOSURES IN NEURODEGENERATIVE DISEASE: EFFECTS OF COPPER ON POST-TRANSLATIONAL HISTONE MODIFICATIONS IN S. CEREVISIAE MODELS

**William Villasi** (UG), Rania Frederic, Mariana P. Torrente, Brooklyn College

Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease associated with motor neuron deterioration and loss of voluntary muscle movement. Due to their similar mechanisms, ALS forms a disease continuum with frontotemporal dementia (FTD), which is connected t0 the death of neuronal cells in the frontal lobe of the brain. ALS/FTD is associated with certain epigenetic changes, which are modifications in heritable traits and gene expression that do not change the DNA genetic code. We are focusing on post-translational histone modifications, or the addition of chemical groups on histone tails, like methylation and phosphorylation, that impact gene expression and are linked to ALS/FTD in yeast and human models of the disease. There has been a link between exposure to environmental toxins and an increased risk of ALS. The goal of this work is to determine the effects of heavy metal toxins on the post-translational histone modification landscape in yeast. After exposing yeast to heavy metals, specifically copper chloride, we perform western blots to quantitate post-translational histone modifications including H3K36me3, H3K79me3, H3K9ac, and H4K16ac. Findings can reveal epigenetic channels where environmental exposure correlate to ALS/FTD and create new methods for disease prevention.

**CHEM – 300 NUCLEAR MAGNETIC RESONANCE (NMR) DETECTION OF EPOXIDE AND DIHYDROFURAN PHOTOPRODUCTS WITH A PHENOLIC ADJUVANT TO ACCELERATE THE KILLING OF OVARIAN CANCER CELLS.**

**Serah Essang** (G), Lloyd Lapoot, Goutam Ghosh, Akshaya Iyer, Alexander Greer, Brooklyn College

The photosensitized oxidation of ortho-prenyl phenol can lead to byproducts capable of killing ovarian cancer cells in mechanism separate from singlet oxygen phototoxicity. We are interested in cell killing achieved by such 'priming' events, where an adjuvant is capable of delivering the second of a 'one-two' punch to kill already weakened cells. The byproducts formed in ortho-prenyl phenol photooxidation are capable of priming, but some structures after extended photolysis have not been characterized. Thus, we undertook an NMR investigation to detect compounds capable of adding toxicity above and beyond the phototoxicity. The photooxidation of prenyl phenol leads to the production of compounds including dihydrobenzofuran, hydrogen peroxide, and 'ene' allylic hydroperoxides.[1] As we will discuss, additional compounds were detected by 1D and 2D NMR techniques, including dihydrobenzofurans bearing hydroperoxide, alcohol, and epoxide side-groups. The photoproduct formation appears to depend on tandem type II (singlet oxygen, 1O2) reactions, instead of type I reactions involving oxygen radicals and radical ions.

[1]Durantini, A. M.; Lapoot, L.; Jabeen, S.; Ghosh, G.; Bipu, J.; Essang, S.; Singh, B. C.; Greer, A. Tuning the 1O2 Oxidation of a Phenol at the Air/Solid Interface of a Nanoparticle: Hydrophobic Surface Increases Oxophilicity. Langmuir 2023, 39, 11134-11144.

**CHEM – 301 PARTITION COEFFICIENT (LOGP) CALCULATIONS OF ADJUVANTS: STUDIES TO AMPLIFY THE PHOTODYNAMIC OF KILLING OVARIAN CANCER CELLS**

**Akshaya Iyer** (G), Lloyd Lapoot, Serah Essang, Goutam Ghosh, Alexander Greer, Brooklyn College

Photodynamic therapy (PDT) has emerged as a promising modality for the treatment of ovarian cancer. PDT utilizes photosensitizing agents (PS), light and molecular oxygen to generate cytotoxic reactive oxygen species (ROS) in target tissues. Ortho-prenyl phenol (Pr) has been investigated for its unique property to potentiate PDT by serving as an adjuvant. The sensitized photooxidation of Pr has implications in biomimetic natural products synthesis to reach dihydrobenzofurans as primary products and epoxides presumably as secondary products. To understand the partitioning of these products, we have carried out coefficient (logP) calculations with software called ACD. The ACD results lend insight to predict the degree of hydrophobicity of the products to potentially help deduce their toxicity with ovarian OVCAR-5 cells. We find diverse hydrophobicity profiles among the studied products, indicated by their logP values. Products containing hydroxyl or carbonyl groups possessed fairly low logP values (1.45 to 1.62), and comparably,

products with terminal epoxide groups displayed even lower logP values (0.63 to 1.26) due to decreased hydrophobicity. Products with C=C double bonds in the side chain exhibited moderate to high logP values (2.04 to 3.57), while those containing hydroperoxide exhibited even higher logP values (2.87 to 3.25), suggesting higher lipophilicity and potential for enhanced membrane localization. The above findings will be discussed to try to add insight to photooxidation products' hydrophobicity and ovarian cancer cell killing ability.

**CHEM – 302 BLUER PHOTOTRUNCATION:RETRO-DIELS-ALDER OF HEPTAMETHINE CYANINE TO TRIMETHINE CYANINE THROUGH ALLENE HYDROPEROXIDE INTERMEDIATE**

**Lloyd Lapoot** (G), Connor Wang, Siddharth S. Matikonda, Martin J. Schnermann, Alexander Greer
Brooklyn College

Photoconversion reactions entail the conversion of one emissive species to another of different absorbance/emission wavelengths. Recently, the photoconversion of heptamethine to pentamethine cyanines and of pentamethine to trimethine cyanines was reported. In the present poster, we present mechanistic studies and initial experimental evidence for a previously unexplored 4-carbon truncation reaction that converts the simplest heptamethine cyanine to the corresponding trimethine cyanine. We propose a density functional theory-supported model describing a singlet oxygen ($^1O_2$) mediated formation of an allene hydroperoxide intermediate and subsequent 4-carbon loss through a retro-Diels-Alder process. Fluorescence and mass spectrometry measurements provide evidence for this direct conversion process. This 4-carbon truncation reaction adds to the growing body of cyanine reactivity and may provide an optical tool leading to a substantial blue-shift of ~200 nm. Interestingly, some previous studies had found that these molecules undergo photobluing processes, and originally characterized it as an artifact in various microscopy settings, which is shown here not to be the case.

### CIS – 228 RECOGNIZING EVERYDAY SOUNDS WITH WIRELESS RADIO FREQUENCY SENSORS

**Yahia Imad Elhag** (UG), Alston Devero-Belfon, Panneer Selvam Santhalingam, Brooklyn College

Recognizing and classifying different environmental sounds is crucial for day-to-day functioning. A common device used for these is a microphone. A microphone converts the mechanical vibration of the diaphragm into electrical signals that encode the corresponding audio. A limitation of microphones is that they receive a composite signal from different sources, which could include significant noise depending on the operating environment, making it hard to differentiate different sounds. Continuous operation of microphones also incurs privacy concerns, and limiting their usage could be prudent. Except in extreme circumstances, most of us can depend on our ears to recognize and localize sounds with reasonable accuracy, reducing our dependence on technology.

However, for people with hearing disabilities and the machines we build, technologies for recognizing audio are essential. Some existing works step aside the privacy concerns and focus on building such systems using microphones. In this work, we propose a different sensing mechanism using wireless radio frequency signals to recognize sound from everyday appliances. Wireless radio frequency devices are becoming ubiquitous and embedded in devices like smart thermostats, digital assistants, sleep monitors, etc. These devices consume less power, incur fewer privacy concerns, and enable the reuse of existing ubiquitous solutions. They could help us address the shortcomings of contemporary microphone-based sensors.

### CIS – 229 EXPANDING ON SOFTWARE ACCESSIBILITY FOR CANCER SURVIVORS WITH DISABILITIES THROUGH SIMULATORY PROGRAMS

**Royta Iftakher** (UG), Kyrie Zhou, Rachel Adler, Devorah Kletenik, Brooklyn College

As cancer survivorship increases in the United States, there is a growing population that possess varying degrees of impairments as a result of the disease and/or its treatments. This includes the cognitive impairment known as “chemo brain,” peripheral neuropathy, and decreased visual and auditory acuity. With society's increasing reliance on technology and software, and especially with the role that technology plays in cancer survivors’ lives, a lack of consideration for software accessibility results in the exclusion of this group of users. Our research goals were to understand: the challenges and needs of cancer survivors with impairments when using software; cancer survivors’ life needs regarding health, socialization, and cancer rehabilitation; and which accessibility guidelines and design features should be formulated for software design for cancer survivors with impairments. We surveyed cancer survivors (N = 40) and conducted in-depth semi-structured interviews (N = 13) to understand the impairments that cancer survivors have and their impact on software use, and developed a set of four accessibility guidelines and five design features for the development of software geared towards this population.
*Supported by Pilot grant from the American Cancer Society, Tow Research and Mentoring Program.*

### EES – 102 THE EFFECT OF OCEAN ACIDIFICATION ON MACROALGAE

**Tomiriz Abdulkhamidova**[1] , **Jaina Leung**[1], **Ravital Reingold**[1] (HS), Ileana Friedman[2]
[1]Midwood High School
[2]Brooklyn College

Rising temperatures and general climate change had led to fundamental changes in ecosystems on land and in bodies of water. The ocean offers a habitat to many organisms as well as being a valuable economic resource to humans. However, the ocean's stability is constantly changing, with factors such as ocean acidification threatening to limit growth of aquatic organisms. Organisms such as macroalgae provide necessary habitat space and nutrients for other aquatic organisms. However, these organisms may be susceptible to climate changes such as ocean acidification. In this study, the effects of ocean acidification were tested on three types of macroalgae, *Gracilaria spp., Fucus spp.* and *Ulva lactuca*. Objects were subjected to a pH of 8 and a pH of 6 and the change in wet weight was measured. All three macroalgaes grew at disproportionate rates. Overall, the *Ulva lactuca* had the greatest overall percent change in wet weight mass in the pH of 6 and 8. *Fucus spp.* had a constant growth rate between both the control (pH 8) and the experimental group (pH 6). *Gracilaria spp.* had a slower growth rate in the pH of 8.

