80th Annual

Eastern Colleges Science Conference

March 21, 2026

Eastern Colleges Science Conference Meetings

1947: Vassar College, Poughkeepsie, NY
1948: Union College, Schenectady, NY
1949: Adelphi College, Garden City, NY
1950: Barnard College, New York, NY
1951: Yale University, New Haven, CT
1952: PA College for Women, Pittsburgh, PA
1953: N.Y. State Col. for Teachers, Albany,NY
1954: Brooklyn College, Brooklyn, NY
1955: Seton Hall Univ., South Orange, NJ
1956: Temple University, Philadelphia, PA
1957: Georgetown Univ., Washington, DC
1958: Wilkes College, Wilkes-Barre, PA
1959: Suffolk University, Boston, MA
1960: Hunter College, New York, NY
1961: SUNY College of Forestry, Syracuse, NY
1962: NC State College, Raleigh, NC
1963: Boston College, Chestnut Hill, MA
1964: Jersey City State College, Jersey City, NJ
1965: Danbury State College, Danbury, CT
1966: D.C. Teacher's College, Washington, DC
1967: Fordham University, New York, NY
1968: Yale University, New Haven, CT
1969: Yale University, New Haven, CT
1970: Wilkes College, Wilkes-Barre, PA
1971: Rosary Hill College, Buffalo, NY
1972: U.S. Military Academy, West Point, NY
1973: Pennsylvania State Univ., Univ. Park, PA
1974: Worcester Polytech. Inst., Worcester, MA
1975: Widener College, Chester, PA
1976: Rhode Island College, Providence, RI
1977: Fairleigh Dickinson Univ., Rutherford, NJ
1978: Union College, Schenectady, NY
1979: Wilson College, Chambersburg, PA
1980: SUNY at Cortland, Cortland, NY
1981: Jersey City State College, Jersey City, NJ
1982: Lycoming College, Williamsport, PA
1983: Wilkes College, Wilkes-Barre, PA
1984: Providence College, Providence, RI
1985: SUNY and Fredonia, Fredonia, NY
1986: DuquesneUniversity, Pittsburgh, PA
1987: Lycoming College, Williamsport, PA
1988: Ithaca College, Ithaca, NY
1989: U.S. Military Acad., West Point, NY
1990: Manhattan College, New York, NY
1991: SUNY at Fredonia, Fredonia, NY
1992: U.S. Naval Academy, Annapolis, MD
1993: Central CT State Univ., New Britain, CT
1994: Duquesne University, Pittsburgh, PA
1995: Ithaca College, Ithaca, NY
1996: Lycoming College, Williamsport, PA
1997: Central CT State Univ., New Britain, CT
1998: Niagara University, Lewiston, NY
1999: Sacred Heart University, Fairfield, CT
2000: Wagner College, Staten Island, NY
2001: Wilkes University, Wilkes-Barre, PA
2002: Niagara University, Lewiston, NY
2003: Ithaca College, Ithaca, NY
2004: Manhattan College, Bronx, NY
2005: Central CT State Univ., New Britain, CT
2006: St.Joseph'sUniversity, Philadelphia, PA
2007: College of Mount St. Vincent, Bronx, NY
2008: Niagara University, Lewiston, NY
2009: Wagner College, Staten Island, NY
2010: Pace University, Pleasantville, NY
2011: Sacred Heart University, Fairfield, CT
2012: William Paterson University, Wayne, NY
2013: Providence College, Providence, RI
2014: Marist College, Poughkeepsie, NY
2015: Niagara University, Lewiston, NY
2016: Western NE Univ., Springfield, MA
2017: Wilkes University, Wilkes-Barre, PA
2018: Ithaca College, Ithaca, NY
2019: Manhattan College, Bronx, NY
2020: Cancelled due to COVID-19
2021: Virtual Conference
2022: Iona College, New Rochelle, NY
2023: Sacred Heart University, Fairfield, CT
2024: Niagara University, Lewiston, NY
2025: Wilkes University, Wilkes-Barre, PA
2026: Wilkes University, Wilkes-Barre, PA

Campus Map

Parking is in lot 5

Registration and all sessions are in Stark Learning Center, building 39

Lunch and the ECSC Board Meeting are in the Henry Student Center, building 46

Welcome to the 2026 Eastern Colleges Science Conference

On behalf of Wilkes University, we are pleased to welcome you to the 80th Eastern Colleges Science Conference. For eight decades, ECSC has brought together students and faculty from institutions across the region to share undergraduate research, exchange ideas, and strengthen the scientific community that connects our colleges and universities. From its first meeting at Vassar College in 1947 to its 80th gathering today, ECSC has remained dedicated to showcasing undergraduate scientific research and fostering collaboration among institutions across the region.

Since that first conference, ECSC has traveled among dozens of host institutions, each contributing to the vitality and continuity of the meeting. Hosting ECSC has always been a collaborative effort that depends on the enthusiasm and commitment of our member schools. Wilkes has been fortunate to participate in this tradition many times over the years, and with the 2026 meeting we are honored to host ECSC for the seventh time. We are grateful for the opportunity to help sustain a conference that has supported generations of undergraduate scientists, and we look forward to seeing the tradition continue as other institutions take their turn hosting in the years ahead.

This year's program features a diverse collection of poster sessions and platform presentations spanning the natural and social sciences, including biology, chemistry, environmental science, psychology, neuroscience, computer science, and interdisciplinary areas such as data science, materials science, and biomedical research. The breadth of work presented here reflects the creativity and dedication of undergraduate researchers across the ECSC community.

We are delighted to welcome Dr. Del Lucent as our keynote speaker. Dr. Lucent's presentation on quantum computing will offer an exciting look into a rapidly evolving field that is reshaping how scientists approach computation, cryptography, and complex scientific challenges.

Following the positive response last year, we are again hosting Talking Circles as part of the ECSC program. Our Student Talking Circle, focused on graduate school and career pathways, and our Faculty Talking Circle, centered on emerging technologies and evolving challenges in scientific research and education, provide opportunities for open dialogue beyond traditional presentations.

Whether you are attending ECSC for the first time or returning as part of its long-standing community, we hope you find this year's conference both intellectually stimulating and personally rewarding.

Welcome to Wilkes-Barre, and welcome to ECSC 2026.

Warm regards,

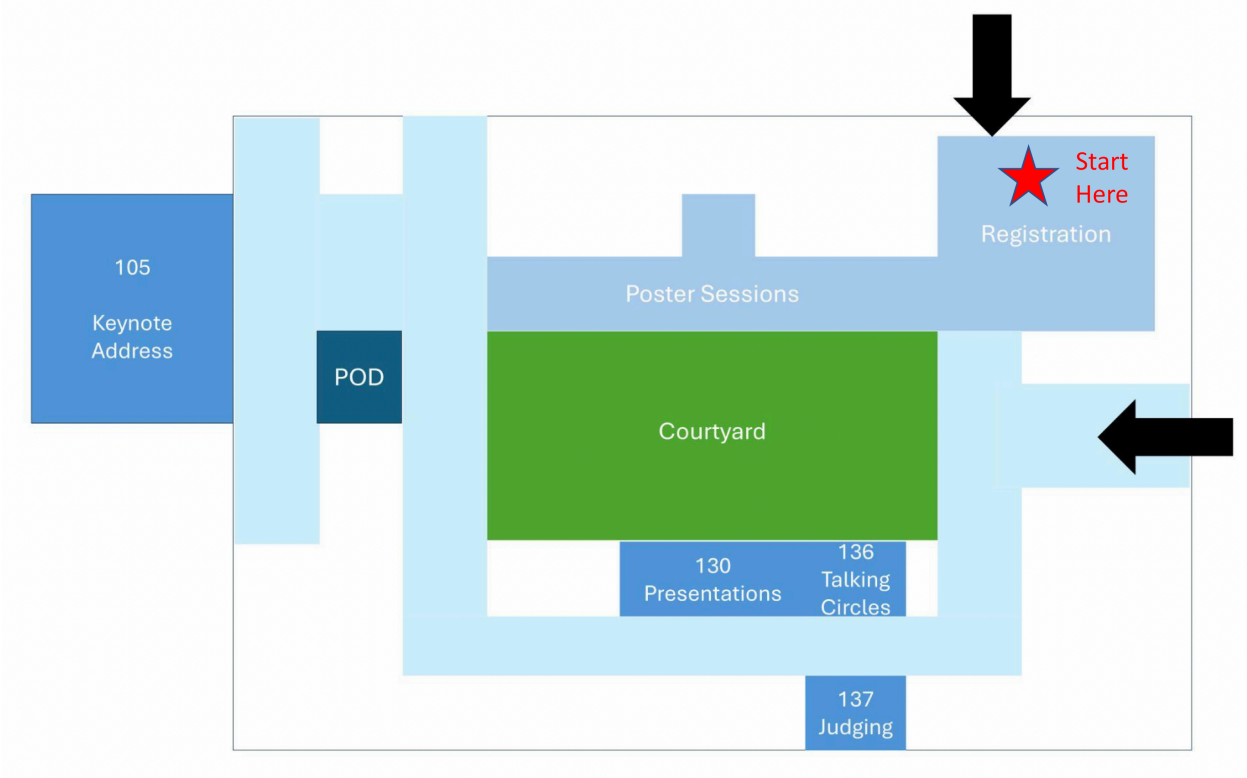
Tony Kapolka and HyeRyeon Lee
Chairs, 2026 ECSC Planning Committee
Wilkes University

Internet Access

The guest.wilkes.edu password is: AtWilkesYouWill

Please make note of the capitalized letters.

Stark Learning Center Map



All conference activities except lunch take place on the first floor of SLC. The hallway extends completely around the first floor so if you get lost - keep walking!

A special thanks goes out to the following Wilkes Students who worked to make this conference a success:

Gavin Adamski
Joey Cox
Vanessa Coyle
Avery Daniels
Mason Fedor
Trevor Gitski
Amanda Koneski
Ayele Kouevi
Salma Lampack-Heverly
Nigel Linton
Collin Morehead
Adam Pratt
Annalyse Santowasso
Shane Senchak
Brayden Shaffer
Ally Sheridan
Brendan Styer
Tahiya Tahsin
Omari Watson
Tyler Whary

Schedule of Events

9:30-10:00 Registration / Breakfast
SLC First Floor

10:00-11:00 Welcome / Keynote Address
SLC 105

11:00-12:30 Poster Session A
SLC Engineering Hallway

11:45-12:45 Student Talking Circle
SLC 136

12:00-1:30 Lunch
Henry Student Center, 3rd Floor

12:30-1:30 Board Meeting
Henry Student Center, 2nd Floor, JPAC

1:30-3:00 Poster Session B
SLC Engineering Hallway

2:30-3:30 Platform Presentations P
SLC 130

3:15-4:45 Poster Session C
SLC Engineering Hallway

3:30-4:30 Faculty Talking Circle
SLC 136

6:00 Award Banquet
Mohegan Pennsylvania Convention Center, 1280 PA-315, Wilkes-Barre, PA 18702

Judging Room (10:30-5:00) SLC 137

From Molecules to Qubits:

Why Scientists Across Disciplines Should Care About Quantum Computing

Del Lucent, Ph.D.

Associate Professor of Physics, Wilkes University

Scientific discovery has often followed the invention of new instruments, from microscopes and telescopes to particle accelerators and modern supercomputers. Today, a new computational instrument is emerging: the *quantum computer*.

In this keynote, Dr. Lucent explores how quantum computing grew from fundamental questions in physics into a rapidly developing interdisciplinary field. Using visual and conceptual examples, including simple quantum circuits and geometric representations such as the Bloch sphere, he introduces the core ideas of qubits, superposition, and entanglement.

The talk will also examine why governments, technology companies, and research institutions worldwide are investing heavily in quantum technologies, and what that means for the broader scientific community. As quantum tools mature, the next wave of discoveries may come not only from quantum specialists, but from researchers in chemistry, biology, engineering, and other fields who recognize where these emerging tools might apply to their own scientific questions.

Biography

Del Lucent, Ph.D., is a professor of physics at Wilkes University whose work explores the intersection of physics, computation, and life sciences. His research includes computational studies of molecular systems, protein folding, and drug design, with a growing interest in quantum information science and the role of quantum computing in scientific research.

A first-generation college student from Northeastern Pennsylvania, Dr. Lucent began his academic career at Wilkes University as a double major in biology and physics before pursuing graduate work at Stanford University, where he studied protein folding and drug design using molecular simulation as part of the Folding@home project. He later conducted postdoctoral research in structural genomics and computational enzyme design at Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO).

At Wilkes, he helped create the WARLOC research computing cluster, which supports interdisciplinary computational research across the university. He teaches courses ranging from introductory physics to statistical mechanics and quantum computing and actively involves undergraduate students in computational research

Manuscripts Submitted for Excellence Awards - 2026

Each manuscript documented original, empirical research that postulated a testable hypothesis, described the laboratory or field experimental design to test the hypothesis, presented the results, and discussed those results in the context of relevant literature.

