Poster Presentations: 11:30am-12:20pm, Bruyette Reception Room

Poster 1

Authors: Quinn A. Bennet, Reuben Callan, & Emma J. Ste. Marie

Affiliation: Norwich University

Title: Synthesis and Evaluation of Sel-Sepharose Resin for Redox Proteomics

Abstract: This project is focused on designing and synthesizing a unique chemical tool that will allow for the detection of persulfide modifications in proteins. These modifications are challenging to detect due to their chemical reactivity and low biological abundance.

Persulfide modifications on proteins occur from exposure to hydrogen sulfide gas. Hydrogen sulfide gas is produced by human cells during normal cell function and some disease states trigger the production of this gas. Proteins can also undergo these modifications if exposed to hydrogen sulfide gas from their environment.

Herein, we designed and synthesized a resin that contains a unique diselenide moiety that can bind to protein thiols and thus, the persulfide modification. Our resin is unique since the removal of bound proteins can be accomplished by addition of ascorbate (Vitamin C), which facilitates a chemoselective reduction of selenium-sulfur bonds. Use of Vitamin C as our reducing agent will allow for the retention of the persulfide modification, which can subsequently be detected by mass spectrometry.

Our resin has broad applications in the field of Proteomics and in the diagnosis of diseases that are known to generate hydrogen sulfide gas.

Poster 2

Authors: Christina Capozzi & Alicia T. Lamere

Affiliation: Bryant University

Title: STEM: Take-Aways from a Semester-Long Study on the Impact University Experiences Have on Undergraduate Student Outcomes

Abstract: Despite the well documented projections for the growth of careers in STEM, studies continue to find that interest in pursuing careers in STEM is declining, particularly for underrepresented demographics. Low income and minority students (African-American, Latino and Native American students) and females, face excessive barriers of entry into STEM careers. As part of an on-going effort to better support these students in their pursuit of STEM, this study sought to better understand their specific experiences at Bryant University in a post-COVID world.

This presentation will discuss the results of a study that tracked the experiences 10 low income and underrepresented minority students over the course of the Fall 2022 semester.

Data collection was performed using the ethnography platform Indeemo, where participants engaged with an anonymous journal entry reporting system. In the selection of these participants, factors such as major, gender, race and household income were considered to ensure a diverse cross section of student experiences. Journal entries for this study consisted of answering prompts on a daily, weekly or bi-weekly basis, addressing a variety of topics regarding their day-to-day lives/routines at Bryant University. Topics examined include the impact of interacting with faculty, the balance between extracurricular and personal responsibilities and course workloads, as well as the effect of the campus's resources, policies, and culture. Trends from across these topics will be discussed to empower other institutions to better support underrepresented students in the pursuit of STEM careers.

Poster 3

Author: Rebecca Giarnese

Affiliation: Northwestern Connecticut Community College

Title: Forestry Technician at Great Mountain Forest

Abstract: I am currently enrolled at NCCC in Winsted, CT in the Natural Resources program working toward an associate's degree and participating in a summer/fall/spring internship for Forestry Technician at Great Mountain Forest in Canaan, CT. The Natural Resources program provides a broad base of programs including biology, ecology and chemistry and introduces different career paths in forestry, limnology and earth sciences. During the internship program from May to August, we assisted in maintaining the needs of the organization and the forest while receiving an education in forestry and wildlife sciences. In that time, instruction was given to conduct trail maintenance along 3.7 miles of trails which included removal of fallen trees, pruning overgrown woody shrubs, trimming herbaceous vegetation, and clearing sight lines for the forest maintenance vehicles to move through the forest safely. Guest educators were invited over the summer to educate the interns on a broad spectrum of topics including forest ecology, forest health, silviculture, land use history, natural communities, local pests, and dendrology. This included participation in a controlled release of lady beetles as a biological control to combat invasive hemlock wooly adelgids that are attacking hemlock pines throughout Great Mountain Forest. Interns were instructed in the process of and assisted in the tick population research with a CAES entomologist. Also, interns played a major role in children's programming by helping 4-H groups in birdhouse construction for bird species that are in decline, and conducted a nature themed scavenger hunt for children aged 5-7. During the fall/winter program I worked in the sugar maple stands counting how many trees we have and recording diameters and amount of woody debris in the stands to provide information to the Bird Friendly Maple Project. Removal of bittersweet and other invasives were carried out through fall. Materials such as white pine, arbor vitae, oriental spruce, white spruce, and winterberries were gathered for the Great Mountain Forest wreath making workshop. I provided instruction on how to make a holiday wreath and explained different aspects of the tree species that were provided for the event.

