Brooklyn College

SCIENCE RESEARCH DAY

May 7th 2021

ABSTRACT BOOK

CASE

Sponsored by NIH MARC, SURGE, and BP-ENDURE, NSF LSAMP, and NYS CSTEP

CASE Center for Achievement in Science Education

Overview of Programs

Maximizing Access to Research Careers (MARC)

Must apply at end of sophomore year

- United States citizen or permanent resident.
- Intent to pursue a Biomedical or Behavioral Science research Ph.D.
- Member of a group under-represented in the biomedical sciences*
- Completion of at least 60 credits in courses consistent with pursuit of a major in a science.
- Minimum overall GPA of 3.2 or higher.

Summer Undergraduate Research Gateway Experience (SURGE)

Incoming Full-time BC freshman

- U.S. Citizen or permanent resident
- Intent to pursue a research-based STEM graduate program
- Member of a group under-represented in the biomedical sciences*

Collegiate Science and Technology Entry Program (CSTEP)

Admission at any level

- New York State resident
- Full-time BC student (grad or undergrad)
- Member of an under-represented group*
- Minimum 2.7 GPA.
- Enrolled in a department that leads to licensure in a profession that requires a New York State License. This includes biology, chemistry, physics, psychology, sociology, accounting, economics, engineering, political science, speech communication, and math and science education.

Louis Stokes Alliance for Minority Participation (LSAMP)

Freshman < 30 credits

- Member of an under-represented group*
- US citizen or permanent resident.
- Intent to pursue a STEM major and a research-based career or academic program.

BP-Endure

Must apply at end of sophomore year

- United States citizen or permanent resident.
- Intent to pursue a Neuroscience research Ph.D.
- Member of a group under-represented in the biomedical sciences*
- Completion of at least 60 credits in courses consistent with pursuit of a major in a science.
- Minimum overall GPA of 3.2 or higher.

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* African-American/Black, Hispanic/Latino, Native American, Alaskan Native, Native Hawaiian or Native Pacific Islander, individuals with disabilities or demonstrated economic disadvantage.

30TH ANNUAL BROOKLYN COLLEGE SCIENCE DAY

Brooklyn College Science Day is sponsored by the
NIH MARC, SURGE, and BP ENDURE, NSF LSAMP, and NYS CSTEP Programs

Organized and Presented by the Center for Achievement in Science Education:
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AWARD CEREMONY – MAY 7, 2021 12PM

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

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BIOLOGY

BIO - 1 UNCOVERING MECHANISMS OF REC-8 COHESIN REGULATING CHROMOSOME AND CENTRIOLE SEPARATION IN THE GERM-LINE OF CAENORHABDITIS ELEGANS.

Akmal Salimov, (UG), Dr. Mara Schvarzstein, Katherine Andrea Rivera Gomez, and Mikaela Murph, Brooklyn College

Errors in chromosome segregation can lead to an irregular number of chromosomes (aneuploidy), which is a major contributor to miscarriages and congenital birth abnormalities like down syndrome and is a driving cause of cancer. Our research focuses on the mechanism by which the Rec-8 cohesin protein regulates chromosome and centrosome inheritance during cell division. REC-8 cohesin maintains sister chromatids and centrioles together during the spermatocyte divisions that give rise to sperm. Despite its importance for reproduction and human health, little is known about the mechanism by which Rec-8 maintains both chromosomes and centrioles together. To answer this question we are testing the effect on keeping centrioles together of an inducible Rec-8 mutant that cannot be removed from chromosomes by the protease Separase and thus does not allow for chromosomes to separate. This will allow clarification as to whether REC-8 maintains chromosomes and centrioles together via similar mechanisms. By visualizing centrioles by immunofluorescence staining we found that in the mitotic germline the Separase resistant mutation in the REC-8 prevents chromosome segregation, but does not appear to affect centriole separation, suggesting that REC-8 may function by different mechanisms in chromosomes and centrosomes. We will further test the effect of this REC-8 mutant in the centrosomes of dividing spermatocytes during meiosis.

BIO – 2 BIOCOMPUTATIONAL ANALYSIS OF ARAP1, A NOVEL GTPASE-ACTIVATING-PROTEIN INVOLVED IN OSTEOCLAST-MEDIATED BONE DIGESTION

Dhruva Chhabra (U), Brooklyn College, Macaulay Honors College, Dr. Shaneen Singh, Brooklyn College, The Graduate Center of the City University of New York

RhoGTPases are involved in bone remodeling, the process of bone digestion and formation. Any abnormalities in these Rho Proteins can lead to osteoporosis, characterized by porous bone, or osteopetrosis, characterized by highly-dense bone tissue. RhoA-GTP is responsible for disrupting sealing zone dynamics and promoting cell motility in osteoclasts. On the other hand, Cdc42-GTP and Rac1-GTP maintain osteoclast attachment, thereby allowing it to continue enzymatic degradation of bone. To employ RhoGTPases as potential drug targets, we need to further understand the control mechanisms for these G-proteins. ARAP1 has been shown to localize to the osteoclast sealing zones upon the release of phosphoinositide (3,4,5) trisphosphate. ARAP1 has a RhoGAP domain responsible for catalyzing the intrinsic GTPase activity of G proteins. However, it is still unknown which GTPase (i.e. RhoA, Cdc42, Rac1) preferentially binds to the ARAP1 catalytic domain. Delineating the substrate specificity for the RhoGAP domain is crucial to its characterization as a pro-migration or pro-digestion protein, allowing us to specifically target its function in managing osteoporosis or osteopetrosis-related illnesses. In this study, we have modeled the ARAP1 RhoGAP domain, characterized its biophysical features, and used docking analysis to scrutinize its interactions. The docking results suggest that ARAP1 shows a preferential substrate specificity for RhoA. This indicates that ARAP1-RhoGAP may behave in a similar manner as ARAP3-RhoGAP, which has been shown to prefer RhoA-targeting in an experimental setup. Lastly, we report an in silico mutagenesis analysis that induces RhoA-like mutations in Cdc42/Rac1 and provides structural data that supports our hypothesis of an ARAP1-RhoA preferential attraction.

BIO – 3 COMPARISON OF SAMPLE PREPARATION METHODS FOR DUCKWEED MICROBIOMES FROM AN URBAN PARK

John S. Lee (UG), Jeydy Perez (UG) and Ashley Civil (UG), Dr. Theodore R. Muth, Brooklyn College

Duckweed are floating aquatic plants that have the ability to remediate waste and chemical contaminants from freshwater sites. They have been studied for their potential use as a source of biofuel production, animal feed stocks, and nutrients for humans. In order to fully realize the potential of water remediation by duckweeds, it is important to understand the role of the duckweed microbiomes in the remediation process. As labs begin to study the microbiomes of these aquatic plants, it is crucial to establish effective protocols for microbiome collection and preparation to standardize methods and allow for comparison of results across independent studies. In this study, duckweeds (Lemna spp. and Spirodella polyrhiza) were collected from Prospect Park in Brooklyn, NY, in the summer of 2020. We compared two methods of microbiome isolation - one using rinsed, whole duckweed and an alternative method, where microorganisms were released from the surfaces of duckweed by first vortexing in a mild detergent solution and pelleted by centrifugation. We compared the Qiagen Power Soil and Power Water DNA isolation kits, along with 70% ethanol and a commercial NASafe solution, as microbiome isolation and extraction methods, respectively. Our preliminary results suggest that greater bacterial diversity is detected in microbiome samples that were vortexed from the duckweed surface and extracted with the Qiagen Power Soil DNA isolation kit. We also found greater bacterial diversity decreased with storage time, but both 70% ethanol and NASafe were better storage solutions relative to water. These results are important as they will contribute to establishing effective protocols for studying microbiomes that can be standardized across the duckweed microbiome research community.

BIO – 4 USE OF QUANTITATIVE POLYMERASE CHAIN REACTION TO ASSESS EXPRESSION OF ERYTHROMYCIN AND PENICILLIN RESISTANT GENES IN THE EAST RIVER AND CONEY ISLAND CREEK

Mumina Sadullozoda (UG), MARC Scholar Brooklyn College, Daniel Pintor, St. Francis College, Mariah Allen, St. Francis College ; Robert Buchanan, NYC Water Trail Association and Dr. Victoria E. Ruiz, St. Francis College

Inappropriate use of antibiotics in human and veterinary medicine and animal agriculture have led to increased levels of antibiotics and associated metabolites in landfills and its leachates, including soil and water. Antibiotic levels in these various leachates may persist long after antibiotic use and promote the presence of antibiotic-resistant bacteria and genetic elements. Enterococci are gram-positive bacteria that are commonly used to assess water quality. Enterococci species are reservoirs of antibiotic resistant genomic elements. Previouswork has demonstrated high Enterococci levels in Coney Island Creek compared to East River sites (Pier 2, Pier 4). Because previous measurements found differences in Enterococci levels at these two locations, we hypothesized that Coney Island Creek would also be found to contain higher levels of antibiotic resistant genes than the East River. To test this hypothesis, DNA was extracted from water samples collected from Coney Island Creek and Pier 2 and Pier 4 of East River, using the DNAEasy PowerWater Kit. Relative gene expression of erythromycin resistance (ErmB) and Beta-lactam resistance (BlaTEM) genes were measured. Samples were normalized with 16S rRNA gene. Coney Island Creek had a higher level of ErmB compared to both East River sites, while the East River contained a higher level of BlaTEM. Our findings confirm that higher levels of Enterococci bacteria are associated with greater resistance to common antibiotics, suggesting that the presence of antibiotic resistant organisms in water may have direct health hazards for humans and animals.

BIO – 5 MAXIMIZING URBAN GREEN ROOF POTENTIAL THROUGH THE UNDERSTANDING OF MICROBIOME COMPOSITION

Lily A. Fillwalk (U), Pitzer College, Samia Ahmed, Lauren Gorelova and Dr. Theodore Muth, Brooklyn College

Green roofs are potentially advantageous to urban communities because they address critical environmental concerns in cities including elevated temperatures, storm-water management, reduced biodiversity, and increasing pollution. Plant and soil-associated microbes have been linked to building resilience in green roof plants against these environmental stressors. However, factors impacting the microbial community composition and dynamics are not yet well understood. Samples for this study were collected from New York City 5 Borough Complex on Randall's Island in September 2020. Green roof soil samples were collected from three different sides of the building to determine the effect of light and exposure on the microbiome community. Soil microbiome DNA was extracted using Qiagen DNeasy PowerSoil Pro kits, and DNA was sequenced at Wright Labs LLC (Huntingdon, PA) on the Illumina MiSeq platform. The microbiome sequence data were analyzed using QIIME2 and other tools within the NIAID Nephele microbiome analysis suite. Our initial analyses of the results suggest that the green roof soils are dominated by Proteobacteria, Actinobacteria, and Acidobacteria phyla, which is typical of most soil types. Our data suggest that the south-facing green roof beds also had a greater Faithâ€™s PD diversity measurement, and differing abundances of Actinobacteria and Bacilli when compared to the north and east-facing beds. We are continuing to analyze these data to gain additional insights into the factors that may influence green roof microbiome communities. Having a more thorough understanding of these green roof microbiomes will give the urban soils community and city planners improved strategies for maximizing the benefits of green roofs.