### EES – 103 THE EFFECT OF COPPER CONTAMINATION IN DIFFERENT MACROALGAE ENVIRONMENTS

**Christian Gabelman**[1], **Rusanna Korotich**[1] (HS), Ileana Friedman[2]
[1]Midwood High School
[2]Brooklyn College

Copper contamination in marine ecosystems, from natural and anthropoid sources, has become a growing concern due to its adverse effects on marine life. This study examines the impact of copper contamination on the growth rates of *Gracilaria*, *Ulva lactuca*, and *Fucus vesiculosus* macroalgae. The research exposed these macroalgae to copper-contaminated saltwater and assessed their physiological responses, revealing diverse responses among the species. Gracilaria and *Fucus vesiculosus* showed minimal differences in wet weight, while *Ulva lactuca* experienced a significant decrease, particularly in the initial phase. Qualitative observations indicated that *Fucus vesiculosus* exhibited signs of decompensation, *Gracilaria* had accumulated copper precipitates, and *Ulva lactuca* displayed increased clarity and reduced copper formation. The rejection of the null hypothesis suggests that copper-contaminated saltwater does affect the physiological state and growth of these macroalgae. The study highlights the potential for macroalgae to serve as bioindicators for copper contamination in aquatic environments and emphasizes the need for further investigations to explore bioremediation possibilities, elucidate the mechanisms of copper contamination at the cellular level, and assess the prospects of reviving and recovering macroalgal populations after copper contamination.

### EES – 104 VARIATION OF TOPSOIL TRACE METAL CONCENTRATIONS IN BIOSWALES FROM NEW YORK CITY

**Linda Xiao**[1] (HS), Zhongqi Cheng[2]
[1]Midwood High School
[2]Brooklyn College

This research focuses on analyzing the variations between heavy metal concentrations in soil samples from bioswales across New York City to determine the implications of the sources where the heavy metals are from. Bioswales are underground channels dug a few feet underground by the streets that help manage the flow and filtration of rainstorm water. The rainstorm water carries heavy metals from the air into the underground channel, which is then absorbed by the soils in the bioswales. The purpose of this

study is to determine how the variations in specific metal concentration reveals its sources and implications that could be drawn from these sources. The soil is collected from different bioswale locations and seven samples are collected from each location. The soil samples would be put under the X-Ray Fluorescence (XRF) spectrometer that detects the elements in certain materials by emitting radiation beams. The result of this research includes the correlation between zinc and lead concentration that reveals a shared source, air pollution, that these metals come from. A significant finding is that one bioswale location has a higher lead and zinc concentration than other sites. The variation of the metal concentration is due to an additional source, tobacco smoking, that emits both types of metals along with nickel.

### EES – 105 IMPACT OF FIRES ON ASTHMA RATES IN BRAZIL: ANALYSIS OF PM2.5

**Jinyu Xu**[1] (HS), Sheena Philogene[2]
[1]Midwood High School
[2]Brooklyn College

In the wake of the alarming spread of air pollution from the 2023 Canadian Wildfires, an intense series of fires that impacted territories in Northwest Canada and the Northeastern areas of the United States, there was a drastic increase in fine particulate matter, or PM2.5 which has had many adverse health effects. This prompted me to think about other places in the world where wildfires are problematic for the health of its citizens.

This study explores the correlation between asthma rates in wake of fires in the macro-regions of Brazil by using geographic information systems (GIS) and coding. Specifically, Brazil was chosen to be focused on due to its dry climate and lack of regulations involving burning forests for profit, both of which contribute to the high number of fires. The growing problem of worsened air pollution is an environmental concern linked to various respiratory problems. PM2.5 (less than 0.0025 mm) are more likely to travel into and deposit on the surface of the deeper parts of the lung and as particles accumulate, they have the potential to cause tissue injury and inflammation. This study looked at the MODIS fire data was also from Google Earth Engine. Data was extracted from DATASUS TABNET – Brazil's national health and demographic datasource. The results suggest that there is a clear correlation between PM2.5 levels and the severity of fires in Brazil as demonstrated by the concentrated red sparks around areas of Brazil that were shown by shades of maroon – representing a severe level of fires occurring at that location. As for the r-values, there was a weak and unclear relationship – as shown by the values such as 0.006 and 0.013 – between the severity of fires and asthma rates. Therefore, this supports the need for additional research considering the other various respiratory conditions, which might suggest a stronger correlation.

### EES – 106 DISTRIBUTION OF HEAVY METALS (PB, CU, ZN) IN RELATION TO SOIL PARTICLE FRACTION SIZES

**Vicky Zheng**[1], **Eric Zhang**[1], **Shan Shan Luo**[1] (HS) , Zhongqi Cheng[2]
[1]Midwood High School
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In New York City, urban gardening has become more popular as a source of recreation, community food, and gathering over the decades. However, a prevalent issue in highly urbanized NYC is heavy metal contamination in the soil. Urban gardeners may not fully understand or have the resources to tackle this because of financial and time investments, a lack of site background, and a perceived lack of need. This research promotes a better understanding of how particle size can affect heavy metal concentration in soil and whether these trends persist in different relative abundances for three different heavy metals (lead, copper, and zinc). Size is important because smaller particles are more likely to be breathed in or

eaten because of higher mobility, but it is also easy to control for testing. To do so, the XRF analyzer, an instrument that calculates the heavy metal content (ppm), is utilized for 14 samples, 7 from Kingston Community Gardens (low lead) and the other 7 from NYC Community Gardens (high lead). T-tests were used to compare the average heavy metal concentration in three fraction sizes (F1: 2mm - 250µm; F2: 250µm - 125µm; F3: <125µm). Ultimately, NYC sample results indicate a moderate to strong correlation between metal concentrations and soil particle size, where heavy metal concentrations increased as soil particle size decreased. Meanwhile, the results from Kingston indicate an inconclusive relationship. Future research could focus on determining factors other than particle size, such as fertilizer use, that affect metal concentrations in soil.

### EES – 230 CONTRASTING ORIGINS OF UNUSUAL IRON-CEMENTED SANDS ON BEACHES OF COASTAL NEW YORK REGION

**Noah Hopkins** (UG), Idriz Caushi, Zane Johnson, Erika Sanchez, Annaliza Lim, Wayne Powell, John Chamberlain, Brooklyn College

Given the insoluble nature of oxidized iron, iron-rich minerals are not commonly found in coastal sediments and iron is essentially absent from seawater (1-3 ppb). However, numerous samples of iron oxide-cemented sand occur in varied and distinct forms along the beaches of NY and NJ. Iron oxide-cemented sand has been observed along the shores of the New York Bight as round fossiliferous concretions averaging 25cm in length, as in-situ beds of beachrock, and as anomalous tabular rocks. Samples of each were analyzed using SEM-EDS and PLM to determine the conditions under which these rocks formed.

Round concretions form naturally in sands containing abundant fossil material. Bacterial decomposition depletes the available oxygen adjacent to the fossil, creating an anoxic microenvironment that allows for the mobilization of the iron that is present. Microfossils present in these objects indicate that they can be no older than about 8,000 years and that their formation is an ongoing process. Quartz in the beachrock and tabular sample is embayed but calcite shells are not, indicating highly alkaline conditions. The presence of preserved amoeboid sarcodines in the beach rock indicates a fen paleo-environment. Thus, it is likely that the beachrock formed at a reaction front where Fe-rich anoxic fen water mixed with subsurface seawater. The unusual form of the tabular sample, along with its mineralogical features, point towards anthropogenic environmental conditions being the main driver of cementation, that is, electrochemical corrosion of iron posts buried in the beach sand. This research not only creates a fuller picture of the New York Bight area that resides in our own backyard, but illuminates how human infrastructure can influence coastal beach environments.

### EES – 231 CONSERVATION OF LONG ISLAND'S WETLANDS: THE IMPACT OF EROSION ON JEROME AMBRO MEMORIAL WETLAND PRESERVE

**Annaliza Lim** (UG), Rebecca Boger, Brooklyn College

The Crab Meadow Watershed covers 3560 square acres and 3 miles of waterfront on the Long Island Sound. Within this formation sits the Jerome Ambro Memorial Wetland Preserve which encompasses 160 of those acres and is an integral habitat for 12 mammal species and 94 species of bird (Berg, 2024). Contemporarily, this environmentally fragile body of water was shown to be in a state of degradation due to soil erosion thus reducing its ability to sustain animal species as well as naturally stabilize the coastline and sequester carbon. Therefore, it is essential to determine the impact of natural disasters, urban development and sediment degradation on wetland and formulate a plan of action to circumvent and protect against further deterioration. Utilizing the computational capabilities of the ArcGIS system the degree of erosion between 2001 and 2023 can be quantified and visualized for the Jerome Ambro

Memorial Wetland Preserve with the hope that this data will aid in the stewardship and conservation for the greater Crab Meadow Watershed.

### EES – 232 ADAPTING TO RISING TIDES: UNDERSTANDING THE IMPACT OF SEA LEVEL RISE ON CRAB MEADOW AND COASTAL WETLANDS IN THE LONG ISLAND SOUND ESTUARY

**Sofia Mariyamis** (UG), Rebecca Boger, Brooklyn College

This research paper investigates the impact of sea level rise on Crab Meadow, a critical coastal wetland within the Long Island Sound estuary, which is situated between New York and Connecticut and is home to a rich biodiversity, including over 1,200 species of invertebrates and 170 species of fish. Given that the rate of sea level rise in this area significantly exceeds the global average, posing threats through increased erosion, habitat loss, and salinity changes, this study utilizes a decade's worth of drone photography and elevation data to examine the specific transformations occurring within Crab Meadow. The project highlights the crucial role of coastal wetlands in natural defense against storm surges, biodiversity conservation, and carbon sequestration, aiming to elucidate the adaptation mechanisms and reshaping processes of such ecosystems in response to climate change. By focusing on sediment accumulation, ecological responses, and temporal changes, the research seeks to offer insights into wetland resilience and inform conservation strategies, emphasizing the urgent need for integrated management practices to protect these ecosystems. This study not only advances our scientific understanding of climate change impacts on coastal environments but also underscores the critical importance of safeguarding vital natural resources for ecological sustainability and the well-being of human communities.

