

WELCOME

*Regional Science Consortium
21st Annual Research Symposium
November 5-7, 2025
Tom Ridge Environmental Center
at Presque Isle State Park*

Welcome... to the celebration of our 21st Annual Regional Science Consortium Research Symposium. Each year I look forward to the Symposium, however this year I may be a little more excited than in years past. The RSC has evolved so much over the last several years, and you will hear all about our new innovative programs in the presentations. For a second year, the Poster Session includes an Art Exhibition, celebrating the RSC's *Art of Science* initiative.

I am excited to report that the next three days will include 41 Oral Presentations, 52 Poster Presentations, and 21 pieces of Artwork from a total of 133 Scientists and Artists! The goal of our Symposium is to provide a venue to present scientific research and artwork by our RSC members. The Symposium is the one time each year that the scientists and students in this region come together, inform others of their research, and also listen to their colleagues' research; thereby creating a great opportunity for collaboration among scientists from all disciplines, which I believe to be the spirit of the Consortium. This year we are expanding that spirit to demonstrate how science inspires and is used to create artwork. Our network is growing with the development of a more multi-disciplinary approach. The overlap of science with art has always been apparent in history, and we are looking forward to making that overlap an essential part of the work at the RSC. All of this makes for a great variety of presentations that will interest everyone. Therefore, take the time to listen or view as many presentations and pieces of artwork as you can... they are so impressive this year.

We encourage everyone to attend our Poster Session & Art Exhibition on Wednesday evening from 6:00 – 8:00, providing the opportunity to discuss the projects with the poster presenters and the fusion of science in the artwork with the Artists. All are welcome to attend (*refreshments provided*).

I would like to thank all the Symposium participants this year. I would like to thank the Researchers, Professors, Students, and Artists for their hard work in preparing their PowerPoint, poster presentations, and artwork to display. I would also like to thank Holly Best and the PA DCNR staff of the TREC for the preparations. I would especially like to thank the RSC Team, Jennifer Salem, Sean Dalton, Sarah Magyan, Hailey Dahl, Jacob Korte, and Tyler Brooks for their support of this event and all their work at the RSC. ***Thank you!***

I hope you all enjoy Symposium 2025! Please mark your calendar for next year's Regional Science Consortium Research Symposium on November 4 – 6, 2026.

Cheers!

Jeanette

Jeanette Schnars, Ph.D.

Executive Director, Regional Science Consortium

SCHEDULE OF TALKS

*Regional Science Consortium
21st Annual Research Symposium
November 5-7, 2025
Tom Ridge Environmental Center
at Presque Isle State Park*

WEDNESDAY, NOVEMBER 5, 2025

- 8:30 – 9:10 **REGISTRATION OPENS**
 Register, upload presentations
- 8:30 – 9:10 **REFRESHMENTS**
- 9:10 – 9:15 **WELCOME**
 Jen Salem, Plant Lab Manager, RSC

Presentations

Session Chair: Jen Salem, RSC Plant Lab Manager

- 9:15 – 9:35 **Microbial Diversity in the Erie Bluffs Region of northwestern Pennsylvania**
 Chenoa Woods*+, Jeanette Baker*+, Olivia Wojciechowicz*+, Chris
 Dolanc, Rajinikanth Mohan
 Mercyhurst University
- 9:35 – 9:55 **Fungal Microbiome Analysis of Vineyard Soil Samples**
 Elise Kelly*+, Michael Campbell
 *Penn State, Lake Erie Regional Grape Research and Extension Center,
 662 Cemetery Rd, North East, PA 16428*
- 9:55 – 10:15 **Superoxide dismutase as a potential mechanism in *Bacillus subtilis*
saccharotolerance**
 Kailey Tyler*+, Maryam Alsaffar, Rajinikanth Mohan
 Mercyhurst University
- 10:15 – 10:30 **BREAK**