BIO – 6 EVALUATION OF NOVEL GOLD-TRASTUZUMAB-BASED ANTIBODY-DRUG CONJUGATES AND IMMUNOLIPOSOMES IN HER2-POSITIVE BREAST CANCER

Afruja Ahad (G), Brooklyn College & MSKCC; Hiwa Saeed, Brooklyn College; Virginia del Solar, Brooklyn College; Natalia Curado, Brooklyn College; Jason Lewis, MSKCC and Dr. Maria Contel, Brooklyn College

Antibody-drug conjugates (ADCs) combine the selectivity of monoclonal antibodies (mAbs) with the efficacy of chemotherapeutic drugs to provide targeted treatment. Most of the ADCs currently in the clinic for chemotherapy are based on complex organic molecules. In contrast, the conjugation of metallodrugs to mAbs has been overlooked when there is enormous potential with the resurgence of metal-based drugs as prospective chemotherapeutics. Recently, we have described the first gold ADCs containing gold-triphenylphosphine fragments as a proof of concept. The ADCs (based on the antibody Trastuzumab) were selective and highly efficacious towards HER2-positive breast cancer cells. In this study, we evaluate the efficacy of novel second-generation gold-based ADCs with improved cytotoxic payloads. Studies on the mechanism of action of these ADCs will be understood via fluorescent labeling to visualize internalization with the aim to optimize subsequent design of the improved ADCs. In addition to this, we aim to develop a method of drug delivery that combines the advantages of the ADC with a further increased payload by the means of immunoliposomes. These nanocarriers are advantageous in that they have an extended blood circulation time, allowing for higher accumulation in the tumor, they are much more sensitive towards the tumor microenvironment and they allow for precise control of drug release. With the encapsulation of our gold-based drug inside of a lipid vesicle that is then engrafted with Trastuzumab, we will effectively increase their ability to target and treat HER2-positive breast cancer. This system can then be extended to other metal-based drugs such as

some platinum-based chemotherapeutics already approved by the FDA as well as a variety of theragnostic agents.

BIO – 7 EPIGENETIC HISTONE POST-TRANSLATIONAL MODIFICATIONS IN A YEAST AMYLOID-BETA OVEREXPRESSION MODEL

Muna M. Hugais (G), Brooklyn College, Samantha N. Cobos, Brooklyn College and The Graduate Center, Jailene Paredes, Brooklyn College, Genevieve Foran, Ossining High School and Dr. Mariana P. Torrente, Brooklyn College and The Graduate Center

Alzheimer's disease (AD), the most common type of dementia, is a neurodegenerative disease characterized by plaques of amyloid-beta (AÎ²) peptides found in the cerebral cortex of the brain. The pathological mechanism by which AÎ² aggregation leads to AD remains unknown. Remarkably, 95% of AD patients do not carry genetic mutations associated with AD suggesting that other mechanisms are at play. Epigenetic mechanisms, such as histone post-translational modifications (PTM), may provide insight into the development of AD. Histone modifications are responsible for regulating gene transcription and impacting phenotype without any changes in the DNA sequence. Here, we exploit a yeast AÎ² overexpression model to map out the histone PTM landscapes associated with AD. In particular, we characterize histone methylation, acetylation, and phosphorylation in the context of various AÎ² peptide aggregates. Our results show that there are no significant changes in the histone PTM levels across AÎ² isoforms compared to control. Our most recent data suggests that increasing the growth temperature results in increased toxicity of the AÎ² aggregates, which may result in an impact on the histone PTM landscapes. Our hope is that our findings can illuminate unknown features of disease pathology and uncover novel markers to track disease progression.

BIO – 8 IN VITRO EVALUATION OF A POTENTIAL RUTHENIUM-BASED CHEMOTHERAPEUTIC AGENT FOR TRIPLE NEGATIVE BREAST CANCER

Arefa Yeasmin (U), Nazia Nayeem and Dr. Maria Contel, Brooklyn College

A water-soluble Ruthenium compound containing an iminophosphorane ligand (1) was tested in multiple cell lines and analyzed for its cytotoxicity in vitro and in vivo. The compound was found to be significantly cytotoxic to cisplatin resistant cell lines. Furthermore, the compound was tested on triple negative breast cancer (TNBC) MDA-MB-231 xenografts in mice resulting in a 56% tumor mass reduction with low systemic toxicity and preferential accumulation in the tumor but not in kidney and liver. Taking into account these promising data and that cancer deaths are mainly due to metastatic cancers, we sought to clarify the mechanism of action of compound 1 in TNBC, a highly aggressive and invasive breast cancer, by using different TNBC cell lines from Caucasian (CA) and African (AA) ancestry (MDA-MB-231 and HCC1806, respectively). A further understanding of the biological basis of response in the treatment for TNBC is needed that considers racial differences. Additionally, we will report on the results of testing 1 against the National Cancer Institute 60 cell line panel. We will specifically report on the anti-proliferative, anti-metastatic and anti-angiogenic properties of complex 1 in different TNBC cell lines. Overall, the results point out that the compound is anti-metastatic as well as cytotoxic whereas other known Ruthenium complexes, such as NAMI-A, are only known to be anti-metastatic and exhibit low cytotoxicity. Importantly, the compound seems to have similar biological activities on the AA cell line which is of relevance, due to the higher incidence and mortality for TNBC in populations of African ancestry.

BIO – 9 VISUAL JUDGEMENT GUIDES FIDDLER CRAB AGGRESSION LEVEL DURING AGONISTIC CONTESTS

Priyanka Rana (U) and Dr. Frank W. Grasso, Brooklyn College

Male Fiddler Crabs are a colonial species that use their enlarged claw as a weapon in fights for borrows with other males, for agonistic display, or, as a form of gesture to attracts females. In particular, claw use in communications is important for survival and reproductive success within this species. In our field study, we investigated the role of two visual signals (claw size and carapace size) in mediating the degree of aggression in fiddler crab (Uca pugilator) borrow contests. We predicted that the intensity of aggression would increase with similar claw and carapace size. 251 video recordings were made of colonies of fiddler crabs in Marine Park, Brooklyn. These were scored to extract the aggression levels in 156 crab borrow contests. We categorized their aggressiveness from least to greatest as no interaction, directed claw waving, physical contact, interlocking claws, and bodily flinging. We also measured the claw size and carapace length for both crabs in each contest. We found significant differences in the frequencies of aggression levels (chi-square (4) = 72.28 $p < 0.01$) with higher aggression levels being less frequent. Our results suggest that overall body size, as indicated by carapace length was a weaker predictor of aggression intensity than the size of the claw. These results are consistent with the view that U. pugilator evaluates its opponent's ability based on the perception of claw size. We speculate that U. pugilator tends to increase aggression based on the similarity of claw size.

BIO – 10 ANTIOXIDANT, ANTIBACTERIAL, AND ANTI-SARS-COV ACTIVITY OF COMMERCIAL PRODUCTS OF XYLOPIA (XYLOPIA AETHIOPICA)

Claudia Melo (U) MARC Scholar Brooklyn College; Rosemary Perdomo , Fadel Yerima, Oneil Mahoney, Borough of Manhattan Community College; Nadjet Cornejal, Brooklyn College; Sahar Alsaidi, Shepherd Coron, Dr. Christine Priano; Dr. Adolfina Koroch and Dr. José A' Fernández Romero, Borough of Manhattan Community College

Xylopia aethiopica (Annonaceae) is a spice and medicinal plant that grows wild in many West African countries (from Liberia to Nigeria) and is locally known as Guinea pepper, grains of Selim, hwentia and uda. The dried fruits are used as a flavoring for soups and traditionally in decoctions as an analgesic and anti-inflammatory, as well as a treatment for infections. The medicinal properties of the fruits are associated with the presence of phenolics and essential oil constituents. We studied the total phenols, total flavonoids and antioxidant activity in different X. aethiopica extracts using spectrophotometry. We found variation in total phenolic and flavonoids and antioxidant capacity between different samples and different extraction solvents. Antibacterial activity against Escherichia coli and Bacillus subtilis were evaluated using a spectrophotometric assay and Kirby-Bauer test. Additionally, a pseudoviral cell-based assay was used to test the antiviral activity against severe acute respiratory syndrome coronaviruses (SARS-CoV-1 and SARS-CoV-2). High total phenolic and flavonoid content was correlated with high antioxidant capacity. Results of antibacterial tests indicated that one Xylopia extract potentially has strong antibacterial activity against gram-positive bacteria B. subtilis. The pseudoviral assay showed moderate antiviral activity against SARS-CoV-1 and SARS-CoV-2.

BIO – 11 ANTI-HPV AND ANTI-HSV ACTIVITY IN RECTAL ENEMA EFFLUENTS COLLECTED FROM SUBJECTS RECEIVING PC-1005 -- A DUAL COMPARTMENT MULTIPURPOSE PREVENTION TECHNOLOGY FORMULATION

Nadjet Cornejal (U) MARC Scholar, Claudia Melo, Brooklyn College and Sahar Alsaidi, Lehman College

MTN-037 is a Phase 1 dose-ranging trial evaluating the rectal safety and pharmacokinetics of PC-1005 (MIV-150, zinc acetate, carrageenan), a peri-coital gel designed for vaginal and rectal use. In an ancillary study, we tested the activity of PC-1005 against human papillomavirus type 16 pseudovirus (HPV16 PsV) and herpes simplex 2 (HSV-2) using the rectal enema effluents collected in MTN-037.
Healthy HIV-negative research participants in MTN-037 sequentially received escalating single doses (4mL, 16mL and 32mL) of PC-1005 rectally and rectal enema effluents were collected at baseline, early (0.5-5 hours) and late (24 hours) time points. The anti-HPV and anti-HSV activity of enema effluents from 6 participants were evaluated using (1) the HPV16 PsV luciferase assay to estimate half-maximal effective concentrations (EC50) based on rectal enema effluent dilution and (2) the HSV-2 plaque reduction assay after incubation of rectal enema effluents with HSV-2 for 30 minutes at 37oC.
Rectal enema effluents in the HPV 16 PsV assay had EC50 values between 0.16 and 2.4x10-5 (dilution factor). The HSV-2 assay resulted in 66-87% decrease in HSV-2 plaque forming units. The anti-HPV16 and anti-HSV-2 activity were significantly different between enema effluents collected at early time points (0.5-5 hours) post gel application and those collected at baseline ($p<0.04$). There was correlation between anti-HPV and anti-HSV activity (Spearman $r=0.7409$; $p<0.0001$). Our results support the further evaluation of PC-1005 as an on-demand formulation to prevent HPV and HSV infections.

BIO – 12 ELUCIDATING THE MECHANISM OF NUCLEOLIN'S INTERACTION WITH THE MICROPROCESSOR COMPLEX IN PRI-MIR 16-1 PROCESSING

Jane Edwards (U), Shaneen Singh and Avdar San, Brooklyn College

MicroRNAs (miRNAs) are short, non-coding single strands of RNA found in eukaryotes. They play a key role in gene silencing through inhibiting translation or degrading mRNA. Primary miRNA (pri-miRNA) processing is an initial step needed to produce a mature microRNA molecule. The microprocess complex (MP), made up of the proteins, DROSHA and DGCR8, is used to cleave the pri-miRNA molecule to a shorter hairpin structure. This cleaved RNA hairpin, known as precursor miRNA (pre-miRNA), is sent to the cytoplasm for further processing into the mature miRNA. Through previous research studies, it has been discovered that expression and cellular localization of nucleolin (NCL) affects the processing of the pri-miRNAs including that of miR16-1. When NCL is in the nucleus, the MP complex works more efficiently in cleaving pri-miRNAs 16-1 to its pre-miRNA form. Therefore, this increases the levels of mature miRNAs 16-1. Additionally, it was discovered that NCL can bind directly and specifically to pri-miRNAs 16-1 and the core components of the MP complex. This may explain how NCL plays a role in miR 16-1 processing. However, the details of how NCL interacts with the miR 16-1-MP complex are still unknown. This study was designed to elucidate the mechanism of NCLâ€™s interactions with the miR 16-1-MP complex and its role in the processing of pri-miRNA16-1 using computational approaches. This information is critical in determining how NCLâ€™s binding impacts the overall function of the MP complex in cleavage of pri-miRNA and how it can be regulated. Since miR16-1 expression leads to apoptosis of cancerous cells and prevents cell proliferation, the results of our study provide important clues in understanding how the NCL-miR-MP complex can be targeted in drug design for cancer therapy.