### EES – 233 TRACE METALS IN BIOSWALES OF NEW YORK CITY: IMPLICATIONS ON METAL FLUXES FROM AIR AND OTHER SOURCES

**Kyla Shorr**[1] (UG), Labib Samari[1], Wilson Deng[1], Glen Johnson[2], Zhongqi Cheng[1]
[1]Brooklyn College
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Thousands of bioswales have been built in New York City in the past 15 years. They effectively capture runoff from streets, reducing the volume of combined sewer overflow – the leading cause of water quality problems for waterways around the city. These bioswales also serve as a sink for trace metals scavenged from the atmosphere by rain, and those from street surfaces. Most trace metals are bound to particles and remain in the topsoil in the bioswale. Therefore, trace metal levels in bioswales can serve as an indicator of metal fluxes in a specific neighborhood. We selected 12 different neighborhoods in 4 boroughs of NYC, varying in land use and traffic density. Within each neighborhood, we randomly selected 3-7 bioswales. These bioswales, usually 20 ft by 5 ft, vary in watershed size and age. Seven topsoil samples were collected from each bioswale. A portable X-ray fluorescence instrument was used to scan the soil sample contained in a Ziploc bag, after the sample was dried and sieved to <2mm in size. Preliminary results show that trace metal concentrations vary, sometimes greatly, among different bioswales and at different locations within a bioswale. Annual fluxes for different land uses can be estimated based on the topsoil metal concentrations and can be used as a proxy for air quality for different urban neighborhoods. Further analysis will also reveal the relationship between annual fluxes and traffic density. This is the first time that bioswales are being used as indicators of air quality.

## EES – 234 ASSESSING THE POTENTIAL OF TRADITIONAL AND HYBRID GREEN INFRASTRUCTURE FOR PHOSPHATE AND NITROGEN REMOVAL FROM NYC URBAN LAKE FEED WATER

**Zachary Strein** (UG), Jennifer Cherrier, Koreana Pak, Brooklyn College

Prospect Park Lake (PPL) is a manmade freshwater lake supplied by New York City's (NYC) municipal water system. Enrichment of PO43-, which is added to NYC municipal water to prevent lead solubilization from pipes, is believed to stimulate widespread PPL blooms of the toxin-producing cyanobacteria, Microcystis, posing a health hazard to humans and animals.

We are engaged in an interdisciplinary project to assess (1) the capacity of green infrastructure (GI) to remove PO43- from municipal water thereby offsetting Microcystis growth, and (2) public perception of the problem and solutions under consideration by NYC City Parks.

Our research team's focus is to compare the PO43- and dissolved nitrogen (N) constituent removal efficiency of traditional GI vs. a hybrid GI system (ecoWEIR, patented 2017). Traditional GI systems are passive, where retention times for intercepted water are not controlled and pollutant removal is variable. In contrast, ecoWEIR is a contained system that can control water retention times and soil conditions to maximize consistent pollutant removal efficiencies.

Mesocosm studies were carried out with both traditional-passive and ecoWEIR systems under controlled conditions in Brooklyn College's AREAC greenhouse. Mesocosms (4 ft tall, 2 ft diameter) contained a layer of gravel below 2 ft of sand, topped with drought and flood tolerant native plants rooted in 0.5 ft of sand/soil mix.

Each mesocosm was flooded with 17.6 gallons of water, which was allowed to pass freely through the traditional-passive GI mesocosm, but retained for 48 hrs in the ecoWEIR GI mesocosm. Mesocosm inflow and outflow samples were collected, filtered, and stored for subsequent PO43- and N constituent measurements, as well as for time-series incubations with Microcystis cultures.

### HNS – 235 BODY APPRECIATION AND EATING BEHAVIORS ARE ASSOCIATED WITH BODY MASS INDEX (BMI) IN YOUNG ADULT WOMEN

**Liz Cortes** (UG), Caren Ghali, Janel A. Clovis, Lauren Zami, May M. Cheung, Brooklyn College

Eating behaviors, such as self-restricted eating, eating to deal with emotions, or uncontrolled/binge eating, are associated with dietary patterns and body weight. Young women are particularly vulnerable to body image concerns, which may lead to disordered eating behaviors, but how each of these eating behavior traits (i.e., cognitive restraint, emotional eating, and uncontrolled eating) are associated with body weight in this population is less explored. We assessed the self-body image appreciation and eating behavior traits of 211 young adult women using two validated surveys, the Body Appreciation Scale-2 and the Three-Factor Eating Behavior Questionnaire-R18, respectively. Body mass index (BMI) was calculated using self-reported height and weight. After adjusting for age, we found that BMI negatively correlated with body appreciation ($r = -0.29$, $p < 0.001$) while positively correlated with all dimensions of eating behaviors (cognitive restraint, $r = 0.19$, $p < 0.01$; emotional eating, $r = 0.27$, $p < 0.001$; uncontrolled eating, $r = 0.16$, $p = 0.24$). When participants were separated by BMI categories, we found that body appreciation and all eating behavior traits significantly differed across BMI categories. Tukey's HSD results revealed that individuals who were in the obese category had lower body appreciation ($p = 0.001$) and higher cognitive restraint ($p = 0.04$), emotional eating ($p < 0.001$), and uncontrolled eating ($p < 0.01$) compared to healthy-weight individuals. Based on our findings, we determined that BMI is associated with body appreciation and eating behaviors. Future research should focus on understanding the direction of these relationships and how they interact with other factors such as food liking and taste preference.
*Supported by NIH 5T34GM007639 and NIH MARC T34GM00878.*

### HNS – 236 DISAGGREGATING SEXUAL HEALTH DATA ON MEN WHO HAVE SEX WITH MEN (MSM) BY RACE USING THE 2019 NEW YORK CITY COMMUNITY HEALTH SURVEY

**Idrees Ilahi** (UG), Margrethe Hørlyck-Romanovsky, Brooklyn College

Men who have sex with men (MSM) continue to be the most impacted population by HIV in the United States, with Black and Hispanic populations disproportionately affected. Currently, there is no quantitative literature that disaggregates anal sex behaviors and HIV testing by all races within the same study. Thus, this epidemiological study compared anal sex and HIV testing practices between Black Non-Hispanic, White Non-Hispanic, Asian/PI Non-Hispanic, and Hispanic populations living in New York City (NYC). Data were obtained from the 2019 NYC Community Health Survey for 116 White, 69 Hispanic, 33 Black, and 13 Asian/PI MSM. Jamovi was used for conducting T-tests, Chi-squared, and multivariate logistic regression. Anal sex and HIV testing behaviors were: analsex (in the past 12 months have you ever had anal sex, Yes/No), analsexcondomuse (in the past 12 months when you had anal sex have you or your partner used a condom, Yes/No) everhivtest (have you ever had an HIV test, Yes/No), hiv12months (have you had an HIV test in the past 12 months, Yes/No), analstdtest (have you ever had an anal/rectal STD test in the past 12 months, Yes/No). Disaggregated racial groups differed in age, education, income, and nativity (all p-values <0.05). Anal sex, anal sex condom use, HIV testing (ever and in the past 12 months), and anal STD testing were not different. Logistic regression models estimated the odds of the existence of nativity, age, education, income, and marital status showed no difference across races as well. Future qualitative research should investigate the underlying social, cultural, and behavioral factors that could explain the observed similarities among these racially diverse populations.

### HNS – 237 HUMAN ADIPOSE TRIGLYCERIDE LIPASE EXPRESSION AND ACTIVITY IN INSECT CELLS

**Zanib N. Ishfaq** (UG), Celines Berroa, Gabriella Polgur, Jorge M. Caviglia, Brooklyn College

Adipose Triglyceride Lipase (ATGL), also known as Patatin-like phospholipase domain containing 2 (PNPLA2), is the main lipase responsible for triglyceride breakdown in humans. ATGL has been proposed to be regulated by ABHD5, a protein which activates ATGL in vitro, yet the mechanism remains unclear. The goal of this study is to produce ATGL in active form to study its regulation. We generated recombinant baculoviruses directing the expression of ATGL, we used them to infect Sf9 insect cells, and we assessed ATGL protein expression and activity. We were able to successfully produce baculovirus. The baculovirus infected the Sf9 cells, and the cells expressed ATGL which has triglyceride lipase activity. We plan to use this recombinant ATGL to study how its activity is regulated.
*Supported by NIH R15DK131627.*

### HNS – 238 ALCOHOL DRINKING BEHAVIOR BETWEEN ASIAN IMMIGRANTS AND US-BORN ASIAN AMERICANS: THE 2019 NEW YORK CITY COMMUNITY HEALTH SURVEY

**Vanchi Ly** (UG), Margrethe Hørlyck-Romanovsky, Brooklyn College

Alcohol behaviors in US-born Asian Americans versus their foreign-born counterparts are unexplored at the population level. This epidemiological study compared alcohol drinking behavior between Asian immigrants and US-born Asian Americans living in New York City (NYC). Data was obtained from the 2019 NYC Community Health Survey for 967 Asian immigrants and 152 US-born Asians. Alcohol behaviors were: drinker (≥1 drink in last 30 days, Yes/No), daysalc30 (number of days drank standardized per month), averagedrink (number of drinks per occasion), heavydrink (men: ≥ 2 drinks, women ≥ 1 drink per day), bingedrink (men: ≥ 5 drinks, women ≥ 4 drink per day). Jamovi project software version 2.4 was used for conducting T-tests, Chi-squared, and multivariate logistic regression. Asian immigrants and Asian Americans differed in age, education, income, marital status, drinking, heavy drinking, and binge drinking (all p-values <0.05). Number of days drinking and the average number of drinks/day were not different. Logistic regression models estimated the odds of the existence of drinking and binge drinking adjusting for nativity, age, sex, education, income, and marital status. Asian immigrants were more likely to be drinkers (OR 1.633 (95% CI 1.069, 2.494) than US-born Asian Americans). There was no difference in binge drinking. Interaction terms determined that differences in alcohol behaviors are likely explained by education and income, and not nativity. Future research should investigate differences in alcohol-drinking behavior by Asian sub-ethnic groups prominent in New York City.
*Supported by The Tow Mentorship Program.*

### HNS – 239 REDUCING MATERNAL MORTALITY AMONG BLACK WOMEN THROUGH THE INCREASED UTILIZATION OF MIDWIVES

**Rhema Mills** (UG), Kiyoka Koizumi, Brooklyn College

Maternal Mortality is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy. In 2021, the United States had a maternal mortality rate of 32.9 deaths per 100,000 live births. Mortality rates in the US are relatively high among all racial groups but women of color are disproportionately affected. In this country, Black women are three to four times more likely to die during childbirth. Direct causes of death include hemorrhage, infection, vascular conditions and hypertensive disorders. Additionally, the statistics suggest that the issue is a result of several factors including little to no prenatal care, obstetric racism, and underlying chronic conditions. Our research investigated the possible root causes of the Black Maternal Mortality and midwifery's potential as a solution to this crisis. Several studies suggest that midwives can ultimately reduce 41% of all maternal deaths. Compared to other nations, the United States has not fully integrated midwives into our health systems. Their licensure

is limited and so is their scope of practice. There are several barriers to both practicing midwifery and receiving care from a midwife which has resulted in their underutilization. This research argues that increased midwifery care could simultaneously lessen the effects of obstetric racism and maternal mortality rates among Black women.