Session Chair: Sean Dalton, RSC Lab and Field Manager

- 10:30 – 10:50 **Trophic overlap between invasive round gobies and native benthic darters in a stream biodiversity hotspot**
Mark A. Kirk*, Casey R. Bradshaw-Wilson, and Kelly J. Pearce
Watershed Conservation Research Center, Allegheny College
- 10:50 – 11:10 **The Influence of Forest Structure on Species Diversity on Foundation for Sustainable Forests Properties in Northwestern Pennsylvania**
Abigail Riedel^{1*}+, Dr. Kelly Pearce^{1,2}
¹ *Allegheny College*
² *Watershed Conservation Research Center*
- 11:10 – 11:30 **Dating Pawpaw Patches in Erie, PA: Assessing Light and Growth Rates**
Tristen Robertson*+
Mercyhurst University
- 11:30 – 12:30 **LUNCH**

Session Chair: Kelly Pearce, Ph.D., RSC Executive Board Member

- 12:30 – 12:50 **A Multidisciplinary Mathematical Modeling Approach to Studying Arachnids**
Dr. Daniel J. Galiffa*
Associate Professor of Mathematics, Penn State Erie, The Behrend College
- 12:50 – 1:10 **Mathematical Models for Predator-Prey Interactions of Erie, PA Wolf Spiders & Extensions**
Gavin Iocona*+, Daniel Galiffa, Amos Ong, Joseph Previte, Alexander Wood, Neil Ghandi
Penn State Erie, The Behrend College
- 1:10 – 1:30 **From Coffee Rings to Capillary Forces: Unveiling Nanoparticle Behavior in Fluid Flow**
Baiou Shi*
Assistant Professor, Department of Mechanical Engineering, Gannon University
- 1:30 – 1:50 **Reinforcement Of Polyurethane Foams With Recycled Brewer's Spent Grain Fillers: A Sustainable Approach For Aerospace Acoustic Insulation Applications**
Christian Johnson*+, Leyre Berganzos Fernandez, Longyan Chen, Xiaoxu Ji
Gannon University Department of Biomedical Engineering
- 1:50 – 2:05 **BREAK**

- 2:05 – 2:25 **The State-of-the-Art in Forensic Human Identification by Skeletal Means**
Joe Adserias-Garriga*
Department of Applied Forensic Sciences, Mercyhurst University
- 2:25 – 2:45 **Reassociation of Commingled Tibiae and Tali Using Geometric Morphometrics**
Nicole Wray, M.S.*, Stephanie Melillo, Ph.D.
Mercyhurst University
- 2:45 – 3:05 **The Effects of Biological Factors on Femoral Fractures**
Kendall Robinson-Jones*+, Rhiannon Toy*+, Kaz Denten, Sydney Carlson, Joe Adserias-Garriga
Department of Applied Forensic Sciences, Mercyhurst University
- 3:05 – 3:25 **Exploring the Use of Zygomatic Arch Extension as a Cranial Sex Indicator**
Kelsey Cole*+, Rachel Becotte*+, Sydney Carlson, Joe Adserias-Garriga
Department of Applied Forensic Sciences, Mercyhurst University
- 4:30 – 6:00 **RSC BOARD MEETING – RSC Board Members – Room 112**
- 6:00 – 8:00 **POSTER SESSION & ART EXHIBITION – All are welcome to attend**
(Refreshments provided)
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THURSDAY, NOVEMBER 6, 2025

- 8:30 – 9:20 **REGISTRATION OPENS**
 Register, upload presentations
- 8:30 – 9:20 **REFRESHMENTS**
- 9:20 – 9:25 **WELCOME**
 Jen Salem, Plant Lab Manager, RSC