Participating in the intern program for Forestry Technician, I learned how conserved land is managed and I had the opportunity to apply concepts I acquired in the Natural Resources program at NCCC. This increased my knowledge regarding careers in forestry and the experience helped me make decisions on additional education and future employment.

Poster 4

Authors: Sokhna Amy Ndoye, Joseph Leszczynski, Acadia Joniec, & Steven Weicksel

Affiliation: Bryant University

Title: Chromatin Organization and Gene Regulation

Abstract: Chromatin (a complex of DNA and protein) has a 3D organization structure inside the nucleus and is essential for gene regulation. Structurally each chromosome contains discrete domains termed Topologically Associating Domains (TADs). TADs are chromatin loops that are either loosely coiled (open) correlating with active gene expression or tightly coiled (closed) correlating with inactive genes. This organization within a TAD is essential for normal gene expression within a cell with changes in the chromatin structure observed in disease states such as cancer. The goal of our research is to better understand the mechanism that regulates chromatin organization. By understanding how loops are formed and maintained within TADs, we could be provided with more insight into how chromatin regulates genes. As a model for our research, we used Zebrafish hox genes which are closely related to human HOX genes and are controlled by chromatin organization. Interestingly, HOX genes have recently been found in various cancers, though the role of HOX in carcinogenesis is unclear. Zebrafish possess seven HOX clusters, one of these the HOX ca cluster, is responsible for mutants related to the extension of lateral bones in some types of Zebrafish. Using circular chromosome conformation capture (4C) we collected 4C libraries of the chromatin connections made by hox genes. These libraries will then be sequenced using Illumina sequencing to identify genomic connections.

Poster 5

Authors: James Petkin, Klejdis Beshi, Steven Tetrault, & Josh Calderon

Affiliation: Naugatuck Valley Community College

Title: Naugatuck Valley Community College Quadcopter Challenge

Abstract: The Naugatuck Valley Community College (NVCC) team recently participated in the annual Quadcopter Challenge organized by the Connecticut Space Grant Consortium. The team was made up of four students who were tasked with designing and building a quadcopter that could navigate through an obstacle course. The event aims to promote STEM education among high school and college students while offering scholarships and prizes to top-performing teams.

The NVCC team approached the challenge with a focus on innovation and teamwork. They chose to add components to their quadcopter, allowing for easy upgrades. They also worked closely with each other to optimize the quadcopter's flight capabilities, ensuring it was agile and responsive to their commands.

During the competition, the NVCC team demonstrated excellent teamwork and communication, making quick decisions to adapt to changing conditions on the course. Their quadcopter was also one of the fastest and most accurate, allowing them to score high points and achieve a solid overall performance.

In the end, the NVCC team was awarded first place in the competition, an impressive accomplishment considering the high level of competition. The team's success was a testament to their dedication, creativity, technical skills, and ability to work together effectively.

Overall, the Community College Quadcopter Challenge provided an excellent opportunity for students to engage in hands-on STEM education and develop valuable skills that will serve them well in their future careers. The NVCC team's success is a testament to the effectiveness of this approach and a source of inspiration for prospective participants in the competition.

Poster 6

Author: Julia Piascik

Affiliation: Sacred Heart University

Title: Understanding the Mechanics and Flight Controls of Drones: Challenges and Opportunities

Abstract: The project aims to understand the mechanics and flight controls of drones. Implementation methods included building a Raspberry Pi drone and setting up NewBeeDrones. Understanding the design and hardware (GPS, motors, ESCs, etc.) that go into building a successful drone is important. Although built, the Raspberry Pi drone has had problems with the power supply and connecting to Mission Planner to code and calibrate. It is expected to solve these issues to be able to fly the drone outside. While troubleshooting the issues faced with the Raspberry Pi drone, a new direction was set to develop a workflow for microdrones. Current outcomes include successfully binding several drones to their radio controllers and FatShark goggles, setting up PreArm, and changing VTX bands and channels. A drone gate was built with an Arduino Uno, ultrasonic sensors, and an LCD display to further this project. It can start a stopwatch when a drone goes past the sensors and stop when the drone is detected again, thus recording the race lap time. It can also reset the stopwatch to start a new lap time. The expectation is to build more stopwatches for a drone race with the NewBeeDrones. One issue to solve with these gates is to edit the code or build for the ultrasonic sensor to be

more sensitive to data and have more accurate time recordings. Overall, this abstract seeks to provide a comprehensive understanding of drones.