Effects of Alli (Orlistat) on Memory in Long-Evans Rats

John Desmond and Bailey Parsons, Interdisciplinary Neuroscience Concentration

John Carroll University Biology (Physiology)

Effects of GABA Supplement as an Anxiolytic in Long-Evans Rats

Grace Dralle and Morgan Szykowny, Interdisciplinary Neuroscience Concentration

John Carroll University Psychology (Clinical)

Holin proteins in *Myxococcus xanthus* contribute to pigmentation.

Nancy Kwelio and David Zuckerman, Biology Department.

Iona University Biochemistry

Ashwagandha and its Effects on Anxiety in Long-Evans Rats

Emma Manley, Interdisciplinary Neuroscience Concentration

John Carroll University Psychology (Experimental)

Mitochondrial Dysfunction and Osteoarthritis: Investigating Polymerase Gamma Mutant Mice for Structural and Neuroinflammatory Insights

Mohammad I. Naqash, Interdisciplinary Neuroscience Concentration

John Carroll University Health Sciences

======== BIOCHEMISTRY ========

A1

Structural studies of protein-stabilizing surface ion pairs using Arg and Glu residues

Kirsten E. Baxa*, Jasmine A. Forbes*, Jaime L. Sorenson§, Aaron C. Robinson§ and Jamie L. Schlessman*

*United States Naval Academy Chemistry Department, Annapolis, MD 21402

§ The Johns Hopkins University Department of Biophysics, Baltimore, MD 21218

Surface ion pairs have been identified as a contributor to the stability of proteins from thermophilic and hyperthermophilic organisms. Using hyperstabilized staphylococcal nuclease as a model system, protein variants were generated with either Glu or Arg engineered into residue 50 or 59. Double substitutions of Glu/Arg or Arg/Glu were engineered at residues 50/59. Substitution sites were positioned on alpha helix 1 and the preceding loop, with a Cα – Cα distance of 5.6 Å in the background protein crystal structure. X-ray crystal structures of each single-substituted protein and putative ion pair were determined to probe steric constraints imposed by the engineered residues, variability of side chain rotamer, and the effects of charge reversal. The crystal structure of the Arg-59 single variant contained a different rotamer for this residue than in the Glu-50/Arg-59 variant, suggesting an Arg rearrangement to form an ion pair. Differences in electrostatic interaction patterns between Arg and Glu side chains in the Arg-50/Glu-59 versus Glu-50/Arg-59 variants revealed an impact of charge reversal. Thermal denaturation studies using fluorescence studies provided thermodynamic parameters for comparison with the structural results, with increased melting temperatures observed for the double substitution variants relative to those with a single substitution. Intriguingly, a destabilizing substitution of Glu at residue 59 was apparently recovered by addition of Arg at residue 50. Results from these studies provide evidence for an adaptable design capable of modulating protein stability through surface amino acid substitution. Furthermore, correlation of structural and stability studies provides a vehicle for evaluating protein engineering candidates.

======== BIOLOGY (BOTANY) ========

A2

Ecological Drivers of Bacterial Community Composition Underlying Parasitism in Rafflesia Lagascae: From Rhizosphere to Host to Rafflesia Bud

Alessandra Barretta

Pace University

Rafflesia, commonly called the “corpse flower”, produces the world’s largest bloom smelling of rotting meat. It is endangered and restricted to Southeast Asian rainforests. It is also a parasite, with no stems, roots nor leaves, embedded inside its sole host vine, Tetrastigma, emerging only to flower. Despite being the “panda of the plant world”, it has been very challenging to cultivate hampering ex situ conservation attempts. The plant microbiome profoundly influences plant health and development, and emerging evidence suggests that microbial communities are crucial for stabilizing the Tetrastigma-Rafflesia symbiosis, with dynamic shifts observed across Rafflesia developmental stages. This research aims to elucidate how microbial communities transition from the soil rhizosphere to microbial endophytic communities within the Tetrastigma-Rafflesia holoparasitic system by characterizing microbiome diversity via Illumina and nanopore metagenomic sequencing. We hypothesized that the phenolic-rich chemical environment of Rafflesia buds acts as a selective filter that permits certain rhizosphere-derived bacterial lineages to colonize the host–parasite interface. This study reveals a core microbiome of phenolic-tolerant taxa that persists across the rhizosphere, Tetrastigma, and Rafflesia compartments, facilitating nutrient cycling, stress resilience, and selective filtering under hypoxic, phenolic-rich conditions. These bacteria may serve as microbial inoculants that could benefit ex situ conservation of this endangered genus.

======== BIOLOGY (ECOLOGY) ========

A3

Do Nutrient Supplementation and Root Modification Improve Spartina alterniflora Restoration Success in Connecticut Salt Marshes?

Isabella Lovato, Emma Valerian, *LaTina Steele

*faculty mentor

Sacred Heart University, Department of Biology

Salt marshes, which support diverse wildlife populations and improve coastal resilience by acting as a natural storm buffer, are declining due to multiple stressors. Thus, marsh restoration is vitally important in maintaining biodiversity. However, many marsh planting projects suffer from high levels of plug loss. We conducted a field experiment to investigate root modifications and supplemental nutrients as methods to increase restoration success of Spartina alterniflora, the most common low marsh plant across the eastern U.S. The experiment consisted of four treatment groups: modified roots-fertilized, modified roots-unfertilized, ambient roots-fertilized, and ambient roots-unfertilized, each containing 12 replicates. The site was observed weekly for 19 weeks to record plug density and remove wrack. Fertilizer stakes were replaced every four weeks. Sediment nitrate and phosphate levels were measured in sediment from 7 ambient and 7 fertilized plots. To assess stress, photosynthesis was measured as effective quantum yield at the end of the experiment and compared to previously established S. alterniflora at the site. Mann-Whitney U tests showed a significant increase in nitrate but not phosphate in fertilized plots. Effective quantum yield did not differ between naturally occurring plants and experimental plants. Finally, even though plug density decreased significantly over time in all treatments, neither fertilization nor root modification affected plug density. Although we found no significant improvements in plug retention with root modification or fertilization, this site experienced high wrack accumulation and was higher energy than some marsh restoration areas, so future work should evaluate these methods in lower-energy areas.

A4

Using a natural experiment to study the effects of coal fly ash on songbird biology

Madison Canales, James Gaffney & Emily J Levy (MC and JG contributed equally)

Sacred Heart University

Coal fly ash contamination, which contains heavy metals such as lead and mercury, is a persistent stressor in many post-industrial ecosystems. Like the canary in the coal mine, birds can be studied in these environments to understand how toxins such as coal fly ash affect organismal development, reproduction, and overall biology. Manresa Island in Norwalk, CT is a former coal-burning power plant site that is about to undergo remediation. To understand how coal fly ash affects bird biology, we will install songbird nest boxes at Manresa Island and at non-contaminated reference sites. Boxes will be monitored throughout the breeding season to document species occupancy, clutch size, hatch success, and fledging success. We will also collect morphometric and physiological data from tree swallows (Tachycineta bicolor), Eastern bluebirds (Sialia sialis), and house sparrows (Passer domesticus). In the short term, this monitoring will allow us to test whether birds at the contaminated site differ from those at reference sites in reproductive success, body condition, and physiology. Tissue sampling of house sparrows will also allow us to determine whether toxin accumulation differs between populations. In the long-term, this monitoring will assess whether successful remediation efforts are reflected in bird biology. The remediation of Manresa Island offers a unique natural experiment to address questions about the effects of contaminants on songbird reproduction and development.

A5

How dissolved oxygen levels relate to horseshoe crab spawning in the Long Island Sound

Antonio Echenique, James Toscano, Jo-Marie Kasinak.

Sacred Heart University, 5151 Park Ave, Fairfield CT, 06825

Horseshoe crabs (*Limulus polyphemus*) are coastal organisms whose spawning activity is related to shoreline habitat quality. This study summarizes spawning survey data conducted along the Long Island Sound (LIS) including Connecticut (CT) and Rhode Island (RI). Survey data includes spawning counts, mating aggregation, meters surveyed, and environmental conditions such as water temperature, wind speed, wave intensity, and ambient light. Clear spatial differences were observed among sites. CT mainland locations, including Stratford Point and Milford Point, showed minimal spawning activity during multiple May–June surveys, with only one and two individuals recorded, respectively, and no complex mating aggregations documented. In contrast, Block Island, RI, exhibited substantially higher spawning intensity. A single night survey recorded 75 spawning index observations, 16 mating pairs, and multiple aggregations (F+2M through F+7M), while another survey documented 213 spawning index observations and more than 400 individuals, including F+8M. Differences in spawning activity between sites suggest certain locations have higher favorable conditions for horseshoe crabs than others. Sound Health Explorer classifies CT in the Western Basin with a dissolved oxygen grade of C in 2023. RI was classified in the Great Basin with a dissolved oxygen grade of A+ in 2023, indicating that locations in RI, Block Island and Napatree Conservation Point, have more favorable conditions for marine organisms. Conducting surveys during mating season will be essential in getting a better understanding of what factors influence the spawning numbers. This will help guide conservation and management efforts to support horseshoe crab populations in the LIS.

A6

The Distribution of Asian Shore Crabs (*Hemigrapsus sanguineus*) in High and Low Intertidal Zones

Ariana Porco and Ashley Stoehr

Sacred Heart University

The high abundance and opportunistic feeding behaviors of the invasive Asian Shore crab (*Hemigrapsus sanguineus*) drives changes in environmental conditions within New England intertidal zones. In this study, we examined their sex and size distribution across high and low intertidal zones in Stratford, Connecticut. We placed 50-meter transects parallel to the shoreline in both high and low intertidal zones, and surveyed crabs using five randomly spaced 50 cm x 50 cm quadrats. We actively searched for crabs over two-minute intervals for up to eight-minutes. We then measured each crab at the widest point of the carapace. The smaller individuals were photographed and measured using ImageJ software. Preliminary results suggest that Asian Shore Crab distribution is patchy within the intertidal and is likely driven by microhabitat features, not sex or size. Individuals are likely responding to the same drivers (e.g., rock shape, moisture), which may have slightly stronger effects in the upper intertidal regions. Future work will continue quantitative comparisons using a stratified random protocol, further contributing to an improved understanding of species distribution patterns within coastal intertidal ecosystems.

A7

Living Shoreline Restoration at Stratford Point: Vegetation and Invertebrate Community Shifts Following Reef and Spartina alterniflora Installation

Donato Catanese, Declan Ratner, *Jo-Marie Kasinak, *LaTina Steele

*Faculty Mentors

Sacred Heart University, Department of Biology, Fairfield, CT

Coastal shorelines and ecosystems are increasingly threatened by erosion as sea levels rise and wave energy intensifies. Nature-based solutions, such as Stratford Point's living shoreline project, provide sustainable approaches to coastal stabilization while enhancing ecological function. This study examined vegetative and invertebrate responses following installation of Oyster Castle reefs (November 2024), placement of bagged slipper shells, and planting of 5,000 native Spartina alterniflora plugs (April 2025). S. alterniflora stem density and height were measured within planted quadrats located between the Oyster Castles and the remnant marsh, as well as within the marsh itself, from June to July 2025. Macroinvertebrate (≥ 2 mm) and small invertebrate (500–2,000 µm) communities were surveyed concurrently and compared to pre-restoration surveys (2023). In the remnant marsh, stem density was greater in the upper intertidal zone than in the lower intertidal and slightly higher in 2025 relative to 2023, though differences were not statistically significant. Invertebrate densities were generally low; however, ribbed mussels were present in the lower intertidal in 2025, where none were observed in 2023. In the previously unvegetated area, small and macroinvertebrate community composition differed significantly between years, with decreases in copepods, ostracods, mud snails, green crabs, and increases in snails, oligochaetes, and nematodes, amphipods and Baltic macoma clams. These findings suggest early biological responses consistent with increasing habitat complexity and shoreline stabilization. Year 2 monitoring (July 2026) will repeat sampling, assess sediment and reef stability, and continue photo documentation, to guide adaptive management and meet permit requirements.

A8

Comparing Condition Trends of Horseshoe Crabs in Long Island Sound

Kathryn Bliss, Nicola Cari, Jo-Marie Kasinak M.S.

Sacred Heart University, Fairfield CT.

The American horseshoe crab (*Limulus polyphemus*) is important ecologically and biomedically. The blue blood of the horseshoe crab (HSC) contains the enzyme Limulus amebocyte lysate (LAL) which causes clotting upon contact with bacteria. The pharmaceutical industry harvests HSC blood for vaccines and medical devices, testing them for bacterial contamination. Long Island Sound (LIS) HSCs have historically been harvested for fishing bait, this and lack of habitat led to dramatic population decline. Ecologically, HSC eggs are a primary food source for migratory shore birds, i.e. the endangered Red Knot, and their gills are parasitized by *Bdelloura candida*. Project Limulus spends each mating season (May-June) studying HSCs in LIS. We record damage on the crabs, and note where it's found (claws, eyes, limbs, shell, or telson). Parasite load of B. candida (scale of 0-4) and shell condition (scale of 1-3) are also recorded with other parameters. Data was collected from May of 2024 to June of 2025 on over 1,000 crabs and variables were compared between 2024 to 2025 to observe any annual trends. A chi-square analysis was performed to determine the significance of the data. The shell and parasite conditions had no significant difference between the two years, but most crabs have low levels of parasites and are shell condition 2. There was a larger total of recorded damages in 2024, most of it on the carapace of the crabs. Understanding these trends can help us assess the overall health of the HSC in LIS and ultimately make management recommendations.