BIO - 13 POTENTIAL BIOLOGICAL ACTIVITY OF COMMERCIAL SAMPLES OF VERNONIA AMYGDALINA PLANT EXTRACTS

Ebube Michael (U) MARC SCHOLAR, Brooklyn College and Dr. Adolfina Koroch, Borough of Manhattan Community College

The role of medicinal plants in the inhibition and prevention of oxidative stress-related diseases is an area of growing interest. The remarkable ability of these plants to cause decline in the rate of formation of Reactive Oxygen Species (ROS)—both in vivo and vitro—has been linked to the presence of a group of phytochemicals, known as polyphenols. This study aims to investigate the potential antioxidant capacity of Vernonia amygdalina, a plant that originates from tropical west Africa. It bears the common name "Bitter Leaf", and as the name implies, virtually every part of the plant is known to possess a distinct bitterness. In traditional medicine, this plant is widely applied in the treatment of illnesses ranging from diabetes and hypertension to several bacterial, parasitic, and viral infections. The main objective of this study is to measure and analyze the antioxidant activity associated with V. amygdalina. This has been achieved through the quantification of phenolic compounds present in commercial samples of the plant. Plant extracts were prepared by grounding dry leaves, dissolved in water, and then boiled for 15 minutes. Total phenolic content was quantified using the Folin-Ciocalteu method and antioxidant activity was quantified using the ABTS radical scavenging assay. Extracts exhibited high total phenolic content and high antioxidant activity. High correlation between total phenolic content and antioxidant activity was observed. These data obtained for total phenolic content and antioxidant activity of V. amydalina supports the validity of its traditional and medicinal uses across west Africa.

BIO - 14 TRAFFICKING MONOCYTES INTO THE ISCHEMIC BRAIN AND MAPPING CELL SUBTYPES

Ominakhon Nazarzoda (U) MARC SCHOLAR, Brooklyn College, Lidia Garcia-Bonilla and Josef Anrather, Weill Cornell Medicine

During a stroke, peripheral leukocytes infiltrate the brain and microglia are activated. These cells function as inflammatory or repair agents. To prevent the damage of ischemic inflammation, we must know whether resident or infiltrating cells cause inflammation and whether leukocytes come with already-specified functions or specialize after entering the brain. We hypothesized that the functional variety of leukocytes is due to their specialization into subtypes in the brain based on the local ischemic milieu rather than the cells coming with an already-specified role. Stroke was induced in mice by middle cerebral artery occlusion (MCAo). The movement of circulating macrophages was tracked by in-vivo injection of fluorescent beads and immunofluorescent assay. To observe and map the specialization of macrophages, we used fluorescence in situ hybridization (FISH). Tm+ microglia reporter mice were used to differentiate a macrophage (MΦ) vs microglia (mg) phenotype. We observed the presence of intraparenchymal mg/MΦ positive for beads at 2 days and intravascular mg/MΦ positive beads at 7 days post MCAo in the beads experiment. However, when a CCR2-KO mouse (MΦ recruitment inhibited) was also mg/MΦ positive, we concluded that the beads found in the vessels were circulating in the blood while those in parenchyma were taken up by microglia after a hemorrhage. The FISH results supported that differentiation occurs once macrophages infiltrate into the brain. An approach to minimize inflammation caused by peripheral immunity can be to desensitize receptors that initiate chemotaxis when they detect damage. However, experiments must be repeated and new probes tested before finding a balance in the inflammatory vs repair activity of immune cells to reduce brain damage post-stroke.

CHEMISTRY

CHEM – 1 ROLE OF OSTEOCALCIN IN THE TOXIC EFFECT OF LEAD ON BONE PROPERTIES

Evan S. Kello (U), Dr. Terry L. Dowd, Gozde Yildarim, Olga P. Berezovska, William C. Budell, Brooklyn College; Sarah Yagerman Meinig School of Biomedical Engineering and Sibley School of Mechanical and Aerospace Engineering, Cornell University and Steven Tommasini, Department of Orthopedics, Yale University of Medicine

INTRODUCTION: Lead (Pb2+) toxicity is a major health problem and bone is the major reservoir for Pb2+. Lead is detrimental to bone, affects bone remodeling and is associated with fractures in the elderly. Osteocalcin affects bone remodeling, fracture resistance and is decreased with age and in some diseases. The role of osteocalcin in bone disorders is unknown. PURPOSE: To determine whether OC plays a role in the detrimental effects of Pb2+ on bone by comparing Pb2+ exposed mouse bones in the presence (OC +/+) and absence (OC -/-) of osteocalcin. METHODS: Two month old female OC +/+ and OC-/- mice, generously provided by G. Karsenty, were exposed to Pb2+ in the drinking water (0 or 250 ppm, blood Pb2+ of 16 ïg/dl) for 4 months. Bone mineral properties from 6 mo old femora were assessed by Fourier Transform Infrared Imaging (FTIRI), Micro-computed tomography (uCT), bone biomechanical measurements and serum turnover markers (P1NP, CTX). RESULTS: In OC-/- mice lead produced a significantly increased total area and Imin value, a trend toward an increased bone area/total area and a trend toward a decreased marrow area/ total area. No lead associated difference was found in the bending stiffness nor bone strength (Mmax) but a significantly decreased size adjusted bending stiffness and Mmax was found in OC -/- mouse bones indicating diminished material properties. Increased bone formation and a decreased collagen maturity in the lead exposed OC -/- were observed as well. CONCLUSIONS: Although bone was larger in the absence of osteocalcin it was not proportionally stronger. This was due to imbalanced bone turnover leading to diminished material properties such as impaired collagen maturity. Lead is more detrimental to bone in the absence of osteocalcin.

CHEM – 2 PHOSPHITE TRAPS FOR TRAPPING PHOTOGENERATED ALKOXY RADICAL AT THE AIR/SOLID INTERFACE OF A NANOPARTICLE

Goutam Ghosh (G) and Dr. Alexander Greer, Brooklyn College

With interests in alkoxy radical formation on natural and artificial surfaces, a physical-organic study was carried out with a Hammett series of triaryl phosphites (p-MeO, H, p-F, and p-Cl) to trap adsorbed alkoxy radicals on silica nanoparticles. A mechanism which involves PhC(Me) 2O• and EtO•
trapping in a cumylethyl peroxide sensitized homolysis reaction is consistent with the results. The p-F phosphite was able to indirectly monitor the alkoxy radical formation, and 31P NMR readily enabled this exploration, but other phosphites of the series such as the p-MeO phosphite were limited by hydrolysis reactions catalyzed by surface silanol groups. Fluorinated silica nanoparticles helped to suppress the hydrolysis reaction although adventitious water also plays a role in hindering efficient capture of the alkoxy radicals by the phosphite traps.

CHEM – 3 EFFECT OF CONFORMATION ON BINDING INTERACTIONS OF NMM LIGAND WITH MODEL TELOMERIC DNA G-QUADRUPLEX FORMING SEQUENCES.

Jessica Desamero (G), Brooklyn College and CUNY Graduate Cente, and Dr. Leslie Davenport, Brooklyn College

A typical double-helical DNA-B structure comprises two polynucleotide-strands stabilized by hydrogen bonding. But DNA sequences rich in guanine can potentially form alternative secondary structures. Four guanine bases form a tetrad, and multiple tetrads stack on top of each other to form a looped G-quadruplex "knot-like"structure along the DNA sequence. G-quadruplexed DNA (qDNA) forming sequences have been identified within genetic material of cells. qDNA located within telomeric ends of chromosomes inhibit the activity of telomerase, a key enzyme in tumorigenesis, preventing further tumor progression. Hence, developing quadruplex-stabilizing ligands for use as potential chemotherapeutic agents is of great interest. One such ligand is N-methylmesoporphyrin IX (NMM), which exhibits binding selectivity for qDNA over duplex DNA in solution, accompanied by a quadruplex conformational switch. Our studies have focused on studying conformational changes with the specific binding interactions of NMM with qDNA. Using a series of telomeric DNA sequences, we have mapped the NMM-quadruplex binding site by substituting specific guanine residues with an environmentally sensitive fluorescent guanine analog (6-methylisoxanthopterin, 6MI) within the quadruplex. Circular dichroism and fluorescence spectroscopy studies reveal that 6MI substitution of certain guanine residues within the G-quadruplex impacts NMM binding through either inhibition or facilitation of a cooperative quadruplex conformational switch. These studies suggest a possible mechanism whereby modulation of DNA quadruplex conformation may serve to regulate important biological gene functions through controlled ligand binding. These insights may ultimately further aid in the design of quadruplex-targeting anticancer drugs.

CHEM – 4 COMPARISON OF SAMPLE PREPARATION METHODS FOR DUCKWEED MICROBIOMES FROM AN URBAN PARK

Lloyd Lapoot (G) and Dr. Alexander Greer, Brooklyn College

A density functional theory (DFT) study is presented involving the formation of the natural product alchornedine via singlet oxygenation. Singlet oxygen is hypothesized to hasten the formation of alchornedine by forming stable and energetically favored intermediates. As the structure of alchornedine is still experimentally uncertain, the proposed alchornedine structures and their formation were subjected to DFT study using pteroginine and pteroginidine as precursors. The computational study predicts an interconversion between the precursors and an isohydroperoxide intermediate, as a key step of the reaction. Following the formation of the isohydroperoxide intermediate, three possible pathways can take place. First, an elimination product can be produced via hydrogen peroxide expulsion. Second, the isohydroperoxide intermediate can transfer an O atom intermolecularly to the prenyl group of the precursor leading to an alcohol and epoxide products. Finally, a hydroperoxide can be formed from a unimolecular H-shift of an isohydroperoxide intermediate. The DFT study provides insights in the mechanism involved in the formation of alchornedine. It also show the potential utilization of singlet oxygen in natural products synthesis.

CHEM – 5 VISIBLE-LIGHT PHOTOISOMERIZATION OF ALKENES AND POLYENES: THE ROLE OF MOLECULAR OXYGEN

Oliver Turque (G) and Dr. Alexander Greer, Brooklyn College; Orrette R Wauchope, Baruch College

We will discuss oxygen-dependent photoreactions for possible routes to C=C double-bond isomerizations. E,Z-isomerizations triggered by oxygen and visible light are an area of potential mechanistic and synthetic interest. The reaction involves the reversible addition of oxygen to form a peroxy intermediate with oxygen evolution and partial regeneration of the compound as its isomer. Targeting of oxygen-dependent photoisomerizations also relates to a practical use of visible light, for

example the improved light penetration depth for visible as opposed to UV photons in batch sensitized reactions. Our discussion is intended to draw a link between visible-light formation of a peroxy intermediate and its dark degradation with oxygen release for unsaturated compound isomerization. Preliminary experimental results with the use of vaccenic acid will also be presented.

CHEM – 6 TOWARDS GOLD-BASED TARGETED THERANOSTIC AGENTS: SYNTHESIS AND CHARACTERIZATION OF CATIONIC Au(III)-NHC IODO COMPLEXES.

Roberto De Gregorio (U), Hiwa K Saeed, Brooklyn College and Dr. Maria Contel, Brooklyn College.