Poster 7

Author: Jonathan Shields

Affiliation: York College

Title: 6g and the Next Evolution of Broad Band Networks

Abstract: In the age of mass internet interoperability, the increasing amount of data transfer through wireless connectivity has pushed the capacity of mobile networks by factors every 10 years. After the advent of 2G then 3G and then 4G, the rate in which files can be uploaded and downloaded between hosts has increased exponentially. Currently 5G is the new cutting edge mobile network which has 10 times the bandwidth of its predecessor, however with the rise of revolutionary technological innovations such as artificial intelligence, artificial and virtual reality, blockchain, autonomous vehicles, and the internet of things, the need for a larger mobile network is required. With the development of a future 6G frequency, it will potentially allow hosts to use networks that have the capacity to maintain data rates spanning terahertz, while reducing computation strain on respected devices. In this poster presentation we would like to inform individuals about 6G technology through basic technicalities and comparisons, as well as describe challenges and future research plans to advance 6G technology.

Poster 8

Authors: Haoyu Wang, Ryan Sharp, Jonathan Escobar, Anson Melick, Austin Jakacky, & Joe Smith

Affiliation: Naugatuck Valley Community College

Title: In-Space Robotic Servicing, Assembly, and Manufacturing through Robotic Teleoperation and Just-In-Time Data Analytics and Visualization Based on Virtual Reality(VR)/Augmented Reality(AR), Cloud Computing, Internet of Things(IOT), and Deep Learning

Abstract: The goal of this project is to use virtual reality (VR) and motion capture technology to create the most intuitive control system possible for remotely operated robotics. A system like this would be easier for users to learn, saving companies time and money, while also providing the ease of use and accuracy that users need. Our team developed a custom Unity program which interfaces with the user's VR headset and controllers of choice in order to collect hand motion data. Users can choose between traditional VR controllers or the Manus Prime II VR gloves for a more intuitive feel. The program then takes that raw data, scales it based on the size of the corresponding robot's bounding box, and filters that data down to the most relevant points while staying true to the user's intended motion. The data is then outputted to RobotStudio, where a simulated or physical robotic arm can mimic the user's motion based on the data received.

Oral Presentations:

McDonough Hall, Room LL7A

1:30-1:45pm

Authors: Victoria Gargan & Derek Dube

Affiliation: University of Saint Joseph

Title: Human Papillomavirus and Cancer: Understanding Differences in How High-Risk HPVs Infect Cervical Cells and Oropharyngeal Cells

Abstract: Human papillomavirus (HPV) has historic and developing links to various types of cancers, including cervical and, more recently, oropharyngeal. The virus is so common that almost all sexually active individuals will encounter in their lifetime, though not all will develop cancer (CDC). Data collected by the CDC from 2015 to 2019 estimates that about 47,199 new HPV-linked cancers occur in the United States every year (CDC). While much is known about how HPV infects cervical cells, less is known about how it infects oropharyngeal cells, and this project aims to bridge that gap in understanding. Five virus-like particle (VLP) systems for high cancer risk viruses (HPV16 and HPV18) were generated and utilized to infect control 293-T, cervical, and oropharyngeal cell lines. Inhibition assays utilizing heparin, nocodazole, cytochalasin D, and NH4Cl were performed to examine aspects of attachment and entry across the cell types. By better understanding HPV's entry into oropharyngeal cells, this may help improve measures to prevent or treat these infections which can lead to cancers later on.