### MATH – 240 DYNAMICS OF THE CHARGED EULER'S THREE-BODY PROBLEM WITH A MAGNETIC FIELD

**Lise Augustin** (UG), Diogo Pinheiro, Brooklyn College

We study the dynamics of a charged particle moving in a plane under the influence of two fixed centers and a magnetic field orthogonal to the plane of motion. Such system can be written as a Hamiltonian system with two degrees of freedom. We employ confocal elliptic coordinates to prove that the system is completely integrable whenever the magnetic field is uniform. Furthermore, we provide numerical evidence for the existence of chaotic behavior in the case of a magnetic field with periodically oscillating magnitude.

### MATH – 273 OPTIMAL STRATEGIES FOR A MARKOV-SWITCHING POPULATION HARVESTING MODEL

**Reuven Goffstein** (UG), Diogo Pinheiro, Brooklyn College

In this presentation we consider an optimal control problem of a population harvesting model. In particular, we study optimal harvesting strategies in a Markov-switching population harvesting model with dynamics involving randomly occurring changes to the population growth rate with a finite number of states. The optimality of any given strategy is defined with respect to a given payoff function. We use the value function defined by the dynamic programming principle to obtain a Hamilton-Jacobi-Bellman equation for the system and we use the HJB equation to derive solutions to the optimal control problem. The solutions are obtained in the form of differential equations governing the behavior of the value function. We then consider some specific examples and use numerical techniques to characterize the behavior of the optimal strategies for different sets of parameters.

**NEURO – 241 MELATONIN REGULATION OF DOPAMINE IN THE CENTRAL AUDITORY SYSTEM OF THE PLAINFIN MIDSHIPMAN FISH**

**Yassir Azzam** (UG), Kobi Kobi, Kara Duclosel, Paul M. Forlano, Brooklyn College

Variation in day length between seasons mediates reproductive-state changes in physiology in seasonally reproducing animals via melatonin production and action on brain systems. The plainfin midshipman fish is a great model for studying mechanisms of auditory plasticity because females undergo a robust enhancement of hearing, at the level of the inner ear, in the summer, reproductive months to better detect and localize the mating call of males. Robust seasonal changes in dopamine innervation of the inner ear partially drive this seasonal change in hearing, but mechanisms that regulate dopamine in the central auditory system are less understood. Previous research in the plainfin midshipman has localized melatonin receptors to a forebrain region that contains auditory-projecting dopamine neurons, thereby supporting melatonin as a candidate hormone responsible for driving these seasonal changes in dopamine. In this study, we are investigating the role of melatonin in regulating dopamine in various auditory regions of the brain. Females in summer, reproductive condition were implanted with either a control or melatonin implant and sacrificed after one week. Blood was collected for a melatonin quantification assay. Brains were collected and processed for immunohistochemical analysis to label for dopamine neurons and fibers innervating auditory nuclei. Images were taken on an epifluorescence microscope and were processed using ImageJ software. These results will provide a first step for understanding melatonin regulation of dopamine in the auditory system, which may, in turn, modulate seasonal changes in hearing sensitivity.

*Supported by NIH R15 DC020327*.

**NEURO – 242 PHOTOGRAPHING URINE RECEIVED FROM BATS AFTER RECEIVING DESMOPRESSIN SOLUTION.**

**Nyia Jones**[1] (UG), Rena Orman[2], Richard Kollmar[2], Jeffery Weiss[2], Adedayo Adetunji[2], Mark Stewart[2]

[1]Brooklyn College

[2]SUNY Downstate

Vasopressin is a hormone that is critical for regulating water balance, in part by controlling the volume of urine produced. Vasopressin acts on the kidney to promote the recovery of water as a way of protecting extracellular volume. A decrease in vasopressin leads to increased urine volume. A condition of the elderly called nocturia is characterized by frequent waking to void urine at night. A drug known as desmopressin (a synthetic analog of vasopressin) is sometimes prescribed for people with nocturia to substitute for decreased levels of vasopressin. There are large differences in the responsiveness of men and women to the drug. Our research project has the overall goal of understanding the underlying pathophysiology of nocturia and to explore the potential for using bats as an animal model.

As a step toward this goal, we sought to compare timed urine collections in bats that received an oral saccharin solution, an oral desmopressin solution, or no oral solution. Bats were allowed to move freely in their home cages until two hours after receiving their single daily allocation of food. Each tested animal was given 10 microliters of solution orally or given no solution and then placed into a soft cage. Urine excreted by the animal fell to the floor of the testing cage, which was covered with watercolor paper. Urine was allowed to dry on the paper and then was photographed while illuminated with ultraviolet light. A yellow filter on the camera increased the contrast of fluorescent spots on the paper.

Results will show our methods and the impact of varying specific collection features on image quality.

Method optimization is a critical step for the reproducibility of imaging to permit small changes in urine output to be detected.
*Supported by the NIH BP-ENDURE NS114326.*

### NEURO – 243 SEASONAL REGULATION OF AXONS AND MYELINATION IN AUDITORY PRIMARY AFFERENTS OF FEMALE PLAINFIN MIDSHIPMAN FISH

**Kobi Kobi**[1] (UG), Jonathan T. Perelmuter[2], Paul M. Forlano[1]
[1]Brooklyn College
[2]Cornell University

Reproductive-state changes in hearing are documented in several vertebrates; however, the mechanisms behind these changes remain unclear. Increases in axon diameter and myelination are associated with increased speed and efficiency of neural signal transmission. Previous research in various animals has shown increases in axon diameter and myelination in the context of developmental growth, injury recovery, and learning and neuroplasticity; however, less is known in the context of reproductive-state changes. The plainfin midshipman fish is a great model to study auditory plasticity due to their robust enhancement in hearing sensitivity during the summer, reproductive months. Here, we investigated if axon diameter and myelin area in the auditory primary afferent nerves, which send information from the inner ear to the brain, are regulated by season. Females in non-reproductive (winter) and reproductive (summer) condition were sacrificed and auditory afferent nerves were collected, processed, and embedded in resin. Semi-thin (0.5um) sections were made and stained with methylene blue. Images were taken on a brightfield microscope and areas of axon and myelin were quantified using ImageJ. We observed that reproductive females have a greater proportion of small axons and a smaller proportion of large axons compared to non-reproductive females. Furthermore, small axons in reproductive females have more myelin than small axons in non-reproductive females. Our findings suggest that 1) there may be functional advantages of having proportionately more small axons in the reproductive season, and 2) myelination of small axons is seasonally regulated.
*Supported by NIH R15 DC020327.*

### NEURO – 244 MELATONIN REGULATION OF DOPAMINE IN THE INNER EAR OF FEMALE PLAINFIN MIDSHIPMAN FISH (PORICHTHYS NOTATUS)

**Xylo I. Lazrinth** (UG), Kobi Kobi, Rachel D. Rodriguez, Paul M. Forlano, Brooklyn College

Dopamine plays an important role in mediating social behaviors in a variety of species, including the plainfin midshipman (Porichthys notatus), a species of seasonally reproducing fish that utilizes acoustic communication to reproduce. In the summer reproductive months, females undergo robust changes in auditory sensitivity to better detect the advertisement call of males. This seasonal change is partially driven by reduced dopamine innervation of the saccule, the primary end organ of hearing, in the summer. However, the mechanism that regulates changes in dopamine is less understood. Since melatonin synthesis decreases with increases in seasonal day length, and melatonin receptors are present in brain nuclei where auditory-projecting dopamine neurons reside, we hypothesize that melatonin may play a role in inducing physiological changes to reproductive state by altering dopamine innervation and/ or synthesis. These changes in the brain may also regulate changes in dopamine of the saccule.In this study, differences in dopamine innervation in the saccules of melatonin and control implanted summer reproductive females will be used to determine the role of melatonin in regulating the peripheral auditory system. These findings may contribute to our understanding of mechanisms by which seasonal changes

in hormones optimize circuitry for detection of reproductive acoustic signals. *Supported by the NSF REU Award #2050755.*

### NEURO - 245 HISTONE PTM CROSSTALK IN A YEAST ALS/FTD MODEL

**Camille Reynoso Fernandez** (UG), Rania Frederic, Sam Cobos, Mariana P. Torrente, Brooklyn College

Amyotrophic lateral sclerosis (ALS) and Frontotemporal Dementia (FTD) form a fatal, incurable neurodegenerative disease continuum involving the death of neurons. Previous work in our lab has discovered that epigenetic mechanisms -namely histone post-translational modifications (PTMs)- are connected to ALS/FTD. In particular, we have discovered that the levels of phosphorylation on Histone H3 on Serine 10 (H3S10ph) are increased in yeast models of the disease. The goal of this project is to examine histone PTM levels when Ipl1 (the kinase responsible for installing H3S10ph) is knocked down in yeast. We hypothesize that removing Ipl1 might affect the levels of H3S10ph and as well as other PTMs via crosstalk. Crosstalk between histone modifications occurs when a histone PTM modulates the status of another modification on the same or a different histone. H3S10ph is known to be involved in a few histone crosstalk examples, specifically with H3K9ac, H3K14ac, H4K16ac, H3k36me3, H3k79me3, H3k27ac and H3k4me1. We hypothesize that we should also detect the levels of these PTMs decrease when Ipl1 is knocked down. We will test this hypothesis by way of immunoblotting. We hope that this research will expand our knowledge of epigenetic mechanisms in ALS/FTD and open new avenues for new treatment for this disease.
*Supported by NIH grant R15 NS125394 and NIH BP ENDURE NS114326.*