Presentations

Session Chair: Hailey Dahl, RSC Education and Outreach Coordinator

- 9:25 – 9:45 **From Reaction to Mechanism: Student Investigation of Isoamyl Acetate Formation and Characterization**
 Madhav Ellini*+, Dylan Crawford*+, Peyton Haight*+, Kaua Dos Santos Da Silva*+, Dr. Femi Oloye
 Division of Physical and Computational Sciences, University of Pittsburgh at Bradford
- 9:45 – 10:05 **Psychoneuroimmunology of Stress: Stress & Cortisol Regulation in Early Adolescent Girls**
 Isabella Udoko*¹+, Phelecia Udoko Ph.D.*²
 ¹*Pennsylvania State University, The Behrend College; Department of Biology Pre-med*
 ²*Gannon University, Department of Psychology & Organizational Learning and Leadership*
- 10:05 – 10:25 **A Lab-on-a-Filter immunoassay for Detecting Microplastics from Human Blood Samples**
 Nardos Bisrat*+, Robe Tefera, Liu Cao, Jun Lin , Andrew Hu, Longyan Chen
 Gannon University
- 10:25 – 10:40 **BREAK**

Session Chair: Femi Oloye, Ph.D., University of Pittsburgh at Bradford

- 10:40 – 11:00 **Determining How Space Use Affects Exposure and Toxicity of Three Common Use Insecticides**
 Samuel Nutile¹*, Kody Klein¹, Lynne Beaty¹, Adam Simpson¹
 ¹*Biology Department, School of Science, Pennsylvania State University – The Behrend College*

- 11:00 – 11:20 **Investigation of Mixed Pollutant Degradation: A Study on Dye and Amoxicillin under UV and Dark Conditions**
 Cassidy D, Elton*+, Thomas M, Burk*+, Dr. Femi Oloye
University of Pittsburgh at Bradford
- 11:20 – 11:40 **The Monitoring and Management of Cyanobacteria HABs in the Shallow, Nearshore Areas of Presque Isle**
 Fred S. Lubnow, Ph.D.*, Senior Technical Director of Ecological Services
Princeton Hydro, LLC
- 11:40 – 12:00 **Using BloomOptix and ELISA to Monitor Multiple Cyanotoxins Along the Pennsylvanian Coastline of Lake Erie**
 Sarah Magyan*
Regional Science Consortium
- 12:00 – 1:00 **LUNCH**

Session Chair: Holly Best, Ph.D., RSC Executive Board Member

- 1:00 – 1:20 **Long term evaluation of three stream restoration projects in the French Creek Watershed**
 Bryan C. Winston*, Mark A. Kirk, Casey R. Bradshaw-Wilson, and Kelly J. Pearce
Watershed Conservation Research Center, Allegheny College
- 1:20 – 1:40 **Assessment of Physicochemical and Microbial Quality of Natural Spring Water in McKean County, Pennsylvania**
 Madhav Ellini*+, Kenneth Alford*+, Ridge G, Gray*+, Melissa K. Odorisio, Dr. Oluwabunmi P. Femi-Oloye, Dr. Femi Oloye
University of Pittsburgh at Bradford
- 1:40 – 2:00 **Comparing the Water Quality and Microbial Ecology of an Urban and a Rural Stream**
 Andrew Samuels*+, Liu Cao
Environmental Science and Engineering, Gannon University
- 2:00 – 2:20 **Changes in Pollinator Communities in a Newly Restored Dune Habitat**
 Tyler Brooks*
Regional Science Consortium
- 2:20 – 2:40 **BREAK**

- 2:40 – 3:00 **Comparative Analysis of Antibiotics and Essential Oils on Classroom Surface Bacteria**
Raquel Sewell*+, Dr. Bunmi Femi-Oloye
Division of Biological and Health Sciences, University of Pittsburgh at Bradford
- 3:00 – 3:20 **Assessing Bacterial Proliferation in Swim Bags Over Time**
Madison Foote*+; Professor: Dr. Bunmi Femi-Oloye
Division of Biological and Health Sciences, University of Pittsburgh at Bradford
- 3:20 – 3:40 **Assessing Lead Paint Exposure in Campus Buildings Using XRF**
Elizabeth Kibler*+, Madelyn Kruth*+, Hwidong Daniel Kim, Ph.D., P.E.
Gannon University
- 3:40 – 4:00 **Mold in Campus Buildings: Environmental Drivers and Mitigation Approaches**
Isaias Sanchez*+; Professor: Dr. Bunmi Femi-Oloye
Division of Biological and Health Sciences, University of Pittsburgh at Bradford