Gold complexes bearing N-heterocyclic carbene (NHC) have shown remarkable promise as potential anti-cancer agents displaying high cytotoxicity (low micromolar to nanomolar range) in vitro against a variety of human cancer cell lines.1 We have recently reported on the development of gold(I)-phosphane complexes containing linkers amenable to bioconjugation to antibodies.2 More specifically, we synthesized Trastuzumab - gold conjugates. These bioconjugates were significantly more cytotoxic (sub-micromolar range) to HER2-positive breast cancer cells than the gold complexes and Trastuzumab.2,3

Here we report on the synthesis and characterization of a series of novel cationic gold (I) complexes containing N-heterocyclic carbene ligands with various substitutions, as well as one phosphane-containing linker amenable to bioconjugation to antibodies. We will also report on preliminary studies for the oxidation of these species with I2 to gold (III) compounds as well as their stability. The goal of this project is to bioconjugate these gold-linker complexes (1) to antibodies like Trastuzumab and explore their efficacy as ADCs. Future studies based on the oxidative addition of 124I2 to generate gold(III) radiolabeled species,4 may afford targeted theranostic gold(III)-based ADCs useful for targeted in vivo bio distribution studies using positron emission tomography (PET).

CHEM – 7 ADJUVANT COMPOUND ANALYSIS FOR MECHANISTIC INSIGHT TO PROMOTE PHOTODYNAMIC INACTIVATION

Ryan M. O'Connor (U) Brooklyn College, Lloyd Lapoot, Shakeela Jabeen, CUNY Graduate Center and Brooklyn College and Dr. Alexander Greer, Brooklyn College

A survey of adjuvants for enhanced photodynamic activity will be presented. Addition of adjuvants (NaBr, KI, NaN3, NaNO2, KSCN, 8-methylnon-7-ene-1 sulfonate, as well as amino acids, vitamins, and repurposed drugs) can enhance phototoxicity towards tumor cells, microbe cells, fungi, and also acceptor compounds in microemulsions. We will discuss candidate reactive oxygen intermediates that are responsible for the enhanced photodynamic action. In the case of bacteria and fungi, antimicrobial agents and their combination with sensitizers leads to improved outcomes for photoinactivation. In the case of tumor cells, exogenous addition of aminolaevulinic acid as a pro-sensitizer along with adjuvants such as vitamins leads to increased formation of the endogenous photosensitizer protoporphyrin IX. Adjuvants act through different mechanisms to amplify the photodynamic effects, as will be discussed.

CHEM – 8 SURFACE MOBILITY OF ALKOXY RADICALS ASSESSED BY THE SYMMETRICAL PRODUCT UPON RECOMBINATION METHOD (SPR)

Sarah J. Belh (G), Goutam Ghosh and Dr. Alexander Greer, Brooklyn College; The Graduate Center of the City University of New York

We describe here the first study of alkoxy radical surface mobility from analysis of the recombination products. A novel method called symmetrical product upon recombination (SRP) uses an asymmetrical peroxide that upon sensitized homolysis recombines to a symmetrical peroxide product [R'OOR → R'O•↑ + •OR → ROOR]. This allows for self-sorting of the radicals, as some are volatile and depart the surface. Self-sorting enhances radical recombination in forming a symmetrical product, which has been applied to distance migration. SPR also provides a new opportunity for mechanistic studies of interfacial radicals, including monitoring competition between radical recombination versus surface hydrogen abstraction. This is an approach that might work for other surface-borne radicals on natural and artificial particles.

CHEM – 9 SELF-CATALYSIS VIA THE SINGLET OXYGENATION OF THE PRENYL-CONTAINING NATURAL PRODUCT GLYCOCITRINE II

Shakeela Jabeen (G) and Dr. Alexander Greer, Brooklyn College

A density functional theoretical study is presented, implicating H2O2 and H2O elimination processes to reach isopropenyl dihydrofuroacidone rutacridine in the singlet oxygenation of the natural product glycocitrine-II. Our study predicts an interconversion between glycocitrine-II and an iso-hydroperoxide intermediate. This interconversion provides a key determinant in the chemistry which then follows. Formation of hydroperoxides is unlikely from a singlet oxygen 'ene' reaction. Instead, rutacridine arises via an H2O2 expulsion from a novel iso-hydroperoxide [R(H)O+–O—] due to the presence of an internal H-bond with the phenol OH via an initial H-bonded perepoxide transition state. The iso-hydroperoxide is analogous to the iso-carbon tetraiodide (I2CI+–I—) from the photolysis of carbon tetraiodide CI4, and computed to transfer an O atom intermolecularly to the prenyl group of glycocitrine leading to alcohol and glycocitrine epoxide. This represents a second route to the rutacridine via loss of H2O. A mechanistic picture now emerges attributing H2O2 expulsion and H2O dehydration reactions to the novel iso-hydroperoxide with new insight to the biosynthesis of dihydrofuran natural products.

CHEM -10 INSIGHT INTO ANTIMICROBIAL PHOTODYNAMIC INACTIVATION FROM TOPICAL AND SUPERHYDROPHOBIC SENSITIZER TECHNIQUES

Jose Quilez Alburquerque (G) Complutense University of Madrid, Caroline Coradi Tonon, Wellman Center for Photomedicine, Massachusetts General Hospital and Harvard Medical School, Shoaib Ashraf, Wellman Center for Photomedicine, Massachusetts General Hospital and Harvard Medical School, Alessandra Nara de Sousa Rastelli, School of Dentistry, Araraquara, Sao Paulo State University-UNESP, Tayyaba Hasan,Wellman Center for Photomedicine, Massachusetts General Hospital and Harvard Medical School, Alan Lyons, College of Staten Island and Dr. Alexander Greer, Brooklyn College

We will discuss diffusion in bacterial biofilms for possible insight into antimicrobial photodynamic inactivation (aPDI). aPDI operates by one of two mechanisms. Typically, aPDI requires the diffusion of a photosensitizer and molecular oxygen into the biofilm and photoactivation of oxygen for the in-situ generation of reactive oxygen species (ROS), which inactivate the microbes. A second approach is

superhydrophobic aPDI (SH-aPDI), a subject we are actively involved in. SH-aPDI involves the generation of singlet oxygen (1O2) adjacent to the biofilm surface, followed by diffusion of the reactive gas into the biofilm. Molecular diffusion in biofilms has been long investigated, where our review of literature is intended to draw a logical link between diffusion in biofilms and ROS, a combination that leads to the current state of aPDI and superhydrophobic aPDI (SH-aPDI). This discussion should be of interest both to photochemists and photobiologists, as is ties together aPDI and SH-aPDI work, drawing attention to subjects often overlooked in reactive oxygen chemistry.

CHEM – 11 PHOTOCHEMICAL AND PHOTOPHYSICAL STUDY OF BIS-ALKYLATED LUMAZINE AND PTERIN PHOTOSYNTHESIZERS

Dobrushe Denburg (U), Baruch College, María José Sosa; Mariana Vignoni; María Noel Urrutia; Andrés H. Thomas, Universidad Nacional de La Plata; Matías I. Quindt; Sergio Bonesi, Universidad de Buenos Aires; Dr. Alexander Greer, Brooklyn College and Edyta M. Greer, Baruch College

A bis-decylated lumazine and pterin have been synthesized and characterized. Namely, bis-decyl chain 1,3-didecylpteridine-2,4(1H,3H)-dione and decyl 4-(((2-amino-4-(decyloxy)pteridin-6-yl)methyl)amino)benzoate conjugates were synthesized. The synthesis was carried out by nucleophilic substitution (SN2) reactions of 1-iododecane with lumazine and pteroic acid, in N,N-dimethylformamide (DMF) and N,N-dimethylaniline (DMA) solvent respectively. Decyl chain coupling arises in a sequential manner, without DMF or DMA condensation. Experimental data from NMR (1D and 2D), HPLC, UV-vis, fluorescence, as well as theoretical data (density functional theory) will be presented to compare the two bis-decylated sensitizers with the notion to add to strategies for increasing sensitizer lipophilicity for use in antimicrobial photodynamic inactivation and photodynamic therapy.

COMPUTER SCIENCE

CISC – 1 VOXEL EDIT: A 3D CROSS-PLATFORM AND WEB-BASED VOXEL EDITING PROGRAM

Alexander M. Aguilar (U), Tzipora Halevi, Brooklyn College

Voxel Edit is a voxel editor which is an application that enables users to manipulate voxels in a 3D scene. A voxel in this sense is a cell within a three-dimensional grid that holds some data. For a voxel editor, this usually includes the position of the voxel, its color, shaders, etc. and is visually represented as a cube. Users are then able to perform various actions with these voxels such as add, delete, reposition, extend, recolor, and so on. The end goal of such actions is to create a 3D model that can be saved for further editing, rendered to an image file, or exported to be used in other 3D software such as the Blender or Unity. To be even more concise, Voxel Edit is an editor used to make 3D voxel artwork.
Voxel Edit is cross-platform in that it was designed to be used on both desktop/laptop and mobile devices. It is web-based as well meaning that it will also work in a variety of browsers supplied by said devices such as Google Chrome or Firefox on a Windows 10 PC or Android phone.
The program requires both a GUI for end users to choose how they wish to edit their voxels and a viewport into a 3D scene with the voxels they are editing. For the GUI, the front-end library React was utilized. Likewise, the 3D library Three.js was used to handle the 3D viewport and implement voxel related data structures and algorithms. Lastly, the programming language JavaScript was used for the actual code.
The source code for Voxel Edit is hosted via GitHub at the following link:
https://github.com/kenny-designs/voxel-edit

The editor itself is also live via GitHub Pages at the following link:
https://kenny-designs.github.io/voxel-edit/
Lastly, documentation for the code can be seen at this link:
https://voxel-edit-docs.netlify.app/

HEALTH AND NUTRITION SCIENCES

HEALTH AND NUTRITION SCIENCES – 1 THE EFFECTS OF PRECARITY ON HAITIAN MIGRANT SEASONAL FARMWORKERS (MSFWS) HEALTH

Christiny V. Celestin (U), Margrethe Horlyck-Romanovsky, DrPH and Maria Farag, Brooklyn College

Haitian Migrant Seasonal Farmworkers (MSFWs) in Maine travel along the eastern seaboard and across the Atlantic for work. Transnational migration has imposed precarious effects on agricultural seasonal migrants. Many Haitian migrants begin their journeys in Florida or Haiti before venturing to North Carolina for the first blueberry season. Afterward, many head to New Jersey for another high-shrub blueberry season until they are ready for the low-bush blueberry season in Maine. From Maine, some go to New York or Pennsylvania for apple season. The continuousness of this journey unsurprisingly generates a precarious physical and mental well-being. My project outlines a multi-layer approach of precarity and how it affects the health of Haitian MSFWs. Precarity - meaning unpredictable cultural conditions of life and unstable living conditions - leaves Haitian migrants susceptible to many health risks, in addition to exacerbating the already chronic illnesses they already have (hypertension or diabetes). The precariousness migrant workers face will be highlighted through survey questionnaires and narratives conducted during the Wreathing Season in Maine (October-December). The study involves Haitian MSFWs who traveled to Maine to work while also receiving healthcare services from The Maine Mobile Health Program. My research shows what precarity Haitian MSFWs face and how it manifests in their health, language barriers, economic insecurity, injury, fear, and transportation. The project also contributes to a broader discussion among cultural anthropologists who focus on emotion and subjectivity, exploring disenfranchisement, displacement, and uncertainty.

HEALTH AND NUTRITION SCIENCES – 2 MICE FED A WESTERN DIET DEVELOP OBESITY AND NONALCOHOLIC FATTY LIVER DISEASE

Kristy J. St. Rose (G), Jasmine Williams and Jorge M. Caviglia, Brooklyn College

Nonalcoholic fatty liver disease (NAFLD) has become the most common liver disease, especially in Western countries, affecting 25% of the world population and up to 90% of individuals with obesity. NAFLD has a spectrum of alterations all stemming from the abnormal accumulation of fat in the liver. NAFLD can lead to nonalcoholic steatohepatitis (NASH) characterized by fat accumulation, liver cell death, and inflammation, which may result in scarring (fibrosis). Early intervention can reverse NASH, but if left undetected, severe scarring (cirrhosis) may develop, leading to liver failure and/or cancer.
To develop a better model of NAFLD, we hypothesized that mice overeating a Western-type diet would develop metabolic and hepatic alterations similar to those in humans with NAFLD.
We fed hyperphagic Ay mice a Western-type diet high in fat and fructose (HFFD), which included solid food containing milk fat and sucrose, and drinking water with high-fructose corn syrup (HFFD diet). Those diets administered for 12, 16, and 52 weeks. We (1) measured food intake, (2) assessed obesity by measuring body weight and composition, and (3) determined liver fat accumulation and fibrosis by TAG assay and histology.