1:50-2:05pm

Author: Caitlyn DiAngelis & Kirsten Martin

Affiliation: University of Saint Joseph

Title: Eating With Their Eyes: Exploring Color Preference in Vanessa cardui

Abstract: Research conducted during Fall 2021 found there was a large presence of insects such as crickets, grasshoppers, bees, and flies within the pollinator garden at the University of Saint Joseph. However, there were no butterflies seen interacting with the pollinator garden at the times of observation. This data is of critical concern since butterflies have various important roles in maintaining a healthy ecosystem. Butterflies are involved in the pollination of flowers individuals enjoy. In fact, it is estimated that pollination is essential in the reproduction of approximately 90% of plants. To combat the lack of butterfly presence seen within the pollinator garden, laboratory observations are being conducted to examine potential color preference amongst Vanessa cardui, a butterfly species native to Connecticut. The aim of this study is to collect data that will aid in attracting more butterflies to the University of Saint Joseph so that a healthy ecosystem can continue to be maintained on campus. The color preference of Vanessa cardui is tested using foam circles in a plethora of colors that mimic the shape of flowers seen within their natural habitat. The control colors used within this experiment are dark blue

and green. Expanding upon research conducted in Fall 2022, two colors are being tested against the controls at the same time during each observation. Predicted results include the preference of purple and pink colors due to their prevalence amongst attractive plants. Based on collected data, plants of preferred colors will be added to the pollinator garden on campus.

2:10-2:25pm

Author: Dexter Saunders Jr.

Affiliation: University of Saint Joseph

Title: Assessment of Antibiotic Longevity in Farm Animals

Abstract: Antibiotics are commonly used to treat bacterial infections; however, the development of antimicrobial resistance (AMR) has become a major global health threat. The use of antibiotics in livestock production has been a contributing factor to the growth of AMR, with studies suggesting that sub-inhibitory antibiotic concentrations and virulence factors can play a role. Infections of E. coli, Staphlococcus sp., and Salmonella sp. in farm animals highlight the different mechanisms by which bacteria can become resistant to antibiotics. Published data was analyzed to determine stages at which resistance genes emerge across various livestock populations. It was determined that antibiotic efficacy can decline in the presence of resistance gene expression and transfer. Currently, antibiotic stewardship programs have been established to ensure appropriate use of antibiotics, and alternative therapies such as phage therapy are being developed. However, the effectiveness of antibiotics continues to decline, and it is essential to find new ways to combat AMR.

2:30-2:45pm

Authors: Koosha Fatemi & Derek Dube

Affiliation: University of Saint Joseph

Title: Bacterial Identification in the Scantic River and Examining Potential Contamination from Fertilizer Runoff

Abstract: Waterborne pathogens cause approximately 7.2 million illnesses in the United States every year, leading to upwards of $3 billion of healthcare costs and over 6,000 deaths (CDC). While these numbers include various types of pathogens, bacterial pathogens are some of the most common and impactful. The Scantic River is a tributary river that flows into the Connecticut River, heavily used for recreational and agricultural activities. In recent years, E. coli (an indicator bacteria) levels have been monitored in the Scantic River, and found to fluctuate based on season and location, occasionally to levels unsafe for human use. To further understand the bacterial community of the Scantic River and its possible impacts on human and environmental health, this study examines water samples collected monthly during 2022-23, as well as local compost and fertilizer samples as potential sources of the river bacteria. Quantitation of the bacterial community

using serial dilution and plate counting methods has shown that variation occurs in the river water from month-to-month and across locations, and that the fertilizer and compost samples have significantly higher bacterial numbers present. The species present in these samples is currently being analyzed, for individual isolates through colony morphologies and 16S Sanger Sequencing, and metagenomically using the MinION next-generation sequencing platform. Together, this information will increase understanding of the bacterial community present in the river and its potential sources, and can help protect those that use it from potential bacterial illnesses.

McDonough Hall, Room LL7B

1:30-1:45pm

Authors: Anthony Terry & Chadene Tremaglio

Affiliation: University of Saint Joseph

Title: Structural and Functional Studies of a Small RNA Species Produced During RSV Infection

Abstract: Respiratory syncytial virus (RSV) presents harsh cold-like symptoms and is responsible for over 10,000 deaths per year in the U.S. (CDC, 2022). In cells, the viral polymerase protein is responsible for transcribing RSV genes and replicating the viral genome. The mechanism of switching between transcription and replication is unknown. However, a previous study found that during transcription small RNA species are generated from the 3' end of the viral genome, in a region called the Leader (Tremaglio et al., 2013). One theory for how this may occur is that the small RNA physically binds to the viral polymerase protein, acting as a molecular switch to change its function. The aim of this project is to characterize the function and properties of the small RNA produced during transcription. We performed overlap PCR to generate a DNA template encoding the small RNA under the control of a T7 promoter. The PCR product was then used as a template for T7 RNA polymerase in an in vitro transcription reaction. We are currently working to purify the RNA. Future directions include transfecting the RNA into cells to determine whether it has an impact on viral replication and transcription. Even with modern medical technology there is no vaccine to prevent RSV infection. Therefore, finding new therapeutic targets for RSV is paramount in order to develop a possible treatment.