A9

Interspecific variation in Daphnia's responses to biocide exposure

Sedra M. Alasadi1, Kayla R. Tracy1, and Torrance C. Hanley1

1Sacred Heart University, Department of Biology, Fairfield, CT

Biocides, including herbicides and pesticides, are commonly used in the United States, yet the effects of exposure to these toxicants on aquatic, non-target organisms remain relatively unexplored. In particular, closely related species may have similar responses to biocide exposures or there may be pronounced interspecific variation in toxicant tolerance among analogous species. To explore this question, we compared the responses of two ubiquitous water flea species (Daphnia magna and Daphnia ambigua) to the independent and combined effects of two common biocides (the pesticide Imidacloprid and the herbicide Glyphosate). We included a range of Imidacloprid (1.83-8.70 mg/L) and Glyphosate (7-56 mg/L) concentrations, and exposed Daphnia to each biocide independently, as well as to combination treatments of low, medium, and high concentrations, with the goal of including environmentally-realistic levels. We identified differences in survival, growth, and reproduction across our treatment combinations that demonstrate the effects of biocide exposure on both Daphnia species. In addition, there were pronounced differences between Daphnia magna and Daphnia ambigua, suggesting that the effects of biocides on non-target organisms may vary substantially within guilds.

A10

Chronic stress and adaptive success? Experimental evolution of Daphnia exposed to multiple biocides

Ava Neville1, Lauren E. Wichelhaus1, and Torrance C. Hanley1

1Sacred Heart University, Department of Biology, Fairfield, CT

Biocide exposure is often frequent and persistent, with herbicide and pesticide application typically occurring multiple times, yet the effects of continuous exposure to these toxicants on aquatic organisms are relatively understudied. Species with short generation times may evolve in response to chronic exposure, but there may also be trade-offs associated with adaptive changes in biocide tolerance or resistance. To explore how chronic biocide exposure may affect a species' vital rates and adaptive capacity, we reared a key aquatic consumer (Daphnia magna) in the laboratory for ten generations under conditions with different combinations of the pesticide Imidacloprid and the herbicide Glyphosate, and then exposed these lines to a variety of biocide treatment combinations. We included a range of Imidacloprid (1.83-8.70 mg/L) and Glyphosate (7-56 mg/L) concentrations, and exposed Daphnia to one or both biocides at low, medium, and high levels. We identified differences in survival, growth, and reproduction within biocide treatments dependent on rearing conditions, demonstrating that i) Daphnia have the capacity to adapt to chronic biocide exposure at low to medium levels, and ii) prolonged exposure to herbicides and pesticides can result in unpredicted trade-offs in Daphnia vital rates.

A11

Food Desert Strategies for Growing Medicinal Plants in Hydroponics Vs. Traditional Soil Environments

Martina Awad and Dr. Brandy Garrett-Kluthe

Saint Peter's University

In urban environments it is sometimes difficult to find fresh medicinal and culturally relevant plants. Developmenting a growing method that maximizes the ability of an individual to grow their own plants is important. This study looked at two different types of medicinal herbs: Rosmarinus officinalis commonly known as rosemary seeds and Hibiscus sabdariffa commonly known as roselle. Rosemary seeds have antioxidant and anti-inflammatory properties, which helps protect our cells from damage or harm. Roselle's a medicinal herb that has many health benefits, such as lowering blood pressure and cholesterol, and weight management. The growth of roselle and rosemary seeds was monitored in soil and hydroponics systems. A total of 96 seeds were used, 48 replicates of each seed type. Over 7 weeks roselle and rosemary seeds were measured every Monday from the surface of the growth medium. The results indicated that soil for both plants had a lot more root production, However, the hydroponics had a better germination and better overall yield.

======== BIOLOGY (NEUROSCIENCE) ========

A12

Abstract Title: Effects of Recreationally Ingested Neuromodulators on Planarian Regeneration

Carter Green, Sofia Lopez Meneses and Christopher Marra

Wagner College

Energy drink and non-tobacco nicotine industries combine for an annual global market value of over 100 billion USD. Despite regulations on commercial advertising, 30-50% of adolescents consume energy drinks and up to 10% of highschoolers report using nicotine products, with 25% of teen vapers report using daily. While the brain reaches almost its adult size by age 6, the teen years are focused on efficiency. The goal of this study is to determine how some of the neuromodulators found in these products, which are regularly ingested by adolescents, might affect neurodevelopment. We hypothesize that these chemicals would display the ability to dysregulate neuronal activity enough to impact observable developmental progress. To do this, we utilized planarians, which are commonly employed model organisms for studying neural development due to their centralized nervous system and regenerative abilities. We exposed freshly bisected planarians to concentrations of caffeine, nicotine or y-aminobutyric acid (GABA) and recorded their regeneration progress daily, as compared to a control cohort. We also recorded the motor behavior of whole planarians during acute and chronic exposure to each of these chemicals. We found that all three of these chemicals caused significant dose-dependent impairments in planarian regeneration, and that behavioral deficits caused by chronic exposure could be rapidly recovered in some but not all cases. We conclude from this data that these chemicals do display the potential to dysregulate neural processes during development. One might suggest that commercial advertising regulations should also be extended to social media influencer promotion of these products.

A14

Analysis of Microplastic Contamination in Hudson Valley Flora & Fauna

Aleksandra Belugin, Jae Lembo, Dr. Lynn Maelia

Mount Saint Mary College, Newburgh, NY

Microplastics are pervasive environmental pollutants no larger than 5mm in size. Primary microplastics are manufactured for cosmetics and other consumer products. Secondary microplastics form from the breakdown of larger plastic products due to use, UV exposure, and weathering. In aquatic settings, microplastics are taken in by organisms and accumulate in tissue. This study examined the microplastic accumulation in local benthic organisms and aquatic plants. Samples of crayfish, macroinvertebrates (fauna), aquatic moss, and macroalgae (flora) were collected from various sites along the Quassaick Creek in Newburgh, NY and analyzed for microplastic contamination following peroxide and nitric acid digestion. The presence of microplastics was validated via Nile red staining and microscopy. Fibrous microplastics, such as those from textiles and clothing, were most prolific in local fauna, whereas shard-like microplastics were found in higher abundance in flora. In the future, we hope to calibrate our analysis using spikes & known microplastic concentrations.

A15

Dog Petting 101: Examining the Impact of a Brief Therapy Dog Interaction on Stress Levels in College Students

Chelsea St Cloud and Sebastian Rosario

Mentors: Barbara Pierce, Department of Biology, Dawn Melzer and Deirdre Yeater, Department of Psychology

Sacred Heart University

Elevated stress levels are known to increase the risk of developing mental health illnesses such as depression and anxiety. In college students, this may cause a lack of motivation and other negative behaviors, likely resulting in poor academic performance in the classroom. Recently, colleges have begun to offer animal assisted therapy programs to help students manage stress. This study examined the impact of either a 10-minute therapy dog interaction or coloring therapy session on perceived stress, general self-efficacy, and salivary cortisol levels among college students. Cortisol was used because it is a conventional biomarker of physiological stress. The General Self Efficacy Survey and Perceived Stress Scale were used to measure students' current perceived stress level and perceived ability to deal with that stress. We predicted coloring and a therapy dog interaction would significantly increase self-efficacy and significantly decrease perceived stress and cortisol levels. We expected therapy dog interactions to produce significantly greater changes in all treatments compared to coloring. Students completed the two surveys, and provided salivary cortisol samples, prior to and after their respective treatment. As predicted, college students' self-efficacy significantly increased and their perceived stress level significantly decreased with both treatments. The dog interaction caused a significantly greater decline in perceived stress than coloring, but there was no significant treatment effect on self-efficacy. Additionally, cortisol levels significantly decreased with the therapy dog interaction but not with coloring therapy. Our findings suggest that integration of therapy dog interactions on college campuses may be beneficial to students' mental health

======== BIOLOGY (IMMUNOLOGY) ========

A16

Quantification of Cytokines in a Mouse Macrophage Exposed to The Hemoglobin-Based Oxygen Carrier OxyVita©

Parmveer Singh, Dr. James Moran

Mount Saint Mary College

OxyVita is an artificial blood substitute made by OxyVita Inc., which is a polymer derived from bovine hemoglobin. This product is in pre-clinical studies investigating both its oxygen-carrying capacity and immunostimulatory capacity. The objective of these experiments was to test the immunostimulatory capacity of OxyVita by exposing a mouse macrophage cell line to the polymer *in vitro* by measuring cytokine secretion. We used the ELISA technique to quantify the pro-inflammatory cytokines interleukin-6 (IL–6) and tumor necrosis factor alpha (TNF-α), as well as the anti-inflammatory Interleukin-10 (IL-10). The OxyVita polymer stimulated a high level of IL-6 cytokines, and moderate levels of IL-10 and TNF-α, when compared to a known stimulator, lipopolysaccharide (LPS). These results suggest that innate immune cells, such as macrophages, may recognize OxyVita and produce an innate immune response *in vivo*. This response is unexpected since bovine hemoglobin lacks known pathogen-associated molecular patterns (PAMPs). We hypothesize that the repeated monomer sequence in the OxyVita polymer may mimic the different repeated molecular patterns found on pathogen surfaces. Future studies will examine bovine hemoglobin tetramers lacking these repeated patterns as a control in our macrophage cultures.

A17

Call Note Variation in Gibbon Hybrids

Alyvia DeLauzon and Thomas Terleph*

*Faculty Mentor

Sacred Heart University

Gibbons are apes that produce complex, species-specific songs that include coordinated duets by mated pairs. White-handed (Hylobates lar) and pileated gibbons (Hylobates pileatus) sing duets that differ conspicuously. The geographic distribution of these species also differs with the exception of a small zone of co-occurrence in Khao Yai National Park, Thailand, where they sometimes hybridize. We analyzed spectral measures of duet phrases in white-handed and pileated males and compared them to those of hybrids. We found that note frequency distributions from hybrid animals differ from those of each parent species. Despite the close relatedness between white-handed and pileated gibbons, their distinct vocal repertoires suggest that vocal behavior may serve as a reproductive isolating mechanism between species. If this is the case, then the song characteristics of hybrids that we report here may be less attractive to potential mates of either parent species and thus could account for the small number of hybrid individuals occurring in the zone of species overlap.

A18

DAPHNIA MAGNA BEHAVIOR IN RESPONSE TO THE CHEMICAL PRESENCE OF THE FISH PREDATOR *DANIO RERIO*

Dante Rodney, Donald Stearns (Research Advisor)

Wagner College Staten Island, NY

Daphnia magna (common name water flea) is a freshwater crustacean that swims in a hop-like manner by flicking its first antennae. The species is a target for visual predators such as freshwater fish. However, the crustacean can detect the chemical presence of these fish and behaviorally respond by moving downward into deeper waters where they are less likely to be seen. This behavior raises the question: does the concentration of the fish chemicals affect this response? This question was addressed by placing individual daphnids in different relative concentrations of fish-exposed water (100%, 5%, 1%, 0%) for one-minute trials, during which the number of hops per minute was recorded (n=50 trials per concentration). The fish-exposed water was obtained from an aquarium holding zebrafish (*Danio rerio*). Statistical analysis revealed that daphnids responded in a dose-response fashion: the greater the concentration of fish chemicals, the lower the number of hops per minute. Even the lowest concentration tested triggered significantly ($p = 0.00178$) lower hops compared with the control. These results suggest, that *D. magna* can detect the presence of visual predators at relatively low concentrations and respond by lowering activity in a dose-responsive fashion.

A19

Effects of supplemental feeling on the immune development of two songbird species, Eastern bluebirds and house sparrows

Brianna Nieves & Emily J Levy

Sacred Heart University

Energy intake from the food we eat is vital for physiological development, including immune system development. An essential component of the immune system is white blood cells, which are key to fighting off infections. The ratios of some white blood cell types to others can be affected by food availability and indicate immune and physiological health. For example, some avian species have increased heterophil:lymphocyte (H:L) ratios during food restriction, which may indicate increased stress. In this study, we performed a food supplementation experiment to test how food availability affects the development of the immune system. We did this experiment in two common songbird species, the Eastern bluebird (Sialia sialis) and the house sparrow (Passer domesticus). Food-supplemented nests were given live mealworms, while control nests were not. We measured the nestling growth, metabolism and white blood cell counts. We hypothesize supplemental feedings will improve immune development, as measured through white blood cell counts in blood smears. We also hypothesize that invasive house sparrows will benefit more from supplemental feedings than native Eastern bluebirds due to their adaptability as an invasive species. This study will help us better understand the impact that food availability can have on physiological development in birds.