Any mice fed the HFFD diet for 16 weeks or longer developed progressive obesity, fatty liver and liver fibrosis. Therefore, this animal model replicates the hepatic alterations found in humans with obesity and NAFLD and can be used, as a model of NAFLD.

HEALTH AND NUTRITION SCIENCES – 3 ESTABLISHING SOCIAL MEDIA COMMUNICATIONS BETWEEN STUDENTS AND AN ACADEMIC DEPARTMENT DURING COVID: A PROCESS EVALUATION

Cynthia Clairjeune (U), Uzoamaka Meremetoh and Margrethe F. Horlyck-Romanovsky, Brooklyn College

Nutrition Sciences (HNSC) created a social media committee whose goal was to, a) increase outreach to students; To make social media activities relevant to students, the Social Media team consists of a communications intern, a Federal Work Study Student, and five faculty members with expertise in public health nutrition, emergency management, clinical nutrition and health communication. In March 2021, all team members met to establish expectations, create a social media communication plan, and a schedule whereby faculty rotate as weekly social media hosts. The team noted special events, holidays, key conferences, and public health campaigns for the semester. Interns have a social media engagement schedule and rotate responsibilities for posting content on the four social media platforms. Interns either work independently or collaborate to create flyers to promote events, health/nutrition awareness, or identify existing posts to share. Faculty members revise and review posts before they are posted. The social media team works to create relevant material, and our reach is increasing. Within six weeks, activities for our four social media accounts are as follows: Twitter: Active since March 3, 2021, with 275 Tweets, 67 Photos and Videos posted; Instagram: Active since March 11, 2021, with 31 posts, and 57 Followers. YouTube: Active since March 26, 2021, with 2 videos posted, 20 views and 1 subscriber. An interdisciplinary faculty and student social media team can be a successful model for promotion of academic department research, scholarship and student engagement.

HEALTH AND NUTRITION SCIENCES – 4 TYPE 2 DIABETES PROFILES AMONG AFRO-CARIBBEANS AND AFRICAN AMERICANS IN NEW YORK CITY: NYC HEALTH AND NUTRITION EXAMINATION SURVEY 2013-2014

Maria Farag (U) and Margrethe Horlyck-Romanovsky, DrPH, Brooklyn College

Using the 2013/14 New York City (NYC) Health and Nutrition Examination Survey data, this study examined differences between African Americans and Afro-Caribbeans regarding a) the prevalence and odds of type 2 diabetes mellitus (T2DM); b) phenotypic and biochemical characteristics by T2DM status. T2DM was defined as prior diagnosis; HbA1c≥6.5%; and/or fasting glucose ≥126mg/dL. Logistic regression estimated odds of T2DM by nativity, adjusting for sociodemographic variables, BMI, waist circumference, physical activity and smoking. Among Afro-Caribbeans (n=81, Age (Mean±SE) 49±2years, BMI 29.2 ±0.7kg/m2) and African Americans (n=118, Age 47±2years, BMI 30.3±0.9kg/m2) T2DM prevalence was 31% and 21% respectively. Among those with T2DM, Afro-Caribbeans had lower mean BMI (29.9±0.8kg/m2 vs. 34.6±1.78kg/m2, P=0.01), lower waist circumference (102±2cm vs. 114±3cm, P=0.0015) and higher HDL levels (50.64±2.53 mg/dL vs. 42.52±3.20 mg/dL, P=0.0519) than African Americans. Compared to African Americans with T2DM, obesity was less prevalent among Afro-Caribbeans with T2DM (33.2% vs. 74.7%) and overweight was more prevalent (57.2% vs 13.3%, P=0.0159). 65.4% of Afro-Caribbeans with T2DM met physical activity goals compared to 75.5% of African Americans with T2DM (P=0.0335). Odds of T2DM did not differ between groups. In stratified logistic regression analysis, age and waist circumference were associated with increased T2DM odds among African Americans but not among Afro-Caribbeans. In New York City, Afro-Caribbeans with T2DM

are younger, have healthier lipid profiles, lower BMI and lower waist circumference than African Americans with T2DM, but odds of T2DM do not differ. Combining all African descent populations into one group obscures important phenotypic and clinical differences.

HEALTH AND NUTRITION SCIENCES – 5 THE ROLE OF TOLL-LIKE RECEPTOR 4 IN BONE MARROW-DERIVED IMMUNE CELLS IN THE DEVELOPMENT OF NON-ALCOHOLIC STEATOHEPATITIS-RELATED LIVER FIBROSIS

Ryan Huang (G) and Dr. Jorge Matias Caviglia, Brooklyn College

Previous findings from our lab have demonstrated that in mice, deletion of TLR4 reduces the development of non-alcoholic steatohepatitis (NASH)-induced liver fibrosis. However, it is unclear if TLR4 in hepatocytes, leukocytes, and/or other cell types, mediated the observed effects. This study aimed to investigate the role of TLR4 in bone marrow-derived immune cells in the development of NASH-related liver fibrosis. Hyperphagic Agouti yellow (Ay) mice were fed a high fat and high fructose diet for 16 weeks to induce NASH. TLR4 was deleted in bone marrow (BM)-derived inflammatory cells (TLR4Î”BM) and compared with TLR4-expressing TLR4-floxed (TLR4Flx) mice. Obesity and NASH development were determined by measuring body weight (BW), perigonadal and subcutaneous fat pad mass, liver weight (LW), liver triglycerides (TG), plasma aspartate transaminase (AST) and alanine transaminase (ALT), and hepatic inflammation. Liver fibrosis was assessed as a percentage of collagen in tissue sections. NASH mice had significantly higher body weight, perigonadal and subcutaneous fat pad mass, liver weight, liver TG, plasma AST and ALT, hepatic inflammation, and liver fibrosis (all $p<0.001$) when compared to lean controls. There were no significant differences in any measurements between TLR4Î”BM and TLR4Flx mice. Data from this study suggest that TLR4 in BM-derived immune cells do not contribute to the development of obesity and NASH-related fibrosis. This indicates that other liver cells such as hepatic stellate cells are responsible for the TLR4-mediated development of fibrosis. Therefore, blocking TLR4 in those cells could prevent liver fibrosis without the need for blocking TLR4 in immune cells, avoiding interfering with the normal immune response to pathogens.

HEALTH AND NUTRITION SCIENCES – 6 THE ROLE OF HEPATIC STELLATE CELL ACTIVATION VIA TLR4 IN NON-ALCOHOLIC STEATOHEPATITIS-INDUCED FIBROSIS

Elza Eliza Tenorio Altvater (G), Dr. Jorge Matias Caviglia, Daniah Khoj, Sahira Bibi, Kristy St.Rose and Ryan Huang, Brooklyn College

Objective: To investigate the role of hepatic stellate cell activation via TLR4 in non-alcoholic steatohepatitis (NASH)-induced fibrosis Methods: We used hyperphagic Agouti yellow (Ay) mice fed a high fat and high fructose diet for 16 weeks as a model of NASH. We deleted TLR4 specifically in hepatic stellate cells (HSCs) using the Cre-lox system (NASH TLR4ΔHSC). Ay high fat and fructose-fed TLR4 floxed mice were used as controls (NASH TLR4flox); we also included two groups non-hyperphagic mice fed a low fat and low fructose diet as lean controls: lean TLR4ΔHSC and lean TLR4 floxed mice. We evaluated the development of obesity and NASH, including steatosis, liver injury, liver inflammation, and liver fibrosis. Results: The mice in the NASH groups had significantly higher body weight, perigonadal fat weight, liver weight, liver to body weight ratio, ALT and AST plasma levels (all $p <0.0001$), and steatosis score ($p <0.001$) the lean groups. However, pairwise comparison of TLR4ΔHSC and Tlr4 floxed groups treated with the same diet did not show statistically significant differences in these biomarkers. On the other hand, when comparing the two NASH groups for fibrosis and inflammation levels, the mice with a deletion of TLR4 in HSC (NASH-TLR4ΔHSC) showed significantly decreased in those parameters when compared to controls (NASH-Tlr4 floxed) mice, $p < 0.0001$ and $p = 0.01$, respectively. Conclusion: The

HSCs TLR4 is involved in the fibrogenesis and inflammation that occur during the progression of steatosis to steatohepatitis in NAFLD. More studies are needed to investigate the inhibition of HSC TLR4 as a potential therapeutic strategy for NASH.

MATHEMATICS

MATH – 1 LINE GRAPHS AND EDGE-CENTRALITY MEASURES

Rohma Khan (U) Remi M. Laurence, Dr. Sandra R. Kingan and Zaeema Tamur, Brooklyn College

Vertex centrality measures determine which vertices are most important in a network and edge centrality measures determine which edges are most important. Google's PageRank algorithm that determines important web pages is a famous example of a vertex centrality measure. There are many vertex measures, each useful in a different context, but very few edge measures.
Let G be a graph (also called network). The line graph of G denoted by L(G), obtained by placing a vertex along each edge and joining vertices placed on adjacent edges. Due to the scarcity of edge measures, vertex measures of the line graph are used as a proxy for edge measures of the graph, often with no indication as to whether they give meaningful results.
However, there is one edge measure known as edge-betweenness and a corresponding vertex measure known as vertex-betweenness. Ortiz-Gaona, M. Postigo-Boix & J. L. Melús-Moreno (2016) asked how does the edge-betweenness ranking of edges in G compare with the vertex betweenness ranking of vertices in L(G). They found experimentally that the rankings were similar, thereby justifying the use of vertex measures of the line graph in lieu of edge measures of the graph. They wondered if there is any theoretical basis for their observation.
A tree is a connected graph with no cycles. We proved that for a tree, edge-betweenness ranking of edges in G is the same as the vertex-betweenness ranking of the corresponding verticesin L(G). However, it is not true in general. We found counterexamples. This is joint work with Ana Osorio-Alvarado and Zaeema Tamur. Professor Sandra Kingan is our faculty advisor. This research is sponsored by NSF DMS grant #1820731.

PHYSICS

PHYSICS – 1 FUTURE PROJECTIONS OF GLOBAL WARMING IN THE HIMALAYAS

John Semanduyev (U), Brooklyn College

Climate change has contributed to worldwide temperature anomalies. Focused on the Himalayan mountain range, we can see just how intensely climate change has affected the area and we seek to examine the extent of the effect as time goes if nothing changes. Ever since the IPCC disaster of the spreading of false information, what exactly has been happening in the Himalayas has remained under the radar. Recent data support the claim that the region is affected by climate, albeit not as intensely as the IPCC originally predicted. We seek to examine what is projected to happen in the region if things do not change. Data has been used from Kulkarni et al, national geographic, climate action tracker, la times, climate.org, ipcc.ch. We have found that if we were to continue at current global warming trends, the Himalayan region will be further devastated. Simulations predict that temperature changes may rise to nearly +5 C in the region. Our findings indicate that if we do not make an immediate change, the region will continue to get worse and worse. We will also examine what the countries surrounding the region are doing about climate change.