1:50-2:05pm

Authors: Zoha Alam & Darlene Olsen

Affiliation: Norwich University

Title: Identifying Disparities in Elementary Education

Abstract: Multivariate data from several sources on the New York City Public School students was mined and analyzed by several factors including gender, race, household income, and community income. These data illustrate the achievement gap in the New York City

schools among various socio-economic groups and racial and ethnic groups. Analysis of the aggregate data showed that students from families classified as low-income had lower levels of proficiency on a third grade math assessment than students from households not classified as low-income. Further analysis revealed that scores were not, in fact, tied to the income level of students' household, but rather associated with the socio-economic status of the school community. This presentation will describe the process of mining and analyzing the multivariate data set as well as the findings of the analysis.

2:10-2:25pm

Authors: Emily Huntley & Chadene Tremaglio

Affiliation: University of Saint Joseph

Title: Exploring the Effect of Respiratory Syncytial Virus (RSV) Infection on mRNA and Protein Expression of Calnexin (CANX) and Integrin Alpha V (ITGAV)

Abstract: Respiratory syncytial virus (RSV) is a leading cause of pneumonia in children and causes 3.2 million hospital admissions and 118,200 deaths each year. There are currently no vaccines or therapeutics for RSV, therefore it is important to investigate the basic biology of RSV infection to uncover new targets for treatment. This study explores the relationship between RSV and cellular messenger RNAs (mRNAs), calnexin (CANX), and integrin alpha chain V (ITGAV). CANX encodes an endoplasmic reticulum associated protein involved in the cellular stress response to infection, while ITGAV encodes a cell surface protein that is thought to play a role in RSV entry into cells. Recently, it was shown that a viral protein, M2-1, binds these mRNAs during infection. It is unknown whether this binding event alters expression of CANX and ITGAV. In this study, cells were infected with RSV and protein lysates were harvested and subjected to Western blot to determine ITGAV and CANX protein levels in mock and RSV infected cells. Preliminary results suggest that CANX is downregulated during RSV infection. Results for ITGAV were inconclusive, but this experiment is being repeated. Quantitative RT-PCR is currently being performed to determine whether CANX and ITGAV mRNA levels are affected by RSV. If it is confirmed that RSV infection alters the expression of CANX and ITGAV, this may be a mechanism for how the virus evades the immune response and gains entry into cells.

2:30-2:45pm

Authors: Caitlyn DiAngelis, Victoria Gargan, & Irene Reed

Affiliation: University of Saint Joseph

Title: Examining the Impact of Medroxyprogesterone Acetate (MPA) and Calcitriol on the TGF-ß Signaling Pathway in Endometrial and Breast Cancer

Abstract: Breast and endometrial cancer are some of the most commonly diagnosed cancers impacting women within the United States today. In order to combat these cancers, researchers have begun to look at how medications known as Medroxyprogesterone

Acetate (MPA) and Calcitriol could impact the TGF-ß signaling pathway within cancer cells. The TGF- ß signaling pathway has the potential to play the role of a tumor suppressor as well as a tumor promoter. When the pathway is properly regulated it plays the role of a tumor suppressor as it inhibits rapid cell growth and aids in the process of cellular apoptosis. However, when the pathway is unregulated it can act as tumor promoter by aiding in the migration of cancer cells and stimulating epithelial-to-mesenchymal transition (EMT). The aim of this study is to specifically investigate how MPA and Calcitriol may regulate the pathway in order to inhibit cell migration and promote apoptosis of endometrial and breast cancer cells. It is hypothesized that the combination of MPA and Calcitriol would lead to less cell migration and more cell death than using the treatments separately. To test this hypothesis, researchers performed scratch assays on the RL95-2 (endometrial) and MCF-7 (breast) cancer cell lines to measure cell migration. A cell viability assay was also performed on the MCF-7 breast cancer cell line. The data collected from the assays suggests MPA alone had a better effect of inhibiting cell migration of both types of cancer, while Calcitriol alone had a better effect of inhibiting cell growth of breast cancer. These findings may prove to be beneficial in expanding treatment opportunities amongst women suffering from endometrial or breast cancer.