A20

Parental investment across sympatric songbird species: nestling development and provisioning strategies

Cassandra Vallon, Lena Seerosh & Emily J Levy

Sacred Heart University

Altricial young hatch underdeveloped and in need of intensive parental care. Bi-parental care is typical in most avian species, including the tree swallow (Tachycineta bicolor), Eastern bluebird (Sialia sialis), and house sparrow (Passer domesticus). Chick development is rapid and extremely intense, with tiny hatchlings increasing their weight ten-fold by around day 15 and fledging the nest 20 days post-hatch. The parental investment for these birds is taxing for the duration of nestling development. The aim of this research is to explore how parental provisioning rates change throughout the course of nestling maturation in three species of songbird. The extent to which parental care in songbirds has been studied is broad, but what remains understudied is the link between parental investment and nestling age across species in the same geographical region. Provisioning strategies can vary across species due to both intrinsic and extrinsic factors, so nestling development may correlate with provisioning rate. We performed an observational study of parental provisioning (n = 25 tree swallow nests, 8 bluebird nests, and 9 house sparrow nests). We pair parental behavior with a dataset of nestling development in Eastern bluebirds and house sparrows. Preliminary results suggest a positive correlation between developmental stage and the rate of parental care across species. Additional variables, such as brood size, sex-specific parental investment, chick body size, and temporal variation within the breeding season, will be explored to gain a clearer understanding of the relationship between parental behavior and nestling development in songbirds.

======== BIOLOGY (GENETICS/MOLECULAR) ========

B1

Circadian control of learning and sleep

Lily Deking and Ben Collins,

Sacred Heart University

We all have an internal circadian clock that regulates many aspects of our behavior and physiology, including our cognition. As the circadian clock also regulates when we sleep, it is unclear if our clock helps us learn by promoting sleep at the appropriate time (and therefore relieving tiredness) or through a direct, positive impact on neurons involved in cognition. This question can be addressed in the fruit fly, Drosophila melanogaster, where just 4 neurons which contain a circadian clock regulate a daily rhythm of memory acquisition, and also promote sleep. We are currently using genetic tools to manipulate the electrical activity and neurotransmitter release from these clock neurons to determine whether they are directly regulating memory acquisition, or instead indirectly increase cognition and learning through the promotion of sleep. Our data suggests that just 2 DAL neurons in the Drosophila brain control daily rhythms in cognition by promoting wakefulness through the release of the neurotransmitter serotonin.

B2

Carbendazim Disrupts Mauthner Neurons and Motor Circuits Underlying Escape Behavior in Zebrafish

Lauren Larson, Emily Heath, Megan Prettyman and Nicole M. Roy, Ph.D.

Sacred Heart University

Carbendazim is a widely used benzimidazole fungicide that inhibits cell division by disrupting microtubule assembly through tubulin binding. It is commonly applied in agriculture, horticulture, and forestry as both a preventive and curative treatment against fungal disease. Due to its low solubility, limited soil binding, and environmental persistence, with a half-life of up to 25 weeks, carbendazim is frequently detected in surface waters and can be transported through the food chain. Residues have been identified in crops including beans, lettuce, apples, oranges, and bananas. Despite its widespread presence, the effects of carbendazim on aquatic vertebrate development remain understudied. In this study, we investigated the impact of environmentally relevant concentrations of carbendazim on nervous system development using zebrafish (Danio rerio) as a vertebrate model. Embryos were exposed prior to gastrulation and continuously treated until 72 hours post-fertilization. We focused on the development of Mauthner neurons in rhombomere 4 of the hindbrain, which mediate rapid C-start escape responses critical for predator avoidance. We examined Mauthner cell bodies, axonal crossing, and axon length. Control and vehicle-treated embryos exhibited normal development. Exposure to 0.5 mg/L carbendazim resulted in reduced axon visibility, while 0.75 mg/L caused severe axonal loss, diminished cell body morphology, and asymmetric neuronal organization. Because Mauthner neurons form direct electrical and chemical synapses with primary motor neurons, we further assessed motor neuron development and associated musculature. Increasing carbendazim concentrations were associated with progressive loss of primary motor neurons and disruption of somite architecture, including loss of the characteristic chevron pattern and decreased muscle fibril integrity. These structural defects suggest impaired neuromuscular function and compromised escape behavior. Collectively, our findings indicate that carbendazim exposure disrupts neural and muscular development in zebrafish embryos at ecologically relevant concentrations. Such developmental impairments would likely reduce survival in natural environments, highlighting the ecological risk of carbendazim contamination and the need for improved environmental monitoring and regulation.

B3

Investigating Gene Functions in Mycobacterium Bacteriophage Avocado: A Molecular Cloning Journey

Jae Lembo and Dr. Suparna Bhalla

Mount Saint Mary College, Newburgh, NY 12550

As pathogenic bacteria continue to develop resistance to antibiotics, it has become increasingly critical to find alternative approaches to combat persistent infections. One promising approach involves the use of bacteriophages, viruses that infect bacteria, which encode diverse gene products capable of disrupting essential bacterial processes. In addition to using whole phages in a treatment, individual phage genes also have potential as novel antibacterial agents. However, to be able to effectively use phage gene products in a treatment, we must first gain a better understanding of the gene functions in bacteriophage. This study investigates gene function of the Mycobacterium smegmatis bacteriophage Avocado by evaluating the effects of individual phage genes on bacterial growth. Selected genes were isolated through molecular cloning and overexpressed in M. smegmatis. Cytotoxicity assays were performed to assess the impact of overexpression of specific genes on host viability and growth. We are currently in the process of using a bacterial two-hybrid assay to identify phage-host interactions that explain the cytotoxic effects of the phage gene products. Characterizing cytotoxic gene products may reveal novel mechanisms of bacterial inhibition and highlight potential targets for future antimicrobial development.

B4

The role of the circadian clock in mediating light dependent sleep disruption

Morgan Morelli and Ben Collins,

Sacred Heart University

In our modern world we are constantly surrounded by screens, phones, and tablets right until the time we go to sleep. As artificial light takes over it's important to understand how this impacts sleep cycles. Good sleep is vital to human health so understanding how different wavelengths of light affect sleep cycles is increasingly important. Humans have an internal 24-hour clock called the circadian rhythm which allows us to be awake during the day and asleep at night. We have visual photoreceptors that also detect light to synchronize our circadian rhythm with the environment around us. It is therefore not known whether the primary impact of blue light from screens at night is through disruption of our internal clock which then interrupts sleep, or a direct impact of light waking us independent of the clock. The fruit fly, Drosophila, is the ideal model organism to address this question as its circadian and sleep systems have been extensively studied at the genetic and neuronal level. We hypothesized that flies exposed to different colors of light at different times of day would see alteration to their sleep that depend on both the circadian clock and the visual system. By using mutant flies we can find the contribution of these different pathways to sleep, providing insight to how human sleep is impacted by different colors of light, and what we can do about it.

B5

Feeling the Burn: Investigation of the Effect of Capsaicin Analogs on Myoblast Proliferation

Alana B. Reyes, Bennett R. S. Ross, Dr. Suzanne M. Deschenes

Department Of Biology, Sacred Heart University, Fairfield, Connecticut, USA

Little is known about effective treatments for muscle regeneration during disease or post-injury, where extensive muscle use or exposure to harmful chemicals can cause muscle inflammation and degeneration. Capsaicin, found in spicy peppers, has been known to trigger myoblast differentiation but not proliferation. However, the effect of capsaicin analogs 6-gingerol and 6-shogaol remains unknown. To test their effect on myoblast proliferation, the ideal cell density and chemical concentrations must first be determined, in which two assays were performed for this purpose. First, a cell viability assay was done, where varying cell densities were plated in 96-well plates, stained with Alamar Blue HS, and absorbance was measured at 570nm. Second, various cell densities were plated on collagen-coated coverslips in 60mm plates, fixed, and stained with DAPI fluorescent dye. Imaging and cell counting were performed under a confocal microscope and analyzed using Fiji imaging software. Results of these optimization assays will be presented. Next steps include determining capsaicin analog concentrations using dose-response assays and analyzing proliferation under optimal treatment conditions.

B6

Characterizing Post-Emergence Inflorescence Circumnutation and Dark-Growth Rhythms in Arabidopsis thaliana: Exploring Potential Associations between Dark Growth and Starch Reserve Concentrations

Amanda Connors, Dr. Eric Brenner, Dr. Erik Lascaris, Isabella Salicetti and Heather Lucente

Pace University

Thigmomorphogenesis, the morphological and developmental response of plants to mechanical stimulation, remains incompletely understood at the molecular level. This study investigated circumnutational and mechanosensory responses in Arabidopsis thaliana Columbia Wild Type (Col-WT) and CAMTA3 mutants (camta3-1 and camta3-2) using 3D video analysis. Initial objectives focused on quantifying circumnutation and assessing CAMTA3's role in light-independent mechanosensory regulation. Due to widespread fungal contamination and technical setbacks, emphasis shifted toward re-establishing sterile growth conditions and constructing a reproducible developmental framework.

A Post-Emergence Inflorescence Circumnutation (PEIC) timeline was developed, extending the Boyes et al. (2001) staging system by defining five novel stages (PEIC1–PEIC5) that characterize oscillatory stem movements following inflorescence emergence. Spectroradiometer-verified dark-condition trials revealed that circumnutational growth persisted for four consecutive days in complete darkness, constituting the first confirmed documentation of light-independent circumnutation and growth in Arabidopsis. This finding challenges the traditional view that circumnutation growth is primarily phototropic and instead supports regulation by endogenous oscillatory mechanisms.

Ongoing baseline comparisons of Col-WT and camta3 mutants under controlled light and dark conditions will establish whether CAMTA3 disruption alters circumnutational rhythms. Future Lugol's iodine staining will evaluate potential associations between dark-growth persistence and starch reserve concentrations. Together, these findings provide foundational insight into mechanosensory signaling and growth regulation during post-emergence reproductive development.

B7

Exploring Sediment Toxicity and Meiofauna Community Structure of Long Island Sound Shoreline

Kayla DeStephanis, Ashley Stoehr, Naomi Keehnen, Alyssa Woronik

Sacred Heart University

Meiofauna are a diverse group of benthic invertebrates that range between 0.04 mm and 1mm in size and represent 24 of the 35 animal phyla. Meiofauna are ideal for biomonitoring because their fast population turnover means that community composition can indicate anthropogenic influence and environmental health. We conducted transects and sampled sediment at Seaside Park, a recreational shoreline on Long Island Sound. The park has public beaches and sports fields, and is adjacent to a recently decommissioned coal plant (PSEG's Bridgeport Harbor Station), a newly opened hydroelectric plant (Bridgeport Harbor Station Unit 5), and the University of Bridgeport. The goals of this project are: 1) to characterize the meiofauna community present in the sediment at our sample site using both visual and genetic assays; 2) to determine if sediment toxicity varies across space and time; 3) and finally whether variation in toxicity was correlated with variation in meiofauna community composition

B8

Downstream transcriptional targets of Drosophila Egf receptor signaling play roles in eggshell structure and morphology

Megan Robinson, Mikaela Hughes, John Tondora, and Dr. Lisa Kadlec

BESS Department, Wilkes University, Wilkes Barre, PA, 18766

Signaling by the Drosophila epidermal growth factor receptor (Egfr) plays a critical role in many aspects of development, including oogenesis, embryogenesis, and wing and eye development. For example, Egfr signaling has a well-established role in the ovary, where it is crucial for establishing the body axes. Our lab previously identified potential novel downstream transcriptional targets of Egf signaling using the Drosophila ovary as a model system. Our initial work compared gene expression in fly ovaries where activity of the pathway was reduced, normal, or constitutively active. A small-scale functional screen taking advantage of UAS-RNAi transgenic flies to knock down gene expression, as well as available P-element insertion mutants, was used to investigate possible functions of a group of our novel Egfr-responsive genes. A number of these genes were observed to have roles in normal eggshell structure and morphogenesis, rather than patterning. Gene mutant/knockdown phenotypes include decreased chorionic integrity, shortened eggs, and various dorsal appendage malformations, as well as decreased fertility. We have used CRISPR-Cas9 to create mutations in several of these “morphogenesis genes” to further explore their functions. Mutant characterization has revealed expected (previously observed), and in some cases additional, eggshell phenotypes. We are continuing to utilize these CRISPR lines for further study of our genes of interest, for example by investigating possible underlying ovarian defects via fluorescence microscopy to look at ovary structure. Preliminary results suggest possible roles in a process called nurse cell “dumping” and in oocyte positioning. Future work will continue to investigate the roles of these Egfr target genes in Drosophila development.