PHYSICS – 2 QUANTIFYING SOCIAL ACCEPTANCE OF CLIMATE CHANGE BASED ON SOCIAL ACCEPTANCE OF VACCINATION

Johnson Lin (U), Brooklyn College

The rising global average temperature is an increasing concern across the globe but the effect is immediate for many poor and developing countries such as Nigeria, Haiti, Yemen, Manila and etc. The purpose of this research is to investigate the correlation between social factors such as political affiliation, business interest, race, region, and social status that affect social acceptance of climate change and COVID-19 vaccination. Using conducted quantitative and qualitative research on literature sources to collect and gather data on social acceptance of climate change and COVID-19 vaccination, this study analyzed the denial and acceptance of climate change among poor and developing countries versus rich and wealthy countries. Amongst the social factors, political affiliation, business interest, and social status were the greatest contributing factors that facilitated the denial and acceptance of climate change and COVID-19 vaccination. This study shows that the correlation between acceptance of climate change and COVID-19 vaccination is greatly influenced by whether or not the result of denial or acceptance of climate change and COVID-19 vaccination is beneficial to developing or rich countries.

PHYSICS – 3 INTERNAL CHANGES OF THE OIL INDUSTRY AND THE IMPACT ON GLOBAL CLIMATE

Paula Glab (U), Brooklyn College

In this past year of 2020, the world has seen immense transformation of global markets and industries, particularly the oil industry. The ongoing pandemic, as well as price wars and growing concerns for global climates exposed the true volatility of the oil industry and shifted the focus of many big companies and governments on to searching for cleaner and more stable energy sources. The goal of the research conducted here is to compile and analyze data from various sources to take a look into the volatility of the oil industry and its severe impact on environmental health. Further, this research is intended to analyze the various events which have led to the fall of oil in the market in the recent past, as well as diving into specific policies which are being implemented in order to reduce emissions and pollution that are a direct result of the global reliance on oil and fossil fuels.

PHYSICS – 4 THE BIG MOVE OF REJOINING PARIS CLIMATE ACCORD BY AMERICA

Yuduo Wu (U), Brooklyn College

Climate change has been a major and severe issue for every country on earth. The United States of America has rejoined the Paris Agreement since January 20, 2021 by President Biden after its withdrawal. The purpose of this research is to investigate America's measures toward its pledge of the Paris Agreement and the deficiencies that need to be solved to be a role model for dealing with climate change. Using quantitative and qualitative research from literature journals to collect data on the Paris Agreement's commitment by developing countries and developed countries, this study analyzes America's responses after it rejoined the Paris Agreement and compares that with other countries' achievements. This research shows that the 2020 United States presidential election directly influenced America's attitude toward the Paris Agreement and President Biden's determination toward the Paris Agreement in terms of climate change.

PSYCHOLOGY

PSYCH – 1 A STUDY OF COMMUNICATION COMPLEXITY IN THE MONK PARAKEET POPULATION OF BROOKLYN

Aamina B. Massimi (U)and Dr. Frank W. Grasso, Brooklyn College

Monk parakeets (Myopsitta monachus) are lifelong vocal learners with complex and individual communication repertoires. Traditionally, monk parakeet calls have been divided into 5 classes: contact, threat, alarm, chatter and flight. This classification has been based upon the interpretation of human observers. We undertook a quantitative analysis of call structure to validate and explore the variation structure of 54 parrot calls recorded in the Brooklyn population from 2018-2020. Our sample did not contain any examples of threat, alarm, or flight calls, so we focused our analysis on contact and chatter calls. We used the maximum cross-correlation between all calls as a distance metric for a cluster analysis. We performed a k-means cluster analysis. A subsequent scree analysis of the clusters allowed us to identify 7 classes of these vocalizations amongst the calls that human observers classify as contact and chatter types. The weakest of these classes had a probability $p<0.1$. One of these classes was pure contact calls, one was pure chatter calls, and the remaining 5 were a mixture of contact and chatter calls. This larger number of call types, supported by quantitative evidence, suggests that the rich vocal communication system of monk parakeets may contain greater complexity than suggested by previous studies.

PSYCH – 2 THE EFFECT OF SLEEP AND PHYSICAL ACTIVITY ON ADOLESCENT'S DISPLAY OF INTERNALIZING AND EXTERNALIZING SYMPTOMS

Angelina M. Allia (U), Macaulay Honors College at the College of Staten Island and Dr. Yu Gao, Brooklyn College

Adequate sleep and physical activity (PA) are both recommended to achieve a healthy lifestyle for all ages. Sleep is vital for our mood, alertness, and attention while PA enhances our mental wellbeing. Insufficient sleep has been demonstrated to negatively impact our physical health and cognitive functioning while too little PA has been shown to correlate with lower levels of satisfaction of life. The current study aimed to examine how sleep and PA levels affect adolescent's mental health by exploring how each contributed to the display of internalizing and externalizing symptoms, risk factors for later mental health issues. Prior research has suggested that adolescents who had inadequate sleep and physical activity had the highest internalizing symptoms that include anxiety and depression. We aimed to extend these finding to externalizing symptoms that include aggression and rule-breaking behavior. The sample consisted of 116 adolescents aged 12 to 16. The Physical Activity Questionnaire for Adolescents (PAQ-A) was used to assess the overall amount of PA adolescents engaged in while the Pittsburgh Sleep Quality Index (PSQI) was used to assess their sleep duration. We expected that adolescents with inadequate physical activity and sleep duration would have the highest amount of internalizing and externalizing symptoms. Preliminary findings showed that there was no effect of sleep duration or physical activity on the level of internalizing or externalizing symptoms. Future analysis will focus on sleep quality (duration and latency) to examine whether this is a better measure of sleep in predicting internalizing and externalizing symptoms.

PSYCH – 3 MODELING CORTICAL ACTIVITY FOR PERCEPTUAL GROUPING FORMATION

Anosha Arshad (U) and Dr. Daniel Kurylo, Brooklyn College

Perceptual grouping allows individual components of an image to be perceptually connected. The neural process by which grouping occurs, and it's timescale are not understood. To explore neural circuitry that mediates grouping, three hypothetical models were tested by comparing to existing data. Initially, stimulus components activate a set of neurons in the cortex (point image). As grouping progresses, point images become associated, following a neural process described by each model. Model 1 rapidly groups when lateral connections become active as point images form. Model 2 delays grouping as neural activity becomes coherent. Model 3 delays as connections project to higher cortical areas for convergence after association. Hypotheses included; (1) development across time is based on stimuli characteristics and duration of the presentation of stimuli; (2) processes must continue in activity after a brief afferent signal has been removed, leaving limited information for additional processing. Results yielded; (1) Grouping is complete at stimulus duration of 60 ms. Based on model 1, grouping is non-progressive, facilitated by lateral connections. (2) Supported by model 2, point images are associated before 42 ms, but the process is incomplete until their oscillations are coordinated, after 42 ms. (3) Grouping is a progressive process; it proceeds to be 80% complete at a 50 ms afferent signal. Confirming model 3, point images become associated, but access higher areas to converge. So, each model is contributive to neural processes underlying grouping. Therefore, grouping is mediated through coherence of neuronal activity as well as lateral connection strength, which then leads to convergence of point images.

PSYCH – 4 FROM ONE STUDENT TO ANOTHER: ETHICS TRAINING SEMINARS IMPACT STUDENTS' BELIEF THAT THEY CAN HELP THEIR PEERS NAVIGATE ETHICAL DILEMMAS

Bracha E. Smith (U), Faigy Mandelbaum, Jennifer E. Drake and Dr. Laura Rabin, Brooklyn College

Undergraduate-level college programs rarely offer formal ethics training courses. Students may therefore feel uncomfortable and be ill-equipped to navigate and address ethical issues effectively. This gap in students' training may result in undesirable support-seeking behaviors for ethical dilemmas from acquaintances who are unfamiliar with research protocols rather than from competent mentors. This study provided 9 cohorts (n=97) of NSF-funded Research Experience for Undergraduates (REU) students with research-focused ethics didactics and assessed students' changing ethics-related perceptions. Demographically diverse participants included: 45.5% Caucasian/White, 19.6% Asian/Pacific Islander, 19.6% African American/Black, 14.4% Hispanic/Latino, and 1% Other, ages 20 to 45 (M=25.1, SD=5.8), of which 75.3% were female. The ethics training included CITI trainings and 10 ethics modules. Post-training, a majority of students shared that they would be comfortable advising a friend on how to respond to ethical dilemmas in research settings; Agree (60.9%), Somewhat agree (18.4%), Neither agree nor disagree (14.9%), Somewhat disagree (1.1%), Disagree (2.3%). Additionally, a paired samples t-test highlights students' increased perceptions on the importance of confidentiality in their research practice, $t(86) = 2.99$, $p=.004$; and the importance of justice in their research practice, $t(85) = 4.34$, $p<.001$. Results demonstrate the impact that ethics training has on students' perceived ethical abilities and research-related ethical priorities. Students' improved ethics perceptions may enable them to become more confident contributors to the research community. References: (Cordingley et al., 2007); (Silverman et al., 2013).

PSYCH – 5 ANTICIPATORY FEAR AND PSYCHOPATHIC TRAITS IN ADOLESCENTS

Catherine Chan (G) CUNY Graduate Center, Yong Lin Huang and Dr. Yu Gao, Brooklyn College

Psychopathy is characterized by impulsive antisocial behavior, interpersonal and affective deficits such as lack of guilt, empathy, and remorse. One affective deficit psychopathic individuals may have is anticipatory fear. In a fearful situation, individuals generally learn that fear and associate it with the situation so they know to avoid it in the future. The ability to anticipate fear prevents individuals from committing wrongdoings due to the negative consequences that arise from it. However, psychopathic individuals lack this fear for anticipation of punishment and threat. As a result, they may not care about the negative consequences of their behavior. In our study, we examined if adolescents with psychopathic traits showed deficits in anticipatory fear. Heart rate responses during a countdown task were recorded in ninety-two adolescents (Mean age = 14.2, 57% male) from the community. During the task, participants viewed a countdown of numbers from 12 to 0 on a computer screen and a burst of loud noise was delivered when the countdown reached zero. Their psychopathic traits were assessed via parents'report. Boys with high psychopathic traits were found to have a lower heart rate deceleration, and girls with high callous-unemotional traits (the affective dimension of psychopathic traits) were found to have a higher heart rate acceleration. These findings provide further evidence for gender differences in the etiology of psychopathy.

Keywords: psychopathy, countdown, heart rate, psychophysiological, children

PSYCH – 6 DOES EARLY SCHOOL EXPOSURE PREDICT CHILDREN'S USE OF ETHNIC LABELING AND RACIAL IDENTIFICATION?

Crystal Gilbert (U) and Dr. Yana Kuchirko, Brooklyn College

Children develop an understanding of ethnicity & race early in life, so much so in fact, that adults unnecessarily delay conversations because they underestimate children's processing of it (Sullivan, 2021). Prior research primarily focuses on older children and adolescents, showing how youth begin to understand and integrate ethnicity/race in their own identity (French, et al., 2006). What is missing is an examination of how young children label their own ethnic/racial identity, and whether early exposure to school settings predicts children's ability to label themselves in ethnic/racial terms. The current study poses two research questions: 1) How do young children view themselves racially?; Does this vary by child's ethnicity?; And 2) Does age of entry into preschool predict whether children will be more likely to label themselves by ethnicity/race?

Mexican, Dominican, and African American reported the age at which children entered center-based care and the children were asked "What is your ethnic background?" Children's responses were recorded verbatim and analyzed for types of labels (ethnic/racial, geographical markers i.e. state or country, language).

Results showed that 53% of children used socially accepted labels for ethnicity/race (e.g., Black). Chi-square test of significance showed a significant difference by ethnicity: African American children were less likely to use the socially accepted label for ethnicity and Mexican and Dominican children. Finally, analyses did not reveal significant differences in labeling by age of school entry. Findings are discussed in light of contexts that could shape children's ethnic/racial identification.