### NEURO – 246 BEHAVIORAL PHENOTYPING OF OPTOGENETICALLY-EVOKED SENSORY RESPONSES

**Samir Samadov**[1] (UG), Remy Meir[2], Akash Nagaraj[2], Obinna Okasi[2], David Sheinberg[2], Jason Ritt[2], Diane Lipscombe[2]
[1]Brooklyn College
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The rapid development of hypersensitivity to sensory stimuli in the skin is protective and is one of the most familiar examples of adaptation of the nervous system to changes in the environment. We have recently developed a comprehensive platform for eliciting and analyzing light-evoked responses through selective activation of sensory nerve endings in optogenetically engineered mice. We utilize mice expressing a light-sensitive opsin, ChannelRhodopsin2, in heat nociceptors or low-threshold mechanoreceptors. These mice exhibit classic reflex paw withdrawal responses to 473nm light directed at the plantar surface of the hind paws. We combined DeepLabCut-Live with a novel platform for simultaneous real-time tracking and laser positioning for optogenetic-driven behavior. Behavior sessions are recorded for offline analysis of the evoked responses. The light intensity can be controlled to establish stimulus intensity-behavior relationships. The VGG image annotator was used on a subset of videos to classify mouse behaviors, such as paw shaking, licking, guarding, resting, walking, and flinching with 98% inter-annotator agreement. Behavior annotations and DeepLabCut pose estimation were integrated for the development of a state space model that identifies each behavior of interest with 98% accuracy. Together, these automated pipelines were used to compare behaviors across mouse strains and stimulus intensities. This automated platform allows precise modulation of nociceptive responses and deep behavioral phenotyping. It improves accuracy and enhances data acquisition during experiments. The

platform is particularly valuable for studying pain-related behaviors and potential discoveries for novel therapeutics.
*Supported by NIH BP-ENDURE NS114326.*

**NEURO – 247 IMAGE ANALYSIS METHODS TO AUTOMATICALLY AND REPRODUCIBLY QUANTIFY VOLUME AND OSMOLALITY OF URINE FROM BATS**

**Mohammed Serri**[1] (UG), Nyia Jones[1], Richard Kollmar[2], Adedayo Adetunji[2], Jeff Weiss[2], Rena Orman[2], Mark Stewart[2]
[1]Brooklyn College
[2]SUNY Downstate

Bats are becoming recognized as an animal model with advantages over rodents, including anatomical and physiological features that more closely resemble human (and primate) anatomy and physiology more than rodents resemble human anatomy and physiology. Certain body functions such as urine production are routinely studied in rodents in specialized caging intended for the collection and quantification of urine (metabolic cage). Urine collection from bats is challenging because animals fly and urinate while hanging from the top of their cage. We developed a method for timed-urine collection and quantification in bats that will enable a wide range of studies of physiology and pathophysiology that impact urine output. Our method involves collecting excreted urine that falls onto the cage floor, which is covered by watercolor paper. Dried urine is photographed under ultraviolet illumination. Quantification methods were performed using Fiji/ImageJ as our main software. To minimize the subjectivity in image analysis, we first flattened the background of the image to unify the degree of brightness of urine spots and the fluorescence light. Typically, when thresholding the images, some parameters are assessed and adjusted manually. To eliminate this source of variance, we developed a thresholding method Rstudio software that is nearly automatic. Results show the analytical algorithm and methods in detail and demonstrate their reproducibility. These methods are critical for eliminating variance in image quantification to enable reliable detection of relatively small changes in urine volume (as determined from spot size) and urine osmolality (as determined from spot brightness).
*Supported by NIH BP-ENDURE NS114326.*

### PHYS – 248 ELECTROCHEMICAL ETCHING FOR A SHARP PT/IR TIP FOR SCANNING TUNNELING MICROSCOPY OF HOPG SURFACE

**LaToya Anderson** (UG), Yurii Kurys, Abdul Rahman, Brooklyn College

Scanning Tunneling Microscopy (STM) is a crucial tool in materials science for probing surface structures at atomic scales. The platinum-iridium (Pt/Ir) tip is an important component in an STM for imaging the surface topology and requires a systematic approach to achieve a sharp tip. This study focuses on refining the Pt/Ir tip making process by using the chemical etching method to improve the tips sharpness and obtain the atomic resolution of Highly Oriented Pyrolytic Graphite (HOPG) samples. By improving the tips sharpness, this increases the current tunneling effect and improves the image resolution of the sample. We will use the prepared Pt/Ir tip in an instructional STM equipment for imaging the surface of graphite and gold. This project underscores the importance of tip refinement in STM and lays the foundation for future advancements in nanoscale characterization.

### PHYS – 249 ION TRANSPORT IN ZINC CHLORIDE BUTYRAMIDE DEEP EUTECTIC SOLVENTS USING EIS AND/OR NMR

**Ruhamah C. Cox** (UG), Shannon Forde, Domenec Paterno, Brooklyn College

This study investigates a low-cost, eco-friendly, and non-flammable electrolytic gel for utilization in energy storage devices. Accordingly, a novel electrolyte was synthesized using zinc chloride and butyramide (xxZnCl2 : 5BuA) in the molar ratio range from 0.20 to 2.0. Conductivity was determined using electrochemical impedance spectroscopy (EIS) at variable temperatures (15 - 85 °C) and corresponding activation energies for each sample were then calculated. The results showed that with increasing zinc concentration the ion transport and energy storage capability decrease. These results will aid in future synthesis of zinc ion electrolytes.

### PHYS – 250 EXAMINING THE TEMPERATURE DEPENDENT ELECTRICAL TRANSPORT PROPERTIES OF A SEMICONDUCTOR SILICON SAMPLE

**Joshua Dylan Gorbatov** (UG), Moshe Skolnick, Deborah Rappoport, Mim Lal Nakarmi, Brooklyn College

This study investigates the electrical transport characteristics of condensed matter, focusing on the mobility and density of electrical charges. Semiconductors form the basis of all electronic devices ubiquitous in the modern world. In our project, we assessed the carrier density and mobility in a lightly-doped silicon sample. We found a conductivity value of 11.56 S/m for the sample at ambient temperature. We will examine the transport property of the sample at various temperatures using the TeachSpin Condensed Matter Physics (CMP) apparatus. The equipment allows for measurements of resistivity and Hall voltage at temperatures in the range of 80 to 320 K, utilizing an integrated vacuum system and a liquid nitrogen (LN 2) cooling system. Additionally, we calibrated a semiconductor diode temperature sensor for accurate temperature readings. Our presentation will explore how temperature influences the carrier concentration and mobility of the sample and discuss how the temperature-dependent carrier concentration can reveal the thermal activation of the charge carriers from the dopant.

### PHYS – 251 ELECTROSPINNING COMPOSITE POLYMER BLENDS WITH VANADIUM NANOPARTICLES

**Shannon Forde** (UG), Fariha Ahmed, Domenec Paterno, Sophia Suarez, Brooklyn College

This study focuses on electrospinning vanadium (V2O5) polymer fibers to try to make the fibers conductive. Fibers that can hold or transport a charge, or electrons, have many uses, such as in dye sensitized solar cells, or as a battery mediator. Vanadium nanoparticles were synthesized from ammonium metavanadate and cetyltrimethylammonium bromide (CTAB) dissolved in distilled water and ethanol. These nanoparticles were then mixed into a prepared solution of 10% polyacrylonitrile (PAN) in DMF and electrospun to produce the vanadium-PAN fibers. 4% was found to be the optimal concentration of vanadium in the solution. Composite polymer blends were then made by adding in another polymer to the PAN and vanadium solution at a concentration of 2%. The morphology of the fibers were analyzed using a scanning electron microscope (SEM). Data were also taken to test the tensile strength and porosity of the fibers. The fibers were then tested for conductivity, and after undergoing electrolyte imbibement, the fibers with the vanadium nanoparticles were found to be conductive.

### PHYS – 252 MEASUREMENT OF SPIN-LATTICE RELAXATION TIME AND SPIN-SPIN RELAXATION TIME OF SIMPLE AMIDES OF DIFFERENT CHAIN LENGTHS

**Emin Kica** (UG), David Paré, Domenec Paterno, Matthew Kundla, Mim Lal Nakarmi, Brooklyn College

Nuclear Magnetic Resonance (NMR) is the process by which spin-lattice relaxation time (T1) and spin-spin relaxation time (T2) are determined for a substance. T1 is the time interval that the sample takes to reflect the energy it received from the pulses of the coil into the lattice. Individual protons have local fields that interact with one another. T2 gives information about the distribution of these local fields relative to the original field. The purpose of this experiment is to determine the effect of chain length on T1 and T2. Three substances were examined: acetamide, propionamide, and butyramide. These simple amides have similar chemical composition with increasing chain length. T1 & T2 values were obtained and processed using an Oxford NMR 300 Machine under room temperature along with the Varian 300 software. The T1 and T2 for acetamide were determined to be 13.16 ± 0.058s and 7.29 ± 0.094s respectively. The T1 of propionamide was determined to be 12.65 ± 0.061s. Additional data is forthcoming. Future research will include the analysis of different substances.

### PHYS – 253 ELECTROSPUN PVA MEMBRANES WITH NANOPARTICLE ADDITIVES FOR USAGE AS GEL-POLYMER ELECTROLYTES

**Matthew Kundla** (UG), Deborah Rappoport, Fariha Ahmed, Domenec Paterno, Sophia Suarez, Brooklyn College

Battery cell technology has become one of the most intriguing fields of energy physics with the ever-increasing desire to move away from fossil fuels. One of the main topics of interest is the optimization of electrolytes in the battery cell. Gel-polymer electrolytes (GPEs) are at the forefront of this optimization. Poly-vinyl alcohol (PVA) is a polymer commonly used in GPEs due to excellent chemical stability, electrochemical inertness, durability, and non-toxicity. The addition of nanoparticle additives assists in improving the liquid electrolyte uptake capabilities and mechanical stability of the PVA GPEs. This research focuses on optimizing the electrospinning process to produce porous, uniform nanofiber membranes, as well as examining how the addition of nanoparticle additives improve uptake capabilities and mechanical stability of the membranes. Nanofiber membranes were obtained by electrospinning a homogenous solution of PVA dissolved in a solvent; both water and dimethyl sulfoxide (DMSO) were used. Scanning electron microscopy (SEM), mechanical stretching, and porosity measurement techniques were used to

analyze the nanofiber membranes. Utilizing these results, the next step is to test these GPEs in a battery cell.

### PHYS – 254 UNDERSTANDING THE SIGNAL PROCESSOR/LOCK-IN AMPLIFIER AND APPLYING IT TO IDENTIFY UNKNOWN RESISTANCES IN A BRIDGE CIRCUIT

**Haritha Lakshmanan** (UG), Mohdhar Yafai, Nicholas Yee, Mim Lal Nakarmi, Brooklyn College

The lock-in amplifier and signal processor are used to understand the process of extracting weak signals that are embedded in noisy environments. The project examined the TeachSpin Signal Processor/Lock-in Amplifier first in order to understand the different sections of the instrument such as the preamplifier, filter, noise generator, reference oscillator, lock-in/amplitude detector, phase shifter, and low-pass filter output. Lock-in detection is useful especially when the signal has a lot of background interference. We also investigated the measurement of an unknown resistor in a bridge circuit. This project used the TeachSpin signal processor and lock-in amplifier, resistors, protoboard, and a potentiometer. We will discuss how the resistance of unknown resistors at different temperatures and made of different materials can be determined using the lock-in amplifier and signal processor.