B9

Developing dCAPS primers to genotype horses at the "Gaitkeeper" locus

Maya Velasco and Alyssa Woronik

Sacred Heart University

Horses exhibit distinct patterns in which they move their limbs, known as gaits. Most horse breeds exhibit 4 gaits: walk, trot, canter, and gallop. However, some breeds exhibit additional gaits that result from the legs moving in different footfall patterns. It is known that a nonsense mutation within the gene DMRT3, a doublesex and mab3 related transcription factor that affects spinal cord development, is required for a horse to exhibit additional gaits, also known as gaitedness. Gaitedness is often a favorable trait for breeding and training purposes, a simple way to genotype horses for this mutation would therefore be helpful. Here we develop one such method using dCAPS primers and restriction enzymes to genotype horses at this locus.

B10

How does M. xanthus regulate transcription of BacM isoforms

BacM is a member of the bactofilin family of proteins found in bacteria that play a role in maintaining cell shape. Two isoforms, BacM-small (S) and BacM-large (L), can be observed in Myxococcus xanthus each with their own independent start codons, with their own predicted Shine-Dalgarno sequence. By immunoblot, BacM-S is observed to be ~6 times as abundant as BacM-L. Since the start codon for bacM-L is earlier on the transcript than bacM-S and as they share a common coding region, translation for BacM-S would be interfered by a ribosome already translating BacM-L. We consider three non-mutually exclusive hypotheses to explain the abundance of BacM-S. Translation reinitiation, where the previous gene on the genome, parB, has reached it's stop codon and does not reinitiate well on the bacM-L start codon, leading to more translation of bacM-S. The Shine-Dalgarno sequence of the bacM-L region is weaker than the one in the bacM-S region and could be initiating translation more efficiently than former. Rare codons for the amino acid lysine are also present in the sequence for BacM-L, possibly pausing the ribosome, and by extension translation, and allowing for translation of BacM-S to initiate before the encoded amino acids are incorporated. A plasmid was successfully constructed containing the bacM gene with a snippet of the upstream sequence and the sequence for mCherry was generated. 5 mutants were developed and successfully transformed into M. xanthus, collected, lysed, and analyzed through immunoblot.

B11

Using C. elegans as a Model to Investigate the Role of TCP11 in Sperm Activation and Male Fertility

Anna Nahata

Pace University

Human t-complex protein 11 (TCP11) is a testis-specific gene product hypothesized to be necessary for sperm capacitation, acrosome reaction, and proper sperm morphology. M05D6.2 is the Caenorhabditis elegans ortholog of human TCP11, and we are investigating M05D6.2 gene function as a model for understanding TCP11's role in human reproduction. C. elegans has two sexes: hermaphrodite and male. Sperm from both must undergo proper activation — including processes analogous to mammalian sperm capacitation and acrosome reaction — in order to migrate to and fertilize the egg. We used RNA interference (RNAi) to disrupt M05D6.2 function in C. elegans. Hermaphrodites subjected to M05D6.2 RNAi showed no reduction in fertility. However, males subjected to the same treatment showed a significant decrease in fertility despite producing a normal number of sperm. To further characterize M05D6.2 function and localization, we generated three transgenic C. elegans strains via CRISPR/Cas9 genome editing: a deletion mutant, a mutant mimicking mutations found in infertile male patients, and a GFP-tagged version of the protein. Preliminary results indicate that M05D6.2 is expressed in sperm and is necessary for proper sperm production. We are currently conducting fertility assays with the deletion and human-mutation-mimic strains to determine whether these mutations cause fertility defects.

B12

Testing α-Tubulin as a reference gene for chronic DEP exposure

Brayden Schaeffer

Wagner College

Endocrine disrupting chemicals (EDCs) are common environmental pollutants that interfere with normal hormonal signaling and could have long lasting effects on cellular physiology. One common class of EDCs, phthalates, serves as common plasticizers used to make plastics more flexible and durable, and as industrial solvents and binders in cosmetics. Because phthalates are not covalently bound to the plastic, they readily leech from the product resulting in persistent human exposure. The goal of this study was to determine whether α-tubulin would be a good reference gene for reverse transcription quantitative real-time PCR (RT-qPCR) studies analyzing the impact of chronic diethyl phthalate (DEP) exposure on gene expression in Drosophila melanogaster. To achieve this, we used the FlyPrimerBank online database to identify α-tubulin primers appropriate for RT-qPCR. We then used a primer optimization matrix to identify the optimal primer concentrations for one α-tubulin primer pair. We also conducted an assessment of the amplification efficiency of this primer pair by performing RT-qPCR on a serial dilution series of the RNA template. Our analyses revealed that 200nM is the optimal primer concentration for both the forward and reverse α-tubulin primers, and this primer pair yielded an R2 of 0.874 and an amplification efficiency of 117%. These data suggest that further experiments are needed to determine whether this α-tubulin primer pair should be used or whether another pair of primers is needed.

B13

Investigating Unfolded Protein Response Inhibitors for Functional Rescue of a PQ-Type Calcium Channel Mutation Associated with Epilepsy

Haverstick, E., Langdon, V., Kurtin, S., DeFalco, B., and Buraei, Z. Department of Biology and Health Sciences, Pace University, New York, NY

Voltage-gated calcium channels (VGCCs) are integral membrane proteins essential for neuronal excitability and muscle contraction. In neurons, depolarization activates these channels at axon terminals, allowing calcium influx to trigger neurotransmitter release. The PQ-type (Cav2.1) VGCC mediates central neurotransmission, and mutations can cause neurological disorders such as epilepsy. This study examined a truncation mutant of the PQ-type channel, Q1397X, located in the α1 pore-forming subunit. Using in vitro cRNA transcription, we modeled a heterozygous phenotype by coexpressing wild-type (WT) and Q1397X channels. Two-electrode voltage-clamp (TEVC) experiments revealed a significant reduction in current amplitude compared to WT alone, indicating a dominant-negative effect. Literature suggests that the Unfolded Protein Response (UPR) may mediate this effect by impairing mutant and coexpressed channel folding or trafficking. To test this, we pharmacologically inhibited two UPR pathways. 4μ8c, a selective IRE1α inhibitor, prevents mRNA splicing at the IRE1 catalytic site, while GSK2606414 inhibits PERK autophosphorylation. Both suppress UPR signaling but through distinct mechanisms. Prior results show that 4μ8c treatment partially restored WT channel function in oocytes coexpressing WT and Q1397X, implicating the UPR in the mutant's dominant-negative action. In contrast, GSK2606414 failed to rescue WT currents, suggesting pathway-specific effects. These findings indicate that aberrant UPR activation contributes to Cav2.1 dysfunction in the Q1397X mutant and highlight the need for further investigation into UPR-targeted therapies to mitigate dominant-negative VGCC mutations linked to epilepsy.

======== BIOLOGY (MICROBIOLOGY) ========

B14

Evaluating the Impact of Oral-Associated Chemicals on Streptococcus mutans Biofilms

Mia Isabel Reyes Paniagua1, Samuel Lescault1, Eva Varessis1, Christina N. Morra, PhD1

1Biology Department, Sacred Heart University, Fairfield CT, USA

Streptococcus is the most abundant genus in the oral microbiome. Streptococcus mutans is a primary causative agent for dental carries, pre-cavity dental lesions. Cavities are harmful to dental and overall human health. For long term colonization S. mutans must form and maintain a biofilm. S. mutans biofilms will be treated with oleic acid, tricalcium phosphate, or varied carbohydrate combinations and evaluated for the impact of these conditions on S. mutans biofilm formation. Oleic acid is a fatty acid common to oils like olive oil. Oleic acid is expected to damage the bacterial cell membrane, leading to cell death and biofilm failure. Biofilms will also be treated with tricalcium phosphate, a chemical used both as a decaking agent in food chemistry as well as a remineralizing agent to repair and strengthen tooth enamel. We expect tricalcium phosphate to interfere with the external pH of the bacterial environment inducing cell death, and biofilm failure. Alternatively, we will treat the S. mutans biofilms with sucrose, glucose or a combination of both. We expect the sucrose only condition to produce the greatest biofilm biomass, as the glucose alone condition is expected to also increase the acid byproduct production. If glucose boosts bacterial growth while sucrose drives extracellular polymeric substance production by the biofilm, the glucose and sucrose condition will have increased biofilm biomass formation. Overall, these studies seek to gain insights into the effects of these oral-associated chemicals and their impacts on human dental health.

B15

Holin proteins in Myxococcus xanthus contribute to pigmentation.

Nancy Kwelio and David Zuckerman

DKxanthene is a pigment that contributes to the yellow color in Myxococcus xanthus cells. We see this phenotype with mutations in multiple genes involved in the DKX synthesis pathway produces colonies that appear pale in color. We observed that holin mutants of M. xanthus have similarity pale pigmentation. Our experiment was designed to test the hypothesis that holin mutants synthesize DKxanthene but there is a defect in transportation to the membranes. Alternatively, we hypothesized that DKxanthene was not synthesized at all in holin mutants. To challenge the hypothesis, we performed a methanol extraction experiment to detect DKxanthene. The absorption spectrum experiment required control groups for comparison with holin mutants to determine the amount of DKxanthene produced or if DKxanthene is not synthesized at all. A wildtype strain of M. xanthus was used as a positive control for the presence of DKxanthene. A dkxG mutant was important as a negative control. Therefore, a cloning strategy to generate plasmids to disrupt the dkxG gene was developed. Cloning plasmids for dkxG disruption was successful, and sequence data confirmed the presence of inserts in the region of interest. Transformation into M. xanthus produced pale colonies, as expected. Methanol extraction and absorption experiments revealed holin mutants having similar absorption spectrum to dkxG mutants, supporting the competing hypothesis of a defect in DKxanthene synthesis in holin mutants.

B16

Scavenger Receptors Impact the Immune Control of Chlamydia

Thomas Wolosinski and David Gondek

Ithaca College

White blood cells protect the body from invading organisms by consuming the invader and presenting antigens, “foreign pieces” of the invader, to the immune system. Antigen presentation elicits a foreign organism-specific response, to protect the body now and in any future invasion. CD91 is a scavenger receptor expressed on a variety of immune cell types that binds to heat shock proteins. In dendritic cells, a type of antigen-presenting cell, the receptor was shown to play a role in the endocytosis of antigen peptides. Previous research has pointed toward CD91 having a role in cancer immunity and controlling HIV infection. However, the receptor’s role in controlling bacterial infection is currently unknown. This study investigated this role by infecting mice with an antigen-presenting cell-specific knockout of CD91 with Chlamydia muridarum. Samples were then collected from lymph nodes and blood plasma to investigate cell-mediated and humoral immunity against the intracellular bacteria. Results show no difference in Chlamydia-specific CD4+ T cell proliferation or IgA antibodies, but greater production of Chlamydia-specific IgG antibodies at 32 days post-infection. These findings suggest that CD91-/- mice produce a more robust immune response leading to higher IgG levels. Alternatively, the IgG response is high because the infection is ongoing, and the CD91-/- mice have failed to clear the pathogen. Future research will include monitoring the bacterial abundance over time, as well as measuring IgM and IgD production to determine the knockout’s effect on B cell class switching.

B17

Is BacM Polymerization Polar Through N- and C-Terminal Subunit Interactions?

Avia Willis

Iona University

Bactofilins are cytosketelal proteins found in bacteria. BacM is a bactofilin protein that is present in the model organism *Myxococcus xanthus* . BacM has two isoforms, BacM-L and BacM-S. The N-Terminus of BacM-L has an additional 23 amino acids relative to BacM-S. Mutant *M*. *xanthus* cells without BacM have a defective cell wall and crooked shape. BacM has been shown to have robust polymerization without any cofactors. We hypothesize that BacM polymerization is polar, with interactions between the N-terminus of one subunit and the C-terminus of the next. Research from other bactofilins suggests that polymerization may be non-polar. To determine the polarity of BacM polymerization, mutations that disrupt polymerization from either the N- or C-terminus have been made. Four plasmids have been engineered for expression of BacM and various polymerization mutants in *E*. *coli*. Mutants will be purified and their ability to dimerize will be assessed using gel shift analysis.

B18

The Expression of Human Amyloid Precursor Protein in Cultured Chick Forebrain Neurons

Julianna Koman, Benedetto Galluzzo, Liliane Flaim, and Mark Jareb

Biology, Sacred Heart University, 5151 Park Avenue, Fairfield, CT 06825.

The amyloid precursor protein (APP) is widely expressed in the central nervous system and evidence suggests it plays a key role in the pathogenesis of Alzheimer's disease. Understanding the normal targeting and processing of the APP protein in neurons will provide insight into the mechanisms that result in the pathophysiology associated with Alzheimer's. We have expressed a FLAG-tagged human APP in cultured embryonic chick forebrain neurons and visualized its distribution using immunocytochemistry and fluorescent microscopy. Preliminary data suggests that the APP protein is expressed in both the somatodendritic (cell body and dendrites) domain and axons of the cultured chick neurons consistent with data in other systems. Live staining of the FLAG-APP construct suggests that cell surface staining is primarily in axons.

B19

The Expression of Human α6 and β4 Integrin Receptor Subunits in Cultured Chick Forebrain Neurons

Nadia Gaberkorn, Paris Carbone, Sarah Downing, and Mark Jareb,

Biology, Sacred Heart University, 5151 Park Avenue, Fairfield, CT 06825.