FRIDAY, NOVEMBER 7, 2025

- 8:30 – 9:00 **REGISTRATION OPENS**
 Register, upload presentations
- 8:30 – 9:00 **REFRESHMENTS**
- 9:00 – 9:15 **WELCOME**
 Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Sean Dalton, RSC Lab and Field Manager

- 9:15 – 9:35 **Space...the Final Frontier: Tracking Desert and Western Purple Martins with Satellite Tags**
 Joe Siegrist*
 Purple Martin Conservation Association
- 9:35 – 9:55 **Piping Plovers in Pennsylvania: Monitoring a federally-listed species at Presque Isle State Park**
 Mary Birdsong, Sarah Sargent, Holley Short*
 Erie Bird Observatory
- 9:55 – 10:15 **Nine Years of Marsh Bird Monitoring at Presque Isle State Park: 2025 Update**
 Sarah Sargent*, Chris Lundberg and Ron Mumme
 Erie Bird Observatory, 301 Peninsula Dr, Ste 14, Erie, PA 16505
- 10:15 – 10:30 **BREAK**

Session Chair: Jacob Korte, RSC Education Specialist

- 10:30 – 10:50 **Aerial Drone Surveys of Shoreline and Primary Wetland Habitats on Presque Isle State Park, Erie, PA**
 Sean Dalton*
 Regional Science Consortium
- 10:50 – 11:10 **Wetland Restoration at Presque Isle State Park – A Never-ending Story**
 Holly Best*
 Pennsylvania Department of Conservation and Natural Resources
- 11:10 – 11:30 **Wetland and Dune Restoration Updates**
 Jen Salem*
 Regional Science Consortium
- 11:30 – 12:30 **LUNCH**

Session Chair: *Hailey Dahl, RSC Education and Outreach Manager*

- 12:30 – 12:50 **Erie County's 2025 International Coastal Cleanup (ICC)**
 Audrey Knight*
 Erie County Department of Planning and Community Development
- 12:50 – 1:10 **Litter in Waterways and Marine Debris Infrastructure**
 Don Benczkowski*
 Program Coordinator – Lake Erie Region, Keep PA Beautiful
- 1:10 – 1:30 **The Regional Science Consortium's Pennsylvania Clean Marinas and Lake
Friendly Program**
 Jeanette Schnars*, Ph.D.
 Regional Science Consortium

1:30 – 1:45 **BREAK**

Session Chair: *Jen Salem, RSC Plant Lab Manager*

- 1:45 – 2:05 **Mosaicking the PASST: Photogrammetry with the Pennsylvania
Archaeology Shipwreck Survey Team**
 Sarah Magyan*, Sean Dalton*
 Regional Science Consortium
- 2:05 – 2:25 **Coding for Climate Change: An Adaptable STEAM Curriculum**
 Jacob Korte*
 Regional Science Consortium
- 2:25 – 2:45 **School of Sustainability and Experiential Learning (SS&EL) Summer
Camps**
 Hailey Dahl*
 Regional Science Consortium

2:45 – 3:00 **BREAK**

3:00 – 3:15 **PRESENTATION OF THE JERRY COVERT STUDENT RESEARCH AWARDS**
 Jeanette Schnars, Ph.D., Executive Director, RSC
 Jerry Covert, Ph.D., Past Executive Director, RSC
 Student Award Presentations
 Closing Remarks