### PHYS – 255 STUDY OF SATURATED ABSORPTION BY RUBIDIUM ATOM USING LASER DIODE SPECTROSCOPY

**Safiyah Mumin** (UG), Ethan Faulk, Moises Gonzalez, Mim Lal Nakarmi, Brooklyn College

Spectroscopy is used to study the electronic structure of atoms and molecules. The goal of our study is to observe the narrow-line atomic spectral features of Rubidium (Rb) using Diode Laser Spectroscopy. We used the TeachSpin Laser Diode Spectroscopy apparatus with a diode laser of wavelength $\lambda$ = 780.2 nm and Rb cell containing Rb vapor. The built-in diffraction grating controlled by a piezoelectric module provides feedback into the laser and tunes the wavelength to excite the Rb atom. The Rb cell was maintained at 50 C. We observed two absorption peaks related to the electronic transitions from the 5S1/2 state to 5P3/2 state with Doppler broadening. Note that Rubidium has two naturally occurring isotopes: 85Rb, with 72% abundance, and 87Rb, with 28% abundance. In order to observe the absorption peaks without Doppler broadening, we split the diode laser to two beams using a beam-splitter and the intensity of the split laser beam was controlled by using filters in modified configurations. Signals from two detectors were subtracted to observe the two fine absorption lines. In this presentation, we will also discuss our study of the saturated absorption spectrum of the Rb sample in the presence of a magnetic field.

### PHYS – 256 PROBING THE ION TRANSPORT PROPERTIES OF CHOLINE CHLORIDE-GLYCOL-BASED ELECTROLYTES VIA 1H NMR SPECTROSCOPY AND SPIN-LATTICE RELAXATION TIMES (T1)

**Deborah Rappoport**[1] (UG), Ajwad Raed [1], Tawhid Pranto[2], Domenec Paterno[1], Sophia Suarez[1]
[1]Brooklyn College
[2]Hunter College

In the pursuit of non-toxic, biodegradable, and cost-effective electrolytes for energy storage applications, there has been a growing interest in alternative solvents. Choline chloride-ethylene glycol-based solvents have been studied offering similar electrochemical and ionically conductive properties to traditional solvents. Our research investigates combinations of choline chloride (acting as a hydrogen bond acceptor) and different glycols (serving as hydrogen bond donors), containing small quantities of organic solvent additives. The primary objective of our study is to comprehensively evaluate the potential of these solvent

mixtures as electrolytes, while also assessing the impact of organic solvent additives on their ion transport capabilities. Nuclear magnetic resonance (NMR) is a technique that can be used to elucidate the molecular structure and dynamics of chemical compounds, as well as to investigate the properties of materials at the atomic level. 1H nuclear magnetic resonance performed over a variable temperature range was used to study the local interactions between the hydrogen bond acceptor (HBA), hydrogen bond donor (HBD), and organic solvent additives. By analyzing NMR spectra and determining T1 spin-lattice relaxation times, along with activation energies, we gain insights into local interactions and effects, such as shielding. Our presentation will provide a detailed discussion of preliminary findings and analysis, shedding light on the suitability of these electrolyte formulations for energy storage applications. *Supported by the Department of Energy.*

### PSY – 107 RELATIONSHIP BETWEEN LOCOMOTIVE BEHAVIOR AND VOCAL BEHAVIOR IN MONK PARAKEETS (MYOPSITTA MONACHUS)

**Sabrina Henry**[2], **Brandy Antoine**[2] (HS), Frank Grasso[1]
[1]Midwood High School
[2]Brooklyn College

Monk parakeets (*Myiopsitta monachus*), also known as Quaker Parrots, are named for their gray forehead, face, and breast, which evoke either a monk's hood or the colonial-era clothing of Quakers. They are the only parrots that build stick nests. They often breed colonially, building a single large nest with separate entrances for each pair. Their nests provide a year-round home for the colony. The insulation these nests provide may be one reason why monk parakeets are able to survive cold winters. For this study, three minute videos of monk parakeets taken in Brooklyn were analyzed to identify the different types of behavior and voice calls used. The behaviors that were focused on were flight, nest construction, feeding, and walking. The voice calls that were focused on were chatter, contact, threat, and alarm. RStudio was used to perform chi-squared tests to find out if a significant relationship between the behaviors and voice calls existed or if the relationship was due to chance. No statistically significant relationship was found between any of the behaviors and the voice calls. This is interesting because it would be assumed that there would be a significant relationship between at least one of the voice calls and behaviors since most bird's actions usually have a certain purpose. However, it seems that monk parakeets simply perform these behaviors and these voice calls randomly.

### PSY – 108 UNDERGRADUATE RESEARCH STUDENTS BELIEVE THAT ANYONE CAN BE A SCIENTIST - REGARDLESS OF RACE AND GENDER

**Mollie R. Schwartz** (HS), Devorah B. Schwartz, Faigy Mandelbaum, Jennifer Drake, Laura Rabin, Brooklyn College

Scientists were historically portrayed as disheveled, mentally disturbed, evil, elderly, male, or Caucasian. These negative depictions have painted an undesirable mental image of a scientist for those considering a science career. The NSF-funded Research Experience for Undergraduates (REU) program was created to instill a positive association between science engagement and research productivity across diverse minority groups. REU students participated in a semester-long research experience in a laboratory setting and attended weekly didactics. Students' pre-post drawings of scientists were measured using the Draw-A-Scientist (DAST) task. The study had two aims: (1) To determine whether students' drawings would depict an increase in the diversity of minority populations pre-post their REU experience and (2) whether students' drawings would include images reflecting their REU experience such as poster presentations, laptops, and IRB submissions. Nineteen undergraduates (M=23.37, SD=3.24) across two REU cohorts (2019-2021) participated. Most participants were female 79.0%. Students were 47.4% Caucasian, 15.8% Asian/Pacific Islander, 21.1% Hispanic/Latino, 10.5% African American, and 5.3% Other. Drawings were primarily female/gender ambiguous at both pre, 64.7% and post, 84.21%. Only 23.5% of the initial drawings and 15.8% of the post drawings depicted males. A paired samples t-test found an increase in students' pre-post drawings of REU-related experiences, $t(16) = 3.77$, $p = .002$. Pre-post-DAST showed an increase in diverse physical attributes, silhouettes, bisexual sex symbols, and racial-ethnic representations which supports the idea that anyone can be a scientist. The proposed poster will include updated sample information looking at the same measure from 2019-2024.
*Supported by The National Science Foundation.*

### PSY – 257 THE EMOTION REGULATION BENEFITS OF MUSIC AND VISUAL ART: ACTIVE VERSUS RECEPTIVE ENGAGEMENT

**Cherise E. Chancellor** (UG), Jennifer E. Drake, Brooklyn College

Both listening to music and drawing have been shown to improve, affect and regulate our emotions. However, not only do these activities differ in the art form but they differ in their level of engagement, with listening to music being receptive and drawing being active. How do we perceive the experience of actively versus receptively experiencing music and visual art? Are there differences in our motivations for engaging in these activities and do these activities rely on different emotion regulation strategies? Participants were 58 undergraduates that were randomly assigned to one of the four online surveys that varied in art form (music versus visual art) and level of engagement (active versus receptive). Participants completed questionnaires on their art education, frequency of art-related emotions, motivation for aesthetic experiences, and emotional regulation strategies. We hypothesized that actively engaging in music and visual art (singing, drawing) would be more beneficial in regulating emotions than receptively engaging in music and visual art (listening to music, looking at art), and singing would be more beneficial in regulating emotions than the other activities, especially in a group setting. While there were no differences by level of engagement, those in the music conditions experienced more aesthetic emotions and demonstrated greater use of the emotion regulation strategies than those in the art conditions. Experiencing new emotions was a significant motivational factor for engaging in the activities. Mood management and keeping company were key motivators for music, and self-education was a key motivator for visual art. These findings imply that musical activities may be most ideal when trying to regulate emotions and cope with life stressors.

*Supported by the Tow Mentoring and Research Program.*

### PSY – 258 THE PARADOX OF TRAGIC ART

**Gurveen Dhallu**[1](UG) Jen Drake[1,2], Ellen Winner [3]
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[3]Boston College

Tragic art involves the complex interplay of negative and positive emotions, leading to physical and psychological changes within the viewer--such as chills, tears, and feelings of being moved (Hanich et al., 2014; Wassiliwizky et al., 2015). Negative emotions expressed within art are even considered to be an essential resource, allowing artists to create pieces that engage viewers emotionally and are highly memorable (Menninghaus et al., 2017). But, if we often seek to limit negative emotions within real-life situations, why do we seek them out and enjoy them when viewing art? This study aims to investigate the paradox behind tragic art, and further explores whether tragic art has the ability to change our perspectives, specifically from an unsympathetic to a sympathetic view towards a marginalized group: refugees. A total of 150 adults, who identified as politically conservative, were recruited to participate in this study. Participants watched two videos illustrating sculptures depicting the tragedies faced by refugees when fleeing their countries, and were asked to rate their negative and positive affect, and how moved they felt and how meaningful the experience was. Finally, participants were asked to identify whether their opinions regarding refugees entering the United States have changed. We principally found both positive and negative affect ratings were able to predict the feelings of being moved and meaningfulness, and that attitudes towards refugees significantly increased towards a more empathetic view following the viewing of the tragic art video. This research highlights the ability of tragic art to change attitudes significantly, which can be used to help promote empathy and help combat the compassion collapse crisis (Cameron & Payne, 2011).

### PSY – 259 DISAFFILIATION FROM ORTHODOX JUDAISM: FAMILY FACTORS AND SIBLINGS WHO EXIT

**Jacob Eisenbach** (UG), Rona Miles, Alla Chavarga, Brooklyn College

OTD or Off the Derech, translated as "off the path" refers to individuals who grew up practicing Orthodox Judaism, but no longer adhere to its laws and practices.
Previous studies have found that top contributors to disaffiliation were intellectual, social, and emotional factors (Miles et al., 2023b). The current study investigated which of these factors related to whether a single or multiple sibling(s) from a family disaffiliated. Participants were 333 individuals who grew up practicing Orthodox Judaism and no longer practice who completed online surveys. The measure contained: 25 Yes/No questions regarding personal and family experiences. Specific questions related to this investigation were: "Are any of your siblings Off the Derech?" and "If you answered yes to the previous question, how many?" The resulting sample consisted of 57.2% sole disaffiliates and 42.8% disaffiliates who have OTD siblings as well. A binary logistic regression determined that, of the previously investigated 21 factors, parental divorce predicts whether an OTD individual has disaffiliated siblings, b=1.25, SE=0.38, Z=3.28, p=0.001, Odds Ratio=3.48. In our sample, 69.8% of OTD individuals with divorced parents had an OTD sibling, compared to 37.2% of OTD individuals whose parents are not divorced. Our study suggests that parental divorce, in particular, is related to whether there are multiple disaffiliates in one family unit. This indicates that a break within the family system determines whether multiple siblings, as opposed to just one individual, disaffiliates.