Previous data suggest that a laminin receptor is localized in the axons of chick forebrain neurons mediating the axon-growth promoting properties of laminin. Many heterodimers from the integrin family of proteins have previously been identified as laminin receptors, including the α6β4 heterodimer. We tested the role of β4, β1, and α6 integrins in laminin-induced increases in axonal growth using function blocking antibodies. Axons grown on laminin treated with β4 integrin function blocking antibodies or α6 integrin function blocking antibodies were significantly shorter compared to untreated cultures or cultures treated with a β1 integrin function-blocking antibody. These data are consistent with the hypothesis that the α6β4 heterodimer acts as the axonal laminin receptor in embryonic chick forebrain neurons and is important in axonal development and growth. To directly test whether α6 or β4 integrin was localized to axons, we transfected cultured forebrain neurons from embryonic chick with DNA constructs encoding both α6 and β4 integrin genes. Preliminary results show α6 and β4 integrin expression in axons as well as dendrites, though live staining suggests that cell surface α6 is more polarized to the axons.

======== BIOLOGY (PHYSIOLOGY) ========

C1

Effects of Alli (Orlistat) on Memory in Long-Evans Rats

John (Jack) Desmond & Bailey Parsons

John Carroll University

The present study investigated the influence of Alli, a gastric and pancreatic lipase inhibitor, on spatial working memory in average-weight rats. Control and experimental rats were placed into individual cages equipped with a running wheel, and food and water were provided ad libitum. The study was divided into two periods: 1) habituation, 2) experimental. Experimental rats were administered a weight-adjusted dose of Alli during the experimental period. Spatial working memory was evaluated using the Morris Water Maze (MWM). Rats were evaluated by performance in the MWM on the final day of the habituation period, and on the seventh day of every week during the experimental period. Platform placement and start location remained constant throughout the experiment. It was hypothesized that Alli would enhance the spatial working memory and significantly decrease body weight without side effects on activity level or food and water intake in rats. Results supported this hypothesis. Alli-treated rats had a significant improvement in working memory and had significantly lower body weights than control rats at the end of the study, with no effects on average daily food and water intake. However, contrary to expectations, the Alli administration produced significant increases in running wheel activity as compared to control rats. It was concluded that Alli treatment in rats can enhance spatial working memory, and decrease body weight without suppressing normal appetite.

C2

Evaluating the Accuracy of Handheld Lactate Meters for Quantifying Lactate in Fish Muscle

Sophia Wellisch and Ashley Stoehr

Sacred Heart University

Lactate accumulation is a key indicator of physiological stress and mortality risk in fishes following capture. Lactate is produced in white muscle during anaerobic metabolism and diffuses from the muscle into the bloodstream at species-specific rates. This study evaluates whether handheld lactate meters, originally developed for measuring lactate in human blood, can quantify lactate concentrations in fish muscle tissue. Rapid, reliable field measurement of lactate could improve assessments of fish condition and inform handling practices that reduce post-release mortality. Flash-frozen white muscle from tuna (*Thunnus sp.*), mahi mahi (*Coryphaena sp*.), and orange roughy (*Hoplostethus sp*.) was purchased from local supermarkets and homogenized in a teleost buffer solution. Two handheld meters (Lactate Scout Plus and Lactate Scout Vet) were used to measure lactate concentrations in homogenized muscle under different conditions (e.g., time since homogenization, centrifugation). Results to date suggest that hand-held meters can measure lactate in homogenized muscle, and measurements differ between fish with different activity levels. Additional tests will examine the effects of sample temperature and storage on lactate measurements to inform best practices for field use. The development of a reliable protocol could support real-time field assessments of fish stress and contribute to improved conservation and catch-and-release practices.

C3

Adrenal gene expression in female tree swallows: Examining the relationship between aggression and steroid hormones

Ariana Boes, Kate Vincent, Emily J Levy & Kimberly A Rosvall

Sacred Heart University

Elevated levels of circulating glucocorticoids and sex steroids, such as testosterone, have been positively correlated with high territorial aggression across numerous species, particularly with males. This is similar to the challenge hypothesis, which proposes that these hormone changes enable territorial aggression and increase fitness. However, this relationship between glucocorticoid levels, sex steroids, and aggression in females remains unclear. We explored this relationship by examining adrenal gene expression in female tree swallows (Tachycineta bicolor). Female tree swallows require a nest for reproduction and must vigorously fight to obtain and protect their territory. Ten experimental females and eight controls were collected in early spring amid territorial establishment, and therefore, at peak aggression levels. The ten experimental subjects were collected after exposure to a simulated territorial intrusion (STI) to imitate the prevalent social challenges faced by female tree swallows during territorial establishment. The eight control subjects were not challenged. Using qPCR, we measured adrenal gene expression of six steroidogenic enzymes in the pathway toward sex steroid and glucocorticoid production. We hypothesized that the experimental females, who experienced the social challenge, would have higher levels of adrenal gene expression than the control females, who were not challenged. Preliminary results suggest that the experimental challenge did not affect expression of the genes we measured. This work helps us understand mechanisms of territorial aggression in females as they prepare to reproduce.

C4

Hot headed: Brain immune-related gene expression following a heat challenge in nestling tree swallows (Tachycineta bicolor)

Liliana Sosnowski, Kate Vincent, Megan Murphy, Mary Woodruff, Kimberly A Rosvall & Emily J Levy

Sacred Heart University

In the face of climate change and the growing intensity of heat waves, understanding how such environmental stressors affect physiological development can help us assess organismal persistence. However, in endotherms, little is known about physiological changes to the brain due to elevated heat. Since endotherms rely on thermoregulation to maintain ideal thermal neutral zones, acute and chronic heat exposure may induce immune stress resulting in energy diversion from key development processes to maintain homeostasis. In this study, we investigate changes in immune-related gene expression in the brain of nestling tree swallows (Tachycineta bicolor), following an experimental heat challenge. We hypothesize that, within the hippocampus, heat exposure will result in upregulation of immune-related genes to maintain homeostasis. When nestlings were twelve days old, nest temperatures were experimentally elevated by 4.5°C for four hours. After experimental trials, we extracted the hippocampi and measured expression of genes associated with immune system activation: a pro-inflammatory cytokine (TNFa), a cytokine receptor (IL6R), glucocorticoid receptor (GR), and a heat-shock protein (HSP90AA1). Preliminary analyses suggest that these genes were positively correlated with each other, suggesting co-regulation, and that the heat treatment did not affect gene expression in the brain, suggesting that other biological mechanisms can help buffer tree swallows against heat waves. By studying the activation of these genes, we can better understand endotherm neurophysiological responses resulting from elevated heat exposure.

======== BIOMECHANICS ========

C5

Climbing smarter, not harder: gait adaptation, limb proportions, and metabolic implications of steep terrain

Luke Wilke and Kate Harrison

Department of Biology, Sacred Heart University

Historically, human gait research has focused on level or mildly inclined walking, leaving the physiological and biomechanical changes that occur during steep slope walking poorly understood. We developed a methodological framework to evaluate how limb proportions and gait variation during steep incline walking are linked to the metabolic cost of transport. Participants will complete treadmill walking trials at 0%, 20%, 30%, and 40% slopes while wearing zero-drop footwear. To ensure completion of the trial without complications of glycolysis, we are prioritizing participants from mountaineering backgrounds. Data collected will include anthropometric measurements (height, weight), ankle dorsiflexion range of motion (ROM), oxygen consumption (VO2), heart rate, and three-dimensional gait variables (i.e., foot strike pattern, foot progression angle, step width, and stance symmetry). These gait variables will be captured using a combination of markless motion capture (Theia3D, Visual3D) and standard videography. Preliminary data suggest that variables such as ankle dorsiflexion ROM and foot progression angle (outward rotation of feet while walking) may influence metabolic cost when walking at higher slopes, however, results may be complicated by the small sample size of our pilot data. Continued research will determine slope thresholds at which gait transitions occur and clarify how anatomical or gait differences relate to cost of transport. Our method provides a scaffold for further studies in biomechanics, rehabilitation, and assistive device design by combining both metabolic data and gait variable information in the traversal of steep terrain.

======== ELECTROPHYSIOLOGY/EXERCISE SCIENCE/NEUROMUSCULAR TESTING ========

C6

Neuromuscular and Functional Normative Profiling of Collegiate Baseball Pitchers Using Tensiomyography, Handgrip Dynamometry, and Functional Movement Screening

Michael Cohen, Patrick Horvath, Deric Grohowski

King's College, Wilkes-Barre, PA, USA

PURPOSE: To establish normative neuromuscular, strength, and functional movement profiles in collegiate baseball pitchers using tensiomyography (TMG), handgrip dynamometry, and Functional Movement Screening (FMS).

METHODS: Seven male collegiate pitchers (18–25 yrs) completed one pre-competitive laboratory session. TMG assessed delay time (Td), contraction time (Tc), maximal displacement (Dm), and relaxation time (Tr) of the biceps brachii, pectoralis major, anterior deltoid, posterior deltoid, and middle trapezius using a TMG Science for Body Evolution device. Three trials per muscle were averaged. Bilateral isometric grip strength was measured with a hydraulic dynamometer, and shoulder mobility was evaluated via the FMS Shoulder Mobility Test. Inter-limb comparisons were analyzed with Wilcoxon matched-pairs tests ($p \leq 0.05$). An AI tool (ChatGPT) was used only for formatting and editing; all scientific content was produced and verified by the authors.

RESULTS: Significant dominant-side adaptations were observed. Tc was shorter in the anterior ($p = 0.034$) and posterior deltoid ($p = 0.016$). Tr was shorter in the biceps brachii ($p = 0.012$), anterior deltoid ($p = 0.005$), and middle trapezius ($p = 0.008$). Dm was lower in the dominant posterior deltoid ($p = 0.048$), indicating increased stiffness. Td showed no differences ($p > 0.05$). FMS shoulder mobility trended lower on the dominant side ($p = 0.051$). Grip strength was symmetrical.

CONCLUSIONS: Pitchers demonstrated sport-specific neuromuscular adaptations characterized by faster contraction and relaxation and increased dominant-side stiffness, with mild mobility asymmetry.

PRACTICAL APPLICATIONS: These normative data may assist practitioners in identifying asymmetries, guiding corrective strategies, and monitoring performance and return-to-play readiness.

======== HEALTH SCIENCES ========

C7

Evaluating Neuromuscular Asymmetry Across Four Muscle Groups Using Surface Electromyography (sEMG): An Application of Real-Time Feedback Technology

Patrick Horvath, Michael Cohen, Dr. Deric Grohowski

PURPOSE: To evaluate neuromuscular activation asymmetries in the upper trapezius, lower trapezius, rectus abdominis, and gluteus medius using a portable sEMG system (Myoact), and determine the effect of real-time visual EMG feedback on activation patterns and fatigue across repeated contractions.

METHODS: Thirteen healthy undergraduates completed a repeated-measures design. Wireless sEMG sensors were placed bilaterally according to standardized guidelines. Participants performed two randomized conditions (no feedback, real-time visual feedback) separated by rest. For each muscle, 10 standardized isometric contractions were performed. sEMG amplitude was analyzed using two-way ANOVA (side × time × condition; $p < 0.05$).

RESULTS: Significant side-to-side asymmetries were observed across all muscles in both conditions. In no-feedback, asymmetries were present in upper trapezius ($p = 0.0050$), lower trapezius ($p = 0.0139$), rectus abdominis ($p < 0.0001$), and gluteus medius ($p < 0.0001$). A main effect of time was found only for lower trapezius ($p = 0.0313$). With feedback, side differences persisted for all muscles ($p \leq 0.0462$). Feedback significantly altered bilateral activation across all muscle groups ($p \leq 0.0001$).

CONCLUSIONS: The portable sEMG system detected asymmetries comparable to laboratory systems. Real-time feedback altered activation patterns, though responses varied individually. The lower trapezius demonstrated the greatest fatigue-related changes.

PRACTICAL APPLICATION: Portable sEMG with real-time feedback provides practitioners a field-ready method to identify neuromuscular asymmetries and monitor performance. This technology may enhance injury risk screening, corrective exercise programming, and rehabilitation monitoring in athletic and clinical settings.

C8

Mitochondrial DNA Mutations Accelerate Structural Degeneration and Pain Sensitivity in Osteoarthritis

Mohammad I. Naqash

Neuroscience Concentration, John Carroll University

Osteoarthritis (OA) is a leading cause of disability worldwide and is characterized by progressive joint degeneration and chronic pain. Mitochondrial dysfunction has emerged as a critical contributor to OA pathogenesis, influencing cartilage degradation, bone remodeling, and inflammatory signaling. This study investigated the role of mitochondrial DNA mutations in OA progression using Polymerase Gamma (Polg) knockout (KO) mice. OA was induced via destabilization of the medial meniscus (DMM) surgery in wildtype (WT) and Polg KO mice. Trabecular bone structure, bone mineral density, and tissue volume were assessed using micro-computed tomography, and cartilage integrity was evaluated through histological analysis. Pain sensitivity was measured using pressure application measurement (PAM). Polg KO mice demonstrated significantly lower bone volume/total volume (BV/TV), reduced trabecular thickness and number, increased trabecular separation, and decreased bone mineral density compared to WT mice, particularly under DMM conditions. KO mice also exhibited reduced tissue volume and lower mechanical pain thresholds, indicating enhanced pain sensitivity. These findings suggest that mitochondrial dysfunction accelerates structural joint degeneration and amplifies pain-related outcomes in OA. The results support a mechanistic link between mitochondrial DNA instability, bone deterioration, and neuroinflammatory pain pathways, highlighting mitochondrial health as a potential therapeutic target in osteoarthritis.