PSYCH – 7 THE PRESENCE OF DRUZE-ARABS IN THE ISRAELI DEFENCE FORCE: PROMOTING COLLABORATION AND RACIAL HARMONY ACROSS RACIAL-ETHNIC GROUPS

Faigy Mandelbaum (U), Brooklyn College; Mike Mayerheim, Director Lone Soldier Center, Haifa and Tel Aviv; Oren Hason, Previous Director, Lone Soldier Center, Jerusalem and Dr. Laura Rabin, Brooklyn College

American minority military personnel struggle with being on the receiving end of negative religious-based biases, racism, and mistreatment. These biases expressed by military peers against religious and ethnic beliefs cause shame and traumatic stress in minority and religious soldiers, leading many soldiers such as Muslim soldiers to hide their religious ideologies. These religious and cultural traumas exacerbate war trauma, turning the U.S. minority military populations into a high-risk target for PTSD. This study aimed to see if biases experienced by American Muslim-comrade relationships would present between Israeli and Druze-Arabs soldiers in the Israeli military (Druze are Arabic citizens of Israel who serve in the Israeli Defense Force). A convenience sample of n=41 active soldiers were recruited across Israel and asked: How do Israeli soldiers treat non-Jews such as the Druze who have joined the Israeli army? and Why do they treat them this way? Responses were coded using Conventional Content Analysis and broken into themes (i.e., shared goals, unity), categories (i.e. brotherhood), and sub-categories (i.e., components of brotherhood identified in individual responses). Results founds that 39 soldiers (95.1%) expressed positive Jews-Druze relationships. There were 0 negative responses and 0 neutral responses. No negative biases were expressed between Israeli and Druze soldiers. Israeli soldiers enthusiastically stated: “treat them like brothers”, “They are some of my best friends”, “We love them”, “They are part of Israeli society” and “We honor them”. The strengths of Israeli-Druze dynamics should be used as a model to counter religious, racial, and ethnic biases in the U.S. military. References: (Hosein et al., 2019); (Shorer et al., 2018).

PSYCH – 8 DISCLOSURE OF MEANINGFUL RELIGIOUS EXPERIENCES IN INTERPERSONAL RELATIONSHIPS

Jaclyn K. Doherty (G), The Graduate Center, Cheryl L. Carmichael, Brooklyn College

Self-disclosure in interpersonal relationships is associated with greater well-being and relationship quality (Reis & Shaver, 1988), and the present study explores whether this effect extends to disclosing religious experiences. In the present empirical pre-registered study, data collection was completed on the Prolific platform (N=316) to explore to whom people disclose their religious experiences and whether these patterns were associated with greater well-being and relationship satisfaction. Religious participants completed an online survey, reporting their most recent meaningful religious experience and their disclosure of this experience to others, including romantic partners. Romantically partnered people reported patterns of religious experience disclosure and romantic relationship satisfaction. Well-being (life satisfaction, positive, and negative affect) and demographics were also assessed. People who disclosed these experiences had greater positive affect, and the more people they disclosed to, the higher their positive affect. However, disclosure was not associated with life satisfaction or negative affect. Furthermore, religious similarity between romantic partners moderated the relationship between disclosing religious experiences to one’s romantic partner and relationship satisfaction, such that people who were more religiously different than their partners showed greater increases in relationship satisfaction when they disclosed their experiences than those who were more religiously similar. This study confirms that some benefits of self-disclosure extend to religious experiences among religious people, and it provides preliminary evidence for the role of religious similarity in romantic relationship communication patterns and satisfaction.

PSYCH – 9 NURTURING: EXAMINING THE INTERPLAY OF COMPASSION AND TRAUMA AMONG DIVERSE UNDERGRADUATE STUDENTS

James M. Gordon (U) and Dr. Erika Y. Niwa, Brooklyn College

Compassion - a sensitivity to suffering in self and others with a commitment to try to alleviate and prevent it (Gilbert, 2017) - has been shown to have myriad benefits including increased life satisfaction and better stress resistance (Allen & Leary, 2010; Cosley et al., 2010). At the same time, research has shown that exposure to threat can negatively impact the development of compassion, while soothing systems (e.g. parental warmth, social safeness) can work to counterbalance this threat (Gilbert, 2005). Trauma, in particular, may play an important role in shaping compassion. Yet, limited research has examined how trauma may influence the development of compassion. Using an ethnically diverse sample of Brooklyn College students (N=250), this study assesses the relationship between early life trauma and later capacity for compassion, as well as how that relationship is influenced by parental warmth and social safeness. Surprisingly, preliminary results indicate that childhood trauma is not significantly correlated with capacity for compassion later in life ($r=-0.05$, $p>.05$). Thus, future analyses will examine whether the hypothesis that perceived parental warmth and social safeness may act as a protective factor in the relationship between trauma and compassion affected this outcome. This study has the potential to shed light on the impact of childhood trauma on compassion, as well as the implications for interventions and practice.

PSYCH – 10 REJECTION OF CAPITALISM DISTINGUISHES LEFTISTS FROM LIBERAL IDEOLOGY IN THE UNITED STATES

Levi Satter (U), Alix Alto, Kyle Anderson, Grace Flores-Robles, Jordan Wylie, Ana Gantman

The Political Left in the United States are an ideologically heterogenous group, yet little research has been done to quantify to what extent. In the current study Leftists and Liberals were asked to rate their endorsement of policy, moral values, and ideological beliefs as well as briefly describe Leftists and Liberals in free responses. The data were collected during the week leading up to the 2020 Presidential election from self-identified left-leaning people. The participants were recruited using Prolific and online snowball sampling ending in 451 left-leaning participants. The free response data was analyzed using qualitative analysis. We hypothesized and found: 1. Leftists have higher support for each individual progressive policy item compared to Liberals; 2. Leftists are more likely to reject incremental change, compared to Liberals; 3. Liberals will have greater endorsement of free market principles compared to Leftists. Overall, Leftists emphasize a need for systemic change, specifically through a new economic system, which requires a structural rethinking of the status quo. Alternatively, Liberals believe incremental change through the existing capitalist system is the best method to realize progressive policies. In short, while both Liberals and Leftists desire progressive reform, Leftists seek drastic economic change, while Liberals prefer gradual change that is more preserving of the economic status quo.

PSYCH – 11 UNDERSTANDING CHILD'S EMPATHY: THE ROLE OF PARENT'S EMPATHY AND CHILD'S PSYCHOPHYSIOLOGICAL RESPONSES

Mahfuza Sabiha (U), Liat Kofler and Dr. Yu Gao, Brooklyn College

Empathy deficits are associated with externalizing problems and issues with interpersonal functioning in children. There is a need to understand what contributes to child empathy to implement early intervention. As a key environmental influence, parents may play a role in being a model for their child's

empathetic behavior. In addition, the effects of parents may be moderated by the child's psychophysiological characteristics. Specifically, the biological sensitivity to context theory proposes that children differ in their susceptibility to environmental influence, depending on their psychobiological sensitivity to stress. The current study aimed to examine to what extent parents' empathy contributes to children's empathy and behavioral problems, and if this association is moderated by children's psychophysiological sensitivity. In addition, we would expand previous literature by exploring these associations in the three domains of empathy: cognitive, affective, and somatic empathy, using data from the ongoing "Healthy Childhood Study''. Parents and children reported their empathy, and children's heart rate and respiratory sinus arrhythmia (RSA) were recorded. The results of a linear regression showed that parents' empathy predicted children's empathy and behavioral problems, but this association was only significant in girls and not in boys. The results of a moderation analysis showed that heart rate or RSA did not moderate the relationship between parents' empathy and children's outcomes. The implications of the findings will be discussed.

PSYCH – 12 EXPLORING COMMUNICATION ACCOMMODATION IN TEXT MESSAGE CONVERSATIONS

Manijaah Faria (U), Petra Bedeau, Maureen Coyle, Cheryl Carmichael, Brooklyn College

Pairs of unacquainted participants were invited to engage in a text message conversation and form impressions of each other. Dyads (N=97) interacted over iMessage for 20 minutes, taking turns answering questions from a closeness induction task (Aron et al., 1997). According to Communication Accommodation Theory (Giles, 1991), individuals are prone to modifying, or accommodating, their communication style to match their interaction partners. Using guidelines from Miles, Dunbar, and Giles (2018) on coding communication accommodation in text messages, we investigated nonverbal emotional displays (use of emojis, emoticons, GIFs, etc.) within the text message conversations. Among the 194 individual participants, 65.5% (N= 127) of participants displayed positive nonverbal emotional displays and 91.3% (N = 116) of their partners responded with positive emotional expression. Similarly, 38.7% (N = 78) of participants displayed negative nonverbal emotional displays and 75.6% (N = 59) of their partners responded with negative emotional expression. It appears that individuals do engage in communication accommodation over text messages in similar ways to face-to-face conversations.

PSYCH – 13 A QUANTITATIVE METHOD FOR SPECIES-LEVEL CLASSIFICATION OF WILD PARAKEET VOCALIZATION

Meghan Stern (U) and Dr. Frank W. Grasso, Brooklyn College

Parakeets are abundant throughout the world and are lifelong vocal learners, adding to their communication repertoire based on their experiences. Each species of parakeet is known for their multiple distinct vocalizations. In this study we quantitatively analyzed field recordings of five species of parakeets (monk parakeets of Brooklyn, alexandrine parakeets from Asia, and blue-crowned parakeets, yellow chevroned parakeets, and white winged parakeets from South America). The Alexandrine parakeet was selected to be the out group, that is the most phylogenetically distant species. We hypothesized that the monk parakeet would have greater call similarities with species from South America than the Alexandrine parakeet. We studied recordings from our Brooklyn population with audio recordings of the other species collected by the Cornell Lab of Ornithology. We analyzed 470, 5-15 second samples from these recordings and computed cross correlations and extracted a maximum similarity for each sample pair using Raven Pro software. We computed Z-scores between the maximum similarity values for each species. We found that the monk, white-winged, and yellow chevroned parakeets were significantly different ($z(112)\ p<0.05$, $z(55)=-3.418\ p<0.05$, $z(82)=-3.096\ p<0.05$) from the

alexandrine parakeet. Ultimately, we were able to conclude that most South American parakeets have a closer vocal similarity than the Asian parakeet we analyzed. We tentatively conclude that our new method of analysis describes at least part of the functional call structure of these parakeets.

PSYCH – 14 EVIDENCE FOR CHEMOSENSORY ENCODING DIFFERENCES IN THE LEGS OF DIFFERENT CRUSTACEAN SPECIES: A META ANALYSIS

Melanie Camacho (U) and Dr. Frank W. Grasso

In the chemical senses, the role of brain processing and peripheral sensing in taste perception is a central question. We hypothesized that different chemosensory systems would be present in marine and aquatic crustaceans. Contact chemoreceptors on the legs of crustaceans have been well studied and offer an opportunity for cross-species comparison. Current scientific literature measures the direct response to chemical stimulants amongst the different species, but there hasnâ€™t been a systematic comparison across species. The purpose of this study was to statistically estimate the degree of difference of chemosensory systems across a select group of crustaceans. We performed a meta-analysis on the published neurophysiological literature on crustacean leg chemoreception. Of 21 papers, 7 contained suitable data. We computed the relative entropy [0,1] measures from the data contained in these papers as a sense of broadness in chemosensory tuning. 7 papers that met our criterion allowed us to quantitatively compare the chemosensory tuning of Homarus americanus, Libinia emarginata, Carcinus maenas, Uca minax, Procambarus clarkii, and Orconectes limosus. We combined measures of tuning across species and calculated an estimated relative entropy of 0.2046 and a meta-analytic CI [0.0016,0.2690]($p<0.05$). This is consistent with narrow tuning across crustaceans. Contrasting each species against our estimate, we found 3 different groupings of crustacean chemosensory tuning: freshwater species, shallow water and terrestrial marine species, and deep-water marine species. These groupings appear to map into their ecological niche. Our identification of species difference in tuning agrees with theories of species differences in the organization of brain processing of chemical stimuli.