### PSY – 260 ALTERATIONS IN SPEECH CONTENT DURING DEEP AND SHALLOW CONVERSATIONS AND THEIR RELATIONSHIP TO SELF-REPORTED FEELINGS OF CLOSENESS

**Joyce Escatel-Flores**[1] (UG), Hanna Molla[2], Harriet De Wit[2]
[1]Brooklyn College
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Feelings of closeness to others are essential in everyday life. Having minimal connections can increase loneliness, which can be detrimental to one's health. Aron et al., (1997), found that strangers who engaged in a semi-structured conversation that involved increasing self-disclosure (deep talk) showed greater feeling of closeness, relative to having superficial interactions (small talk). Examining differences in speech content within these contexts can give us insight into what language features facilitate connection between strangers. In this study, we aimed to look at differences in speech in participants engaging in deep or small talk and examine the relationship between language and self-reported closeness. We hypothesized that speech within the deep talk condition would contain more personal pronouns, emotional, social content, and informality, compared to small talk, and that these features would be positively related to ratings of closeness. In a within-subject, randomized design, participants (N=32) visited the laboratory twice and engaged in a 45-min small talk conversation with a stranger on one session and a 45-min deep talk conversation with a new partner on another session. Findings revealed that participants showed greater usage of affect related speech content and informal language during the deep talk condition. Correlational analyses did not show significant associations between informal and positive emotional speech in relation to ratings of closeness. These findings indicate that although deep talk altered affect and informal language, these features were not related to feelings of closeness. This study provides a model for studying which linguistic features contribute to feelings of connection.
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### PSY - 261 COGNITIVE FUNCTIONING OF INDIVIDUALS WITH HIV

**Kahlil Fair**[1,2] (UG), Desiree Byrd[2]
[1]Brooklyn College
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HIV is a virus that causes immune deficiencies within adults. HIV has also been linked to the development of the tau protein within human subjects which has a direct correlation to the development of dementia within older populations. This study attempted to analyze the interaction of HIV and Dementia through cognitive functioning and the disparities of cognitive function between racial groups BWH (black, white, hispanic or other). Participants were tested for 6 different cognitions (speed of information processing, working memory, memory retention, verbal fluency and executive functioning). The sample included 138 individuals from varying age ranges and racial backgrounds. The results suggested there was a significant difference based on race with participants' cognitive functioning. Results alluded to the fact that with cognitive functioning white subjects were shown to have higher rates of cognitive functioning for all tests outside of SIP. As well as hispanic participants being shown to have the lowest rates of cognitive functioning throughout all the test. This research opens up the door to groups that may be older that have comorbidity with HIV and dementia, in addition to providing valuable racial information when it comes to studies observing multiple racial groups.

*Supported by the NSF REU.*

### PSY – 262 TRAUMA HISTORIES OF ACTIVE COMBATANTS: INFORMATION FOR NURSES AND MEDICAL PROVIDERS

**Pessy Freund**[1] (UG), Faigy Mandelbaum[1], Ariella Hershkowitz[2], Chana L. Reich[1], Bracha Smith[1], Leah Mandelbaum[1], Laura Rabin[1]
[1]Brooklyn College
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Nurses provide medical interventions for a range of populations including active combat military personnel and veterans. Nurses are at the front lines of medical treatments for injured military personnel, yet nursing programs do not have a formalized system for teaching trauma-informed medical care. Military personnel can have histories of childhood trauma and military traumas that impact their mental and physical health and are a risk factor for PTSD development in veterans. Understanding more about childhood trauma experiences and current trauma-related symptoms in active combat soldiers can be helpful information to disseminate among nursing students. This study aimed to gather data on the trauma histories and traumatic experiences of soldiers in the Israeli military. A bi-lingual Hebrew and English-speaking sample of active combatants was recruited across Israel. A total of 304 participants completed questionnaires. Childhood emotional abuse was endorsed by 19.4% of soldiers, childhood sexual abuse (9.5%), child physical abuse (19.5%), and child physical neglect (83.7%). Additionally, 17% of soldiers struggled with sadness and sleep difficulties and 14.9% with feeling tense. The proposed poster will detail additional findings and outline a proposal for disseminating this information among nursing students.

*Supported by the NSF REU.*

**PSY – 263 SLEEP, LAUGH, LOVE: EFFECTS OF SLEEP QUALITY AND SHARED LAUGHTER ON ROMANTIC RELATIONSHIP QUALITY**

**Aiza Ishenova** (UG), Cheryl Carmichael, Brooklyn College

The present study examines the mediating role of shared laughter in the association between sleep quality and romantic relationship quality (RRQ). Past research has shown how poor sleep negatively impacts relationship quality, but the effect of good sleep on positive relationship processes and outcomes has been overlooked. Positive relational processes are functionally independent from negative processes and need to be studied in their own right. Good sleep is foundational to cognitive function and emotional resilience, which can contribute to one's ability to recognize humor and share its appreciation with a partner. Thus, we examined whether getting a good night of sleep was associated with an increased likelihood of experiencing shared laughter with one's partner, which in turn, was associated with higher RRQ evaluations. Participants in a committed romantic relationship (N = 115 undergraduates, 79.1% female, ages 18-35, M = 22.14) reported daily for 10-days on their subjective sleep quality, whether or not they experienced any instance of shared laughter with their romantic partner, and their RRQ evaluations. Results supported the hypotheses. First, a good night of sleep contributed to more frequent instances of shared laughter between romantic partners ($p = < .007$). Second, shared laughter contributed to more positive evaluations of RRQ ($p = < .001$). Third, shared laughter mediated the association between sleep and RRQ ($p = .012$). The results build on the limited body of literature on how sleep is associated with positive partner interactions and emphasizes the importance of both individual wellbeing factors such as sleep quality and shared positive experiences such as laughter in promotion of happier relationships and ultimately a general wellbeing.

**PSY – 264 CATEGORY LEARNING IN HUMANS: THE EFFECTS OF PARTIAL VERSUS TOTAL REVERSALS**

**Kayla Kowlesar** (UG), Andrew Delamater, Brooklyn College

This study investigates category learning in humans. Participants (N=64) performed in an online experiment in which one image of a fractal stimulus was presented at a time and they were asked to learn whether the image represented an object from the northern or southern hemisphere. Feedback was given on each trial indicating the participant's response time and whether or not they were correct. Participants performed in both "partial" and "total" reversal conditions with the order randomized. Different groups of participants performed in easy (2 exemplars/category) or hard (4 exemplars/category) versions of the task. Once learned, the exemplar-category assignments were reversed for all the fractals in each category in the total reversal task, or for only half of the fractals in each category for the partial reversal task. The goal of this study was to determine if reversal learning would differ in these two conditions and whether this would be influenced by task difficulty. We hypothesized that if individual fractal exemplar-category associations were the basis of category learning, performance would be equivalent in partial and total reversal tasks. However, if participants learn to categorize by "grouping" exemplars within each category, then total reversal learning should be easier than partial because within-category generalization would facilitate total but disrupt partial reversal learning. We observed faster total than partial reversal learning and the effect was more persistent in the hard task. These results support the grouping hypothesis.
*Supported by the NSF REU.*

**PSY - 265 IS INCREASED AUTONOMIC AROUSAL A PROTECTIVE FACTOR IN THE INTERGENERATIONAL TRANSMISSION OF AGGRESSIVE BEHAVIOR?**

**Chantal Miller** (UG), Yu Gao, Brooklyn College

Intergenerational transmission of behaviors from parent to offspring has been previously studied in contexts such as criminal conviction and antisocial behavior. Findings have indicated that parent's behaviors are associated with these behavioral outcomes in offspring4. This research project investigated intergenerational transmission of antisocial behavior from parent to child utilizing indices of autonomic arousal. Raine et al. (2023) compared heart rate in four groups of parent-child dyads: parent antisocial/child non-antisocial, parent non-antisocial/child antisocial, both antisocial, neither antisocial. They found higher heart rate in the parent antisocial/child non-antisocial group than the other three, suggesting higher resting heart rate may be a protective factor in intergenerational transmission of antisocial behavior. The aim of the current study was to replicate their findings in a group of children from a different community sample. Participants in the study consisted of parent-child dyads (n=343 pairs, mean age of child = 9.06, 50.73% female) from the local community. Parents reported their aggressive behavior using the Conflict Tactic Scale and the child's aggressive behavior using the Child Behavior Checklist. Resting heart rate was collected from children. It was found that groups differed significantly on heart rate: $F(3,297)=5.86$, $p< .001$. The neither antisocial group (M=88.7) differed significantly from the child-antisocial (M=83.8), and both antisocial group (M=80.5). No other group differences were found. However, there was no significant correlation between intergenerational discontinuity scores and heart rate: $r =0.079$, $p =0.168$. In conclusion, Raine et al. (2003)'s findings were not replicated in the current sample, and possible reasons will be discussed.
*Supported by the NSF REU.*

### PSY – 266 MENTAL HEALTH LITERACY, ACADEMIC STRESS, AND MECHANISMS FOR STRESS REDUCTION

**Imane Ouadah** (UG), Rona Miles, Anjali Krishnan, Jaia Jones, Laura Rabin, Brooklyn College

Academic stress is very common among college students, and many of them employ varied coping mechanisms to mitigate these stress levels. The types of mechanisms used are not well delineated in the literature. In a demographically diverse sample of undergraduate students, we sought to determine whether there is relationship between: a) level of MHL and academic stress; b) level of MHL and the overall number of methods used to reduce academic stress; and c) level of MHL and types of methods reportedly used to reduce academic stress. Participants were 368 students at an urban public university who completed study questionnaires that included items from the Mental Health Literacy Assessment for College Students (MHLA-c), basic demographic information, and a 10-item questionnaire that queried about academic worry and stress experienced over the past year. Spearman correlation coefficients revealed that while there was no relationship between MHL scores and degree of academic stress ($p>.05$), there was a small, positive relationship between MHL and total number of methods used to reduce academic stress, $r(366) = 0.13$, $p = .010$. Interestingly, of all the different methods of stress reduction, only attending mental health counseling (either on- or off-campus) showed a small but significant positive relationship with MHL, $r(366) = 0.29$, $p < .001$. Study findings suggest that students who possess increased knowledge about mental health conditions and their treatment (i.e., higher levels of MHL) may be more inclined to seek clinically-focused help for academic stress. This approach may have positive effects not only for reducing stress associated with academic tasks but for psychological well-being more generally.
*Supported by the NSF REU.*