======== COMPUTER SCIENCE ========

C9

Tuned Mass Damper (TMD) Test Lab

Dhruv Patel and Zachery Drake

Department of Mathematics, Physics, and Computer Science, Wilkes University

The Tuned Mass Damper (TMD) Test Lab is a microservices-based platform that performs parallel, scalable simulations of skyscrapers with a TMD under seismic events by creating a virtual copy of the skyscraper (a “digital twin”), using attributes like mass, stiffness, damping, and yield strength, then generating an earthquake using acceleration values and time steps between accelerations. The simulation uses a mathematical solver to map the earthquake to the building, producing results that can estimate if the building is at risk of collapse. TMD Test Lab is designed to allow civil engineers to create hypotheses and simulate a large number of structures under various seismic conditions.

Structural simulations are traditionally time-intensive and monolithic, slowing down large-scale testing and exploration [1]. The goal was to build a modular simulation environment that demonstrates how microservices can scale structural simulations and enable rapid exploration.

C10

DiagSatLite: Automated Test System for Spacecraft

Will Everett, Jack Purcell, and Nufsat Tasni

Department of Mathematics, Physics, and Computer Science, Wilkes University

Spacecraft subsystem testing is traditionally resource intensive, often limiting rapid iteration and fault analysis. To address these challenges, this project presents DiagSatLite, a lightweight, automated testing platform designed for satellite power subsystem diagnostics. The system utilizes a modular, microservice based architecture to simulate nominal telemetry, inject controlled faults, and apply rule based checks for anomaly detection. The platform models a satellite's power subsystem telemetry including photovoltaic power, battery state of charge (SOC), and internal resistance and injects faults such as SOC drops and sensor anomalies. Telemetry is streamed in real time through an MQTT broker and routed via Redis to independent ingestion, storage, and analysis services. A rule based diagnostics engine evaluates incoming telemetry and triggers alerts based on threshold driven conditions, such as low SOC, enabling rapid anomaly detection without physical hardware. A SQLite backed storage service archives all telemetry for post test analysis, while an API Gateway and dashboard provide real time charts and system status. Running on Docker Compose, DiagSatLite demonstrates that modern microservice architectures provide scalable, reproducible test environments suitable for small scale missions. Future work includes additional subsystem simulation, encrypted communications, and machine learning based fault detection. By replacing manual testing with an automated, software first pipeline, DiagSatLite enhances the reliability and development speed of modern spacecraft ground segments.

C11

Leveraging LLMs for QA Dataset Creation and Evaluation from a Historical Sermon Corpus

Cherry Mercedes, Juliana Stefanec, Anthony Kapolka, Brent Young

Department of Mathematics, Physics, and Computer Science, Wilkes University

This project builds a question–answer (QA) dataset from Harper's Monthly Pulpit (1932–1937), a 514-sermon collection documenting Protestant preaching during the interwar period. The dataset is intended to support evaluation of retrieval-augmented generation (RAG) systems on specialized historical texts — a domain where vocabulary, style, and theological framing make standard benchmarks a poor fit.

Token context limits forced us to work with five sermons at a time, so sermon selection mattered. We tested two approaches: a Breadth strategy using random sampling, and a Depth strategy that grouped sermons by thematic similarity using TF-IDF–weighted embeddings. Questions were generated via ChatGPT — topic-guided for Breadth, keyword-guided for Depth — and answers were retrieved through a FAISS index built from 2,000-word sermon chunks.

We evaluated all QA pairs against a 25-theme annotation framework covering theological, ethical, social, and rhetorical categories. Two hypotheses guided the work: that generated questions would meaningfully reflect the corpus's core themes (H1), and that thematically grouped sermons would yield more coherent QA pairs than randomly sampled ones (H2).

Results suggest the strategies pulled in different directions — usefully so. Keyword-guided prompts produced doctrinally precise questions grounded in sermon vocabulary. Topic-guided prompts ranged wider, picking up pastoral and moral concerns that keyword methods missed. Neither approach dominated; the more interesting finding is what each one couldn't do alone.

======== PSYCHOLOGY (CLINICAL/COUNSELING) ========

C12

Effects of GABA Supplement as an Anxiolytic in Long-Evans Rats

Grace Dralle and Morgan Szykowny

John Carroll University

Gamma aminobutyric acid (GABA) is an inhibitory neurotransmitter that promotes parasympathetic effects. Thus, it has an anxiolytic property and can relieve stress or anxiety. The purpose of this study was to explore the anxiolytic properties of GABA for potential future utilization in patients suffering from anxiety disorders. In order to determine if GABA does in fact promote anxiety relief, GABA supplements were administered at 1250 mg/kg of body weight to 6 male Long Evans rats for 3 weeks and compared to a control group consisting of 6 male Long Evans rats lacking the supplement. There was no statistically significant difference in mean weight, mean food consumption, or mean water consumption between control and experimental groups. However, there was a statistically significant change in anxiety level in the experimental group between the habituation period and the experimental period. This was determined by test trials using the elevated plus maze and suggested that the GABA supplement provided the experimental rats with anxiety relief.

C13

Ashwagandha and its Effects on Anxiety in Long Evans Rats

Emma Manley

John Carroll University

Ashwagandha (Withania somnifera) is an adaptogenic herb known to reduce anxiety in both humans and rats. Relevant literature on the effect of ashwagandha supplementation in Long Evans rats over time is scarce. The present work aims to determine the effects of ashwagandha supplementation on this species of rat. Six male Long Evans rats were given a 100mg/kg daily dose of ashwagandha for a four-week experimental period, then their anxiety behavior was measured by the elevated plus maze (EPM) and analyzed statistically. Relative open arm activity was used as the quantitative indicator of reduced anxiety. Body weight, daily food, and daily water intake were analyzed as well. It was found that there was no significant difference between control and experimental groups in terms of open arm activity by the end of the experimental period. However, there was significant increase in open arm activity of the experimental group over the course of the experimental period as opposed to the control group. Also, the experimental group weighed and ate significantly more on average than the control. The present work showed that ashwagandha supplementation leads to a relative decrease in anxiety behavior, and increase in body weight and food intake in Long Evans rats over time. Further studies with larger sample sizes and longer experimental periods should be investigated.

C14

The Relationship Between Emotional Intelligence and Personality Traits, Social Media Use, and Coping Styles

Olivia West & Amy Eshleman

Department of Psychology, Wagner College

Emotional intelligence (EI), or the ability to recognize, understand, and manage one's own and others' emotions, has become a major focus of psychological research due to its association with prosocial and self-enhancing behaviors and functions. The use of active and problem-focused coping styles, which are the thoughts and behaviors used to confront and reduce a stressor directly, have a positive correlation with EI. During the rapid popularization of social media over the past few decades, there have been questions about social media's role as a coping mechanism (or a possible cause of stress itself), and what qualifies problematic forms of social media use (PSMU). EI and "Big Five" personality traits of neuroticism, openness, and conscientiousness predict patterns have been shown to predict increased PSMU. The present research consists of two studies exploring the relationships between EI and coping styles, personality traits, and social media use. The results of Study I found positive, statistically significant relationships between EI and conscientiousness, openness to experience, and problem-solving coping. Contrary to prediction, no significant correlations were found between EI and PSMU or total hours spent using social media per day. Study II updated scales and self-report measures of social media use, and results found that participants who reported PSMU also tended to report more time spent on social media and engage in more avoidant coping methods. These findings may be applied to understand the risk factors associated with developing PSMU or for research investigating the impact of social media on methods of coping.

C15

A Look at Reported Domestic Violence Rates During the COVID-19 Pandemic

Jaime Kinyon & Charlotte Samuels Mentor: Jody Resko

Queensborough Community College - CUNY

Abstract: Domestic Violence is defined by Merriam-Webster as "violent or abusive behavior directed by one family or household member against another." During the initial phase of the COVID-19 pandemic, stay-at-home orders may have contributed to an increase of domestic violence reports, where adult women were the reported victims. This quantitative review analyzed multiple research articles, government reports, and hotline data to assess changes in domestic violence reporting across the United States from the beginning of 2019 to the end of 2020. The findings indicate that reported incidents rose during the initial lockdown phase in 2020 compared to the same period in 2019. Additionally, reports were able to shed light on some of the reasons why incidents increased, suggestions for improving care to domestic violence victims, assessing risk factors such as class, race, and socio-economic status, and adapt for circumstances which might lead to underreporting. These reports can help state agencies to better address domestic violence prevention in extreme situations.

C16

Do moral and pragmatic judgments differ in their physiological correlates?

Jaylen Hargrove

Saint Peter's University

The current study explores possible ways that moral judgments differ from non-moral judgments. Previous research has found that people's judgments of everyday behaviors such as "studying" or "wearing a seatbelt" can be influenced by merely framing them in a moral (rather than pragmatic) way (Van Bavel, Packer, Haas, & Cunningham, 2012). Specifically, evaluations of behaviors framed in moral terms were more extreme (i.e., more right/wrong) and were applied more universally. Furthermore, morally framed evaluations were also found to be made more quickly – a finding consistent with theories that moral judgments are based on brief flashes of affect laden "moral intuition" (Haidt, 2001). Building off this past research, the current study sought to also test the hypothesis that moral judgments are more "intuitive" by testing whether they are associated with greater physiological arousal. Participants (N = 87) evaluated a series of 60 different behaviors while we collected data on their skin conductance levels. Furthermore, we also measured several individual difference variables related to affective/intuitive responding to help validate any skin conductance results we found. Our results showed mixed evidence for the intuition hypothesis. Although moral (compared to non-moral) judgments were made more quickly and associated with higher skin conductance levels, analyses including relevant individual difference measures showed a pattern of results opposite what the intuition hypothesis would predict – the effects were larger for those higher in Need for Cognition and smaller for those who reported a greater tendency to relay on "affect based intuition" when making judgments.

======== SOCIOLOGY ========

C17

Who Speaks for the Sharks? A Systematic Review of Gender Representation in Discovery's Shark Week

Gursahiba Johar, Kaitlyn Hartmann, Morgan deHaven, and Ashley Stoehr

Sacred Heart University

Gender disparities in media visibility can impact inclusivity in STEM because the media can shape public perceptions of scientists and influence career aspirations. In this study, we examined the representation of women as shark experts in Discovery's Shark Week. We aimed to quantify the screen time and qualify the overall representation of women who were named as shark experts in a systematic review of Shark Week episodes. Recorded variables included the perceived gender of experts, whether women were named and the duration of screen time or narration for named women. A subset of episodes was independently reviewed by multiple observers to quantify inter-observer error and ensure reliability. Despite some differences, results overwhelmingly suggest that women are underrepresented, appearing less frequently as named experts and with less screen time than men. These findings highlight a lack of gender diversity among featured shark experts in Shark Week, which could perpetuate stereotypes and discourage women from STEM careers. Working to increase the visibility of women scientists in media continues to be vital for equity and inspiring future generations.

======== CHEMISTRY ========

C18

Addition of antibodies to copper to test surface modifications on frequency variations due to the presence of biomolecules

Lina Amraoui
Manhattan University

A copper-based square split-ring resonator (SRR) sensor was used for label-free detection of biomolecules, with a focus on the chemistry and biochemistry of the surface modification. The binding of biomolecules (such as antibodies) changes the local dielectric properties at the surface of the resonator, which leads to a measurable frequency shift. Even though many previous sensors have used gold or silver materials, this study used copper, which is much more cost-effective. The copper surface of our sensor was cleaned, etched, and then chemically modified to create a self-assembled monolayer, using 4-mercaptobenzoic acid (MBA) to bind oxidized copper, utilizing its thiol group. EDC (1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride) and NHS (N-Hydroxysuccinimide) crosslinking chemistry was applied to tether antibodies to the copper surface. A chemical bridge was formed from the copper to MBA to EDC to NHS and finally to an antibody, in order to test frequency shifts in the sensor due to the presence of the biomaterial. Using monoclonal rabbit antibodies, frequency shifts after binding showed about 1.75 times higher sensitivity compared to similar SRRs reported before. Overall, this work shows that proper surface chemistry and antibody immobilization play an important role in improving sensitivity for label-free biomolecule detection. Here we report on the successful chemical addition of antibodies to a copper plated SRR through chemical crosslinking to the copper surface.