PSYCH – 15 A DIFFERENCE IN BEHAVIOR FOLLOWING ENTRAINMENT SUGGESTS DIFFERENT ENTRAINMENT MECHANISMS IN TWO FIDDLER CRAB SPECIES

Richard Troise (G) and Dr. Frank W. Grasso, Brooklyn College

Crustacean chronobiology is interesting because many species follow tidal as well as solar cycles. Entrainment is the synchronization of biological activity with environmental cues such as sunlight and tides. Shore crabs such as Fiddler crabs are ideal to study these interactions. However, literature on Fiddler crab entrainment properties is sparse and has focused on field observations. We report here on a controlled laboratory study comparing the entrainment characteristics of two crustacean species, estimating the exact phase relationships between two species. To our knowledge, this is the first study of circadian phase relationships under controlled laboratory conditions in these species. We studied entrainment in 9 Uca minax and 9 Uca pugilator crabs by exposing them to an artificial 24-hour light-dark cycle over three months, divided among five consecutive periods for a total of 42 observations (allowing for subject mortality). We analyzed for each species the degree of entrainment in daily activity to lights on measured as average phase and reliability ($p < 0.05$). We found a significant difference in the reliability between the two species: $t(40) = 2.35$, $p < 0.05$. In addition, we found a non-significant tendency for the average entrainment phase of U. pugilator to be earlier than U. minax: $t(40) = -1.29$, S.D.pooled = 0.5, n.s. These results can be interpreted as U. minax entrained to our light cue more reliably than U. pugilator and a possibility that our species entrain at different times. A significant difference infers the possibility of unique entrainment adaptations among species. We tentatively

conclude that two distinct entrainment mechanisms are present in these species: U. pugilator anticipates dawn and U. minax synchronizes its entrainment with dawn.

PSYCH – 16 EXAMINING THE ROLE OF FAMILY ENVIRONMENT IN NON-CLINICAL SCHIZOTYPY

Samuelle A.S. Delcy (U) MARC Scholar, Brooklyn College; Victoria Martin, Brooklyn College, The Graduate Center CUNY, Queens College; Kelly Yu, Brooklyn College and Dr. Deborah J. Walder, Brooklyn College, The Graduate Center CUNY, Queens College

Expressed Emotion (EE) is a predictor of psychotic relapse among patients with schizophrenia (Hooley et al., 2017) and has been associated with symptoms in adolescents at risk for psychosis (Oâ€™Brien et al., 2005). Recent research, though limited, has shown an association of EE with schizotypy in non-clinical samples (Premkumar et al., 2019, 2020). EE examines an individualâ€™s family environment such as criticism, hostility, and emotional overinvolvement expressed by relatives. Research has found that patient interpretation of comments made by relatives, and associations of EE with relapse rate and symptom exacerbation, may vary by individual ethnic and/or racial background (Gurak & Weisman de Mami, 2017; LÃ³pez et al., 1999; Tompson et al.,1995). This highlights the potential importance of racial and/or ethnic group differences when examining the role of EE in psychosis. The present study (in progress) aimed to extend the non-clinical literature by examining the relationship of family environment (using the Family Attitude Scale (FAS) and Perceived Criticism Scale (PCS)) with schizotypy (as measured by the Schizotypal Personality Questionnaire) in a sample of 1656 college students. Also, the potential role of race and ethnicity was examined. As hypothesized, preliminary findings indicated that greater total schizotypal symptoms were significantly correlated with higher scores on the FAS ($r = 0.342$, $p < 0.01$) and PCS ($r = 0.250$, $p < 0.01$). Findings held after statistically adjusting for race and ethnicity. Further analyses will be conducted to more directly assess potential racial and ethnic group differences. Preliminary results further our understanding of how EE is related to schizotypy, with implications for understanding psychosis risk from a dimensional perspective.

PSYCH – 17 HOW ALZHEIMER'S DISEASE AFFECTS CAREGIVERS AND FAMILIES IN THE SYRIAN JEWISH ORTHODOX COMMUNITY

Shella Franco (U), Dr**.** Laura Rabin, KC Johnson, and Esther Dee, Brooklyn College

This thesis explores Alzheimer’s Disease-with a goal toward understanding how the disorder affects families and caregivers both apart of and outside of the Syrian Jewish Orthodox Community. Alzheimer’s disease is a progressive physical disease that affects the brain and is characterized by symptoms that include memory loss, difficulties with thinking and communication. Through a combination of interviews and surveys, qualitative and quantitative data on caregiver burden and benefit was collected. Five caregivers from the Syrian Jewish Orthodox community participated in either oral or written interviews, while one hundred and twenty-three caregivers from different nationalities and backgrounds completed an ordinally scaled web-linked questionnaire that asked caregivers to rate their feelings towards statements of caregiver burden and benefit. Interviewees spontaneously discussed eight topics related to caregiver burden and benefits that include: impact on relationship, financial burden and connection to resources, positive aspects of caregiving, additional advice, overall burden, loss of identity, description of early and late symptoms, and religion. The respondents of the questionnaire indicated higher scores on the scale than lower ones when asked about negative aspects of caregiving. Both caregivers apart of and outside the Jewish Syrian Orthodox Community conveyed similar negative and positive aspects of caring for an individual with Alzheimer’s Disease. Having a connection to any religious faith seems to relieve burden for caregivers by providing strength, support and guidance. The research

brings to light the importance of providing accessible information, resources, and psychological support to caregivers of individuals with Alzheimer's Disease.

PSYCH – 18 IT IS POSSIBLE TO IMPROVE ONE'S OWN RESEARCH ETHICS: A CLOSER LOOK AT STUDENTS' ETHICS PERCEPTIONS AFTER AN REU ETHICS TRAINING

Ariella Hershkovich (U), Faigy Mandelbaum, Jennifer Drake and Dr. Laura Rabin, Brooklyn College

Undergraduate students rarely receive in-depth ethics training yet are still expected to maintain all aspects of ethical competencies across their undergraduate and graduate research experiences. Even within NSF-funded student training opportunities, formal research ethics coursework is rarely required. This study provided 9 cohorts (n=97) of NSF-funded Research Experience for Undergraduates (REU) students with research-focused ethics didactics and assessed students' changing ethics perceptions of research protocols. Students were demographically diverse: Caucasian/White (45.4%), Asian/Pacific Islander (19.6%), African American/Black (19.6%), Hispanic/Latino (14.4%), and Other (1%), ages 20 to 45 (M=25.1, SD=5.8), 75.3% female, 24.7% male, 0% LGBT-Q or Other, and approximately 50% were first-generation college students. The ethics training included CITI trainings and 10 modules covering core ethical principles (i.e., beneficence, justice, nonmaleficence, accountability). A paired samples t-test found that post-training, students changed their perception on the importance of research protocols in their research practice, $t(86) = -2.77$, $p<.01$. Descriptive outcomes found that only 3 participants (7.1%) believed that your ethics reflect something about you that you cannot change. with 61.9% of participants stating they agree/strongly agree that no matter who you are or what you have done, you can change your ethics. REU outcomes demonstrate the positive impact that ethics training has on students' ethical perceptions and perceived locus of control in ethics domains. Future studies will assess real-world lab-based applications of these and other ethical issues. References: (NSF, 2020); (Mabrouk, 2016)

PSYCH – 19 SECONDARY CONTROL AND DEPRESSION IN ADULTHOOD: THE ROLE OF AGE AND GENDER

Daniel F. Mesa (U), Jacob Shane, Brooklyn College

Research has identified how the way in which people seek to control their own development (control strategies) can be a factor in the onset of adulthood depression. For example, low capacity to change one's external environment (primary control) is linked to higher levels of depression. Less is known about the potential role that controlling one's internal thoughts and emotions (secondary control) may have. Using data from the MIDUS study (n = 3577, Mage = 57, SD = 5.76) we examined how secondary control strategies are related to depression, and whether age and gender moderated the relationship. Results showed that higher self-protection predicted lower depression, whereas higher goal adjustment predicted higher depression. Age moderated the relationship between selective secondary control and depression such that higher levels of selective secondary control predicted lower levels of depression in young adulthood but not in midlife or older age. Age also moderated the relationship between goal disengagement and depression such that higher levels of goal disengagement were predictive of higher levels of depression in young adulthood, but not in midlife or older age. Gender was not a significant moderator for any of the relationships. Findings provide both a deeper understanding of the role that secondary control strategies have in regards to adulthood depression, and the moderating role that age and gender have. These findings could be used to inform therapy in the sense that specific age groups could receive differing therapy for depression. Those in young adulthood may benefit from therapy that

focuses on increasing selective secondary control and reducing goal disengagement while those in midlife and older age would not reap the same benefit from that type of therapy.

PSYCH – 20 EXPLORING THE EMPHASIS OF ART VIEWING AND ENGAGEMENT OF AESTHETIC PERCEPTIONS AND EXPERIENCES

Melissa Ceren (U), CUNY John Jay College of Criminal Justice, Jennifer Drake, CUNY Brooklyn College

During the COVID-19 pandemic, individuals were found to use the arts as a form of distraction and escape (Drake et al.,in preparation). Research has shown that drawing improves mood in adults when used as a form of distraction rather than expression (Drake & Winner, 2012). Do the benefits of engaging in the arts also extend to viewing art? This study investigated the aesthetic and mood experience of viewing art when participants were asked to focus on the visual properties of works vs. their emotional experience when viewing the works. Participants were 60 mTurk users who were randomly assigned to one of the three conditions: Visual Properties, Introspection, or a Control. Each condition viewed 8 paintings (4 positive and 4 negative). In the Visual Properties condition, participants were asked to identify the elements of each painting's line, shapes, colors, and light. In the Introspection condition, participants were asked to reflect on their own emotions when viewing each painting. In the Control condition, participants passively viewed each painting. All conditions rated how each painting "moved" them. After viewing the images, all conditions reported their mood improvement and use of emotional regulation strategies. We found that being moved was positively correlated with participants' experience of positive and negative emotions, suggesting that participants experienced mixed emotions while viewing paintings. Across conditions, there were no differences in being moved, positive affect, or negative affect. Additionally, participants were more likely to use the viewing experience as an approach emotion regulation strategy than a self-development strategy. Further studies should investigate art viewing under these specific conditions in a museum or laboratory settings.

PSYCH 21 - UNDERGRADUATE RESEARCH STUDENTS BELIEVE THAT ANYONE CAN BE A SCIENTIST REGARDLESS OF RACE AND GENDER

Rebecca Elberger (U), Brooklyn College/Touro College; Faigy Mandelbaum, Dr. Jennifer Drake and Dr. Laura Rabin, Brooklyn College

Stereotypes of scientists as male, Caucasian, mythical, and undesirable have deterred minority students and women from pursuing a science career1. Programs such as the NSF-funded Research Experience for Undergraduates (REU) were established to enable students to see for themselves that anyone can be a scientist. REU students participated in a semester-long laboratory research immersion and attended didactic seminars. Students' pre-post drawings of scientists were measured using the Draw-A-Scientist (DAST) task. The study aimed to determine whether students' drawings would depict a decrease in male representations, mythical figures, and other science stereotypes pre-post lab research training. The study also assessed whether students' depictions would reflect an increase in REU-informed experiences. Nineteen undergraduates (M=23.37, SD=3.24) across two REU cohorts (2019-2021) impacted by Covid-19 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. Students' pre-post drawings depicted a significant increase in REU-related experiences (i.e., poster session, laptop, science-identity themes), $t(16) = 3.77$, $p = .002$. 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. These data demonstrate that REU students are changing

their perceptions of who can be a scientist. This embrace of diverse science identities suggests that trends are changing for the better. (Chambers, 1983); (Miller, 2018).