### PSY – 267 THE ROLE OF GENDER IN ACADEMIC STRESS AND STRESS-REDUCTION MECHANISMS IN UNDERGRADUATE STUDENTS

**Michele Salvaggio** (UG), Rona Miles, Anjali Krishnan, Hannah Bodek, Laura Rabin, Brooklyn College

Academic stress levels significantly impact students' mental well-being and have been found to be especially high at the college level. The current study examines gender differences among undergraduate students in relation to academic stress levels and mechanisms endorsed for stress reduction. A total of 400 undergraduate students (women = 258; men = 120; other = 16) completed a mental health literacy assessment followed by a 10-item questionnaire to rate academic stress and worry over the past year using a 5-point Likert scale. Additionally, participants were asked to specify stress reduction methods they endorsed and answer an open-ended question stating which of those methods they found to be the most helpful. Data were analyzed using a one-factor analysis of variance (ANOVA) to determine if differences in reported academic stress and stress reduction methods were related to gender. The analysis revealed there was an effect of gender on total academic stress levels, $F(2,391)=5.12$, $p=.006$, with women reporting the highest levels of academic stress. However, there was no significant difference observed between gender and the total number or types of stress reduction methods endorsed by participants. Despite this, support from friends was the most frequently endorsed stress reduction method and reported as the most helpful among all participants. Overall, this study provides direction for academic institutions to identify students experiencing high levels of academic stress with the intention of expanding their knowledge of stress-reduction mechanisms and ultimately increasing their mental well-being.

*Supported by the NSF REU.*

**PSY – 268 SEXUAL TRAUMA'S ASSOCIATION WITH PERSISTENT GENITAL AROUSAL DISORDER**

**Bracha Smith**[1] (UG), Faigy Mandelbaum[1], Arielle Hershkovich[2], Pessy Freund[1]
Brooklyn College[1]
Montclair State University[2]

Persistent Genital Arousal Disorder (PGAD) is an understudied sexual disorder characterized by unwanted sexual arousal without sexual stimuli. The cause and effect associated with PGAD is hard to detect due to numerous comorbidities. Patients diagnosed with PGAD are known to have comorbid diagnoses of sexual trauma histories, anxiety, depression, chronic fatigue syndrome, Tarlov cysts, overactive bladder syndrome, and restless leg syndrome. Sexual trauma and other psychopathologies are understudied areas that have been hypothesized to be associated with PGAD onset. For example, some research has found that PGAD was associated with traumatic sexual experiences. Further, trauma-based counseling was found to help alleviate symptoms of PGAD in a 16-year-old patient. This poster will provide a literature review of sexual trauma, psychological disorders, and PGAD symptomology with the purpose of demonstrating the need for further study of trauma's impact to help physicians and clinicians more adequately understand and treat PGAD.

**PSY – 269 RACIALIZED EMOTIONS IN ETHNIC-RACIAL SOCIALIZATION: A STUDY ON WHITE FAMILIES IN THE U.S.**

**Jake Xie** (UG), Yana Kuchirko, Brooklyn College

Racialized emotions are complex and deeply rooted, contextualized by one's race and ethnicity (Bonilla-Silva, 2018). A large body of research has focused on how parents from different ethnic/racial groups communicate messages about the meaning of race to youth. Studies with white families show that they often endorse color-blind messages (e.g., denying race), and avoid topics of race altogether. Few studies examined how emotions are a part of ethnic-racial socialization, especially among white families. In this study, I examine the different emotions that white parents of children attribute to conversations about race. Thirteen white parents of children ages 3-7 took part in a 1-hour semi-structured interview on Zoom. I employed a grounded theory approach to capture racialized emotions in the context of conversations about race. Findings reveal a large range of emotions parents wish their children to feel when it comes to race, emphasizing empathy, while also exposing discomfort and negative emotions experienced by parents themselves. The paradox arose when parents, aiming for positive emotions, grappled with their own nervousness, awkwardness, and embarrassment, often resorting to color-blindness in discussions about race. This study sheds light on how ethnic/racial and emotional socialization intersect in the early years when children are developing conceptions of self, race, and society. My findings have implications for policymakers and practitioners seeking to address racial biases among white communities.
*Supported by the NSF REU.*

**PSY – 270 THE EFFECT OF SAND DEPTH ON BURROWING IN FIDDLER CRABS**

**Simona Zak** (UG), Frank Grasso, Brooklyn College

Fiddler crabs, through their communal burrowing activity, are ecosystem engineers that have a major impact on estuary productivity (Zengel, et al., 2016). In this study we sought to discover conditions under which we could study burrowing behavior in the lab. We hypothesized that fiddler crabs choose a certain sand depth to burrow. Following one day of habituation, we measured the number of burrows constructed by 10 individually-housed crabs at 5 sand depths over 10 days. Each crab experienced a different sequence of sand depths that was chosen at random. We also measured the location (polar coordinates) of each burrow. One crab died during the experiment and its data was excluded. We found a significant relationship between sand depth and the number of burrows dug ($F(5)= 32.4$, $p<0.05$). In addition, we found a preferred location between the center and the wall of the arena that the burrows tend to be dug (mean=3.67" CI 95[3.36, 3.98]), and a significant directional preference ($\bar{r} = 0.4141$, $p<0.05$) in the arena. Therefore, fiddler crabs select certain sand depths to burrow in captivity, as well as decide where their burrows are located. This will allow us to study the cognition behind the decisions fiddler crabs make to guide their burrowing behavior.
*Supported by the NSF REU.*

**PSY – 271 EXPLORING THE RELATIONSHIP BETWEEN GENETIC ESSENTIALISM AND INTERGROUP ATTITUDES**

**Amna Zamir** (UG), Faigy Mandelbaum, Laura Rabin, Brooklyn College

Research suggests that genetically essentialist beliefs are associated with lower levels of tolerance, especially in terms of racism and ethnocentrism. On the other hand, some research suggests that genetically essentialist beliefs are associated with higher levels of tolerance, often in terms of other outcomes, like disability, mental illness, and violence. Some research suggests that when people think about genetics with racial attitudes, there is more tolerance in behavior. The question of this research being asked is not what people think whether genetics makes up a critical component of human health rather why/what people think that genetics makes up a critical component of human health and behavior. The goal of this research is to then examine the correlations between people's perceptions, and their intergroup to public policy attitudes. In today's society, **i**s belief in genetic essentialism associated with

explicit racial attitudes (measured through feelings thermometer) and health care policy attitudes? This means that the more people think that genes form the essence or the core of a person, the more they think negatively about salient groups or certain public policies. It is hypothesized that the more an individual associates' genetics to human behavior, the more negatively they think towards salient groups and certain public policies. Specifically, it is hypothesized that greater belief in genetic essentialism is correlated with racial attitudes that are more positive towards majority groups, more negative towards minority groups, and more restrictive about universal health care policies.

This study examines the relationship between an individual's belief of genetic essentialism and their attitude towards majority and minority racial groups, as well as attitudes towards health care policy. An online survey was conducted examining measures of essentialist beliefs, feeling thermometer towards different racial groups and a policy attitude question about universal healthcare. The data collected for the study in September 2019 with a sample of 2504 participants through an online survey company called Dynata. The statistical program R was used to analyze the data using the *psych* package.

For the essentialist belief measures, higher values on a scale from 1 to 7 correspond to greater belief in genetic essentialism (M=4.27, SD = .87). This means that on average participants slightly agree with genetics making up the essence of a person. For the feeling thermometer measures towards different racial groups, higher values on a scale of 1 to 10 differ in correspondence to the racial group being assessed. For the essentialism and white feeling thermometer, greater belief in genetic essentialism is associated with slightly more negative feelings toward whites (M = 4.13). For essentialism and the black feeling thermometer, greater belief in genetic essentialism is associated with slightly more positive feelings toward Blacks (M =). For the essentialism and feeling thermometers relative to whites, there was greater belief in genetic essentialism associated with slightly more positive feelings toward Asians (M = 4.46), Latinos (M = 4.5), and Arabs (M = 5.23). Lastly, for the universal healthcare question, results state that higher values correspond to stronger opposition to universal healthcare policy (M= 3.4, SD= .65) indicating the results favor towards universal healthcare.

There are 2 possible implications of this research identified. One limitation was the loss of the demographics data file, although this is not essential for the study, the demographics obtained would let researchers know the percentage or even age of the participants and how this could have skewed the results. Another limitation to this study was social desirability bias. Although anonymity was guaranteed for this survey, some participants may answer the survey questions dishonestly. Participants may not want others to think they are racist; therefore, they respond in a way that is much more socially acceptable.
*Supported by the NSF REU.*

**PSY – 303 C-PTSD SYMPTOMATOLOGY AND EMOTION REGULATION DIFFICULTIES IN ISRAELI LONE AND NON-LONE SOLDIERS: A COMPARATIVE STUDY**

**Faigy Mandelbaum** (G), Leah Schwartz, Bracha Smith, Devorah Schwartz, Molly Schwartz, Chana Leah Reich, Laura Rabin, Brooklyn College

There is limited published data on the experiences of soldiers who serve in the army without family support. This correlational study was designed to assess whether lone soldiers have increased histories of child aversive experiences when compared to non-lone soldiers and to assess whether lone soldiers are at greater risk for developmental psychopathology while on active duty in the military when compared to non-lone soldiers. Three hundred and four soldiers on active duty in the Israeli Defense Force (IDF) were recruited in-person and completed survey measures on childhood trauma histories, traumatic war-related experiences, and current trauma, sexual, emotion regulation, and interpersonal difficulties. Lone soldiers had more child physical, sexual, and emotional abuse and neglect histories when compared with non-lone soldiers and greater levels of current C-PTSD symptomatology which included sexual difficulties, anxiety, interpersonal struggles, sleep difficulties, and emotion regulation difficulties. Child trauma predicted severity of C-PTSD symptomatology for both groups.
*Supported by Fulbright, Tow Foundation, NSF-REU.*

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