C19

Synthesis of an Abundant Metal Catalyst Based on a Cobalt-Bipyridine Complex for Sustainable Energy Applications

Allyssia Merisier (Student) and Yosra Badiei (PI)
Saint Peter's University, 2641 John F. Kennedy, Jersey City, 07306

The quest for sustainable, carbon-neutral fuels, particularly hydrogen, necessitates the development of efficient water-splitting catalysts. While precious metal complexes, such as the Ru-based polypyridine "Blue dimer," are typically used for water oxidation, this study focuses on more affordable and abundant metal catalysts. Specifically, we have synthesized and will comparatively analyze the catalytic activity of two cobalt-based compounds in water splitting: a mononuclear cobalt(II) bipyridine aqua ligated complex, $[Co(bpy)_2(H_2O)]^{2+}$with 2,2'-bipyridine and a dinuclear $[Co(bpy)_2(en)(H_2O)_2{}^{2+}]$. The electrocatalytic activity of these complexes will be evaluated by constructing an electrochemical cell for anodic water oxidation and performing cyclic voltammetry studies. This work contributes to the advancement of sustainable fuel development by examining viable cobalt-based alternatives.

P1

Signals That Shape Muscle: Investigating Meteorin and Meteorin-Like as Candidate Regulators of Muscular Development in Zebrafish

Sophia Liu, Lilly Mearsheimer, Narendra Pathak, Michael Barresi

Department of Biology, Smith College

Skeletal muscle development begins in early embryogenesis and involves myofiber migration, elongation, myofibril formation, and maintenance. Disruption of these early processes can lead to muscle diseases, including muscular dystrophies. In this study, Meteorin (Metrn) and Meteorin-like (MetrnL) are suggested candidate factors implicated in slow muscle development. Metrns are small, secreted paralogous signalling proteins and putative morphogens conserved among vertebrates. They have not been studied in the context of muscle development. MetrnL is associated with muscle repair and is induced by cold and exercise. However, Metrn is mainly reported to regulate nervous system development with no role in muscle.

MetrnL is mRNA is detected in migratory slow muscle cells, and metrn/metrnL in regenerating muscle via in situ hybridization chain reaction. Furthermore, inhibition of metrn/metrnL translation via vivo-morpholino injections produces morphants with muscle integrity defects: at 50 hpf, metrnL morphants exhibited loosely packed myofibrils, and metrn morphants displayed reduced fiber tortuosity. Metrn/metrnL double morphants exhibit defects substantially more severe, suggesting that roles of metrn and metrnL are synergistic. Furthermore, muscle integrity defects appear after 25 hpf and worsen over time, indicating a role in slow muscle maintenance rather than initial formation.

Loss-of-function-induced phenotypes are consistent with those associated with muscular dystrophy. Thus, metrns appear to play a role in the maintenance of muscle integrity. Understanding metrns' developmental function may clarify new avenues for development of drug therapies to alleviate muscle dystrophy, for which treatments are limited.

P2

The Teratogenic Effects of Tire-Based Pollutants on Pimephales promelas Morphology

Charles Stearns

Ithaca College

Classified as contaminants of emerging concern, tire wear particles are a type of microplastic with leaching properties through photodegradation and extended saturation. The cocktail of toxicants released includes polymers, antioxidants, PAHs and heavy metals. Notably, the synthetic-derived material 6PPDQ was linked with urban runoff syndrome, the mass mortality of juvenile salmon in spawning streams. A fish embryo toxicity test (FET) was conducted to assess the nonspecific sublethal impairments and lethality of two different tire-based pollutants' leachates on Pimephales promelas morphology, a common species of minnow found in northern US urban streams. This study highlights the teratogenic effects of different tire-rubber pollutants and how each affects the potential fitness and survivorship of embryonic and larval minnows susceptible to urban runoff. Eggs were exposed from 0 hours post-fertilization (hpf) to 120 hpf in two different types of 8-day leachates: tire mulch (recycled tire rubber and fibers for landscaping) and tire aggregate (standard tire rubber, fibers, and the binding metal wires). Three treatments were used for each leachate: 132 g/L, 66 g/L, and ecologically relevant 33 mg/L. Hatched larvae were analyzed at 120 hpf using microscopy and scored for the presence of edema, spinal deformities, and coagulation (mortality). A subsample of each exposure and deformity was imaged to measure standard larval length using ImageJ. All sublethal endpoints were observed in each treatment and exposure, including the control. Tire mulch exposures had a significantly greater teratogenic effect on the number of mortalities and frequency of endpoints such as pericardial edema and lordosis.

P3

Components and Toxicity of Artificial Turf Runoff and Leachate

Joseph Napolitano

Ithaca College

Artificial turf has become prevalent and is regarded as the standard for good sports facilities. What environmental impact can these fields have? The runoff of a turf field's rubber crumbs, layers of fabrics, and artificial grass contains emerging contaminants such as tire wear particles (TWPs), PFAs, and microplastics. These compounds can leach out toxins including endocrine disruptors, carcinogens, neurotoxins, and mutagens. I quantified the concentration of TWPs from the runoff of Ithaca College's Buttermilk Field and compared the concentration to stormwater data from the Ithaca area. A sample was sent to be tested for PFAs compounds and Nile red dye was used to analyze microplastic prevalence.

I conducted toxicity tests on Nicotiana benthamiana to assess sublethal and potentially lethal effects of the turf runoff. Tests were conducted on control groups and artificial turf leachate groups. After six weeks, differences in average dry biomass were measured between groups.

Toxicity tests showed no statistically significant differences in growth between control and treatment groups. There was a smaller variety of PFAS compounds detected, however, there were significantly more PFOAs than stormwater. TWP results showed reduced concentration in runoff compared to the average of three stormwater sites; however, this average was greatly inflated by one site. Microplastics were also found in the turf runoff. Differential expression of oxidative response genes were then analyzed by qRT-PCR. Results are to be determined. As installation of turf fields increases globally and these contaminants are starting to be found in our bodies, the vitality of this research grows.

P4

The Relationship Between Experiences of Discrimination and Devaluation and Disordered Eating

Kaitlyn Miranda, Amy Eshleman, & Laurence J. Nolan

Department of Psychology, Wagner College

Experiences with discrimination, prejudicial treatment of individuals based on their characteristics, and perceived devaluation, perception of oneself being “less-than”, are of interest to researchers due to positive correlations with maladaptive eating variables. This study examined this relationship, as well as the interrelations between different measures of discrimination experience. We also examined the role of impulsiveness which is often positively related to problem eating. Participants (n = 138; 88 women and 50 men) were recruited from the Wagner College psychology department participant pool, and asked to complete four self-report questionnaires. These included the Dutch Eating Behavior Questionnaire (DEBQ), to measure emotional, external, and restrained eating, the Everyday Discrimination Scale (EDS), measuring experiences of day-to-day unfair treatment scored for both frequency and chronicity of experience, the Barratt Impulsiveness Scale (BIS), assessing attentional, motor, and non-planning impulsiveness, and the Multiple Devaluation Scale (MDE), measuring experiences with feeling devalued for body characteristics (e.g., shape, weight) and non-body related characteristics (e.g., ethnicity, gender) . Statistical analyses conducted included correlations, to examine relationships between measures of devaluation, devaluation, and eating behavior, and multiple regression, to examine which variables predict emotional and restrained eating.

P5

*Drosophil*a Egf receptor signaling regulates transcription of genes involved in eggshell Morphogenesis

John Tondora, Dr. Lisa Kadlec

BESS Department, Wilkes University, Wilkes Barre, PA, 18766

Signaling by the *Drosophila* epidermal growth factor receptor (Egfr) plays a critical role in many aspects of fly development. Importantly Egfr signaling has a well-established role in the patterning and development of the ovary, where it is crucial for establishing the body axes. For example, in mid-oogenesis Egfr signaling specifies key cells, leading to dorsal cell fates and resulting in proper positioning of the respiratory appendages. Our lab previously identified potential novel downstream transcriptional targets of Egf signaling using the *Drosophila* ovary as a model system. Our initial work compared gene expression in fly ovaries where activity of the pathway was reduced, normal, or constitutively active. A small-scale functional screen taking advantage of UAS-RNAi transgenic flies to knock down gene expression, as well as available P-element insertion mutants, was used to investigate possible functions of a group of our novel Egfr-responsive genes. Interestingly, a number of these genes were observed to have roles in normal eggshell structure and morphogenesis, rather than patterning. Gene mutant/knockdown phenotypes include decreased chorionic integrity, shortened eggs, and various dorsal appendage malformations, as well as decreased fertility. We have used CRISPR-Cas9 to create mutations in several of these “morphogenesis genes” to further explore their functions. Mutant characterization has revealed expected (previously observed), and in some cases additional, eggshell phenotypes. We are continuing to utilize these CRISPR lines for further study of our genes of interest in order to better understand the roles of our identified Egfr target genes in *Drosophila* development.

80TH EASTERN COLLEGES SCIENCE CONFERENCE 2026

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Parsons, Bailey [C1]
Szykowny, Morgan [C12]

King's College

Faculty

Grohowski, Deric [C6, C7]

Students

Cohen, Michael [C6, C7]
Horvath, Patrick [C6, C7]

Manhattan University

Faculty

Wilkins, Bryan

Students

Amraoui, Lina [C18]

Mount Saint Mary College

Faculty

Bhalla, Suparna [B3]

Students

Belugin, Aleksandra [A14]

Lembo, Jae [A14, B3]

Singh, Parmveer [A16]

New York Botanical Garden

Faculty

Evans, Lance

Pace University

Faculty

Strahs, Dan

Students

Barretta, Alessandra [A2]

Connors, Amanda [B6]

Haverstick, Ellen [B13]

Nahata, Anna [B11]

Queensborough Community College (CUNY)

Faculty

Resko, Jody [C15]

Students

Samuels, Charlotte [C15]

Sacred Heart University

Faculty

Bartholemew, Kirk
Collins, Ben [B1, B4]
Deschenes, Suzanne [B5]
Hanley, Torrance [A9, A10]
Jareb, Mark [B18, B19]
Kasinak, Jo-Marie [A5, A7, A8]
Levy, Emily [A4, A19, A20, C3, C4]
Morra, Christina [B14]
Pierce, Barbara [A15]
Roy, Nicole [B2]
Steele, LaTina [A3, A7]
Stoehr, Ashley [A6, B7, C2, C17]
Terleph, Tom [A17]
Woronik, Alyssa [B7, B9]

Students

Alasadi, Sedra [A9]
Bliss, Kathryn [A8]
Boes, Ariana [C3]
Canales, Madi [A4]
Carbone, Paris [B19]
Cari, Nicola [A8]
Catanese, Donnie [A7]
Deking, Lily [B1]
DeLauzon, Alyvia [A17]
DeStephanis, Kayla [B7]
Downing, Sarah [B19]
Echenique, Antonio [A5]
Flaim, Lili [B18]
Gaberkorn, Nadia [B19]
Galluzzo, Benedetto [B18]
Harrison, Kate [C5]
Johar, Sahiba [C17]
Koman, Julianna [B18]
Larson, Lauren [B2]
Lescault, Samuel [B14]

Lovato, Isabella [A3]
Morelli, Morgan [B4]
Neville, Ava [A10]
Nieves, Brianna [A19]
Porco, Ariana [A6]
Ratner, Declan [A7]
Reyes, Alana [B5]
Reyes Paniagua, Mia [B14]
Rodney, Dante [A18]
Rosario, Sebastian [A15]
Ross, Bennett [B5]
Sosnowski, Liliana [C4]
St. Cloud, Chelsea [A15]
Toscano, James [A5]
Tracy, Kayla [A9]
Valerian, Emma [A3]
Vallon, Cassandra [A20]
Varessis, Eva [B14]
Velasco, Maya [B9]
Vincent, Kate [C3, C4]
Wellisch, Sophia [C2]
Wichelhaus, Lauren [A10]
Wilke, Luke [C5]

Saint Peter's University

Faculty

Garrett-Kluthe, Brandy [A11]

Students

Awad, Martina [A11]
Hargrove, Jaylen [C16]
Merisier, Allyssia [C19]

Smith College

Students

Liu, Sophia [P1]

United States Naval Academy

Faculty

Schlessman, Jamie L. [A1]

Students

Baxa, Kirsten E. [A1]

Wagner College

Faculty

Marra, Christopher [A12]
Stearns, Donald [A18]

Students

Green, Carter [A12]
Lopez Meneses, Sofia [A12]
Miranda, Kaitlyn [P4]
Rodney, Dante [A18]
Schaeffer, Brayden [B12]
West, Olivia [C14]

Wilkes University

Faculty

Kadlec, Lisa [B8]
Kapolka, Anthony [C11]
Young, Brent [C11]

Students

Drake, Zackery [C9]
Everett, Will [C10]
Hughes, Mikaela [B8]
Mercedes, Cherry [C11]
Patel, Dhruv [C9]
Purcell, Jack [C10]
Robinson, Megan [B8]
Stefanec, Juliana [C11]
Tasnim, Nufsat [C10]
Tondora, John [B8, P5]