3:15 – 4:00 **RESEARCH WING TOURS**

ABSTRACTS

*Regional Science Consortium
21st Annual Research Symposium
November 5-7, 2025
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ORAL PRESENTATIONS

WEDNESDAY, NOVEMBER 5, 2025

Microbial Diversity in the Erie Bluffs Region of northwestern Pennsylvania

Chenoa Woods*+, Jeanette Baker*+, Olivia Wojciechowicz*+, Chris Dolanc, Rajinikanth Mohan
Mercyhurst University

Microbial diversity plays a critical role in maintaining soil health, nutrient cycling, and plant growth, making it a vital area of ecological and microbiological research. Within this field, the study of rhizosphere-associated bacteria provides insight into plant–microbe interactions and the environmental factors that shape microbial communities. However, little is known about the specific microbial composition of native and invasive plant rhizospheres on lakeside bluffs that are subjected to harsh light, heat and wind environments. In this study, we sought to identify and compare the bacterial communities present in soil samples collected from the rhizospheres of Colt’s foot (*Tussilago farfara*) and Horsetail (*Equisetum arvense*) at Racoon Park and around Presque Isle State Park. Using culture-based isolation techniques and molecular methods including 16S rRNA gene PCR amplification and gel electrophoresis, we analyzed the bacterial composition and observed significant differences among sites and plant hosts. These results indicate that both plant species and sampling location influence microbial community structure, with notable taxa such as *Escherichia coli* unexpectedly appearing in several samples, possibly reflecting environmental runoff or animal-associated contamination. This research highlights the microbial diversity within Erie’s rhizosphere soils, contributes baseline data for future ecological and environmental monitoring, and underscores the importance of continued investigation into how local environmental factors and plant identity shape bacterial communities.

Fungal Microbiome Analysis of Vineyard Soil Samples

Elise Kelly*+, Michael Campbell
Penn State, Lake Erie Regional Grape Research and Extension Center, 662 Cemetery Rd, North East, PA 16428

Soil health is influenced by several factors including the soil microbiome. Soil microbiomes are defined by the biotic and abiotic factors that make up the soil on a microscopic level; i.e., bacteria, fungi, microorganisms, ions, and soil particles. Fungal composition is important for understanding moisture levels, nutrient composition, disease load, and potential mycorrhizal relationships. The goal of this research is to analyze the effect of cover crop and grape variety on fungal diversity/composition of the soil microbiome at Penn State’s Lake Erie Regional Grape Research and Extension Center. Over the course of 11-week’s, soil samples were collected every two weeks from three grape study groups: Vitis “Concord” with cover crop, Vitis “Concord” without cover crop, and Vitis “Chambourcin” without cover crop. Per grape study group, samples were taken at three different extraction sites in relation to a vine: under the rootstock, between neighboring vines, and between rows of vines. Three replicates of each extraction site were taken per variety. DNA was extracted from 162 soil samples, of which 160 samples were amplified at the Fungal ITS1 region, and sequenced using Illumina sequencing to survey the fungal

composition of the soil. Bioinformatic technology will be used to classify and sort genomic data. This project will describe potential patterns and ecological interactions within the fungal community to support a greater understanding of the interactions between both grape varieties and fungi, and cover crops and fungi. Preliminary data suggests there may be higher levels of diversity in soils with cover crop.

Superoxide dismutase as a potential mechanism in *Bacillus subtilis* saccharotolerance

Kailey Tyler*+, Maryam Alsaffar, Rajinikanth Mohan

Mercyhurst University

Beekeeping is a growing sustainable practice that raises questions about the microbial environment honey produces. Microbes have been isolated from honey, but their mechanisms of adaptation to the high sugar concentration present in honey are less understood. In this study, we isolated six bacteria from a honeycomb and identified them by sequencing the 16S rRNA and discovered that five were *Bacillus* related, and one was an *Aurantimonas* species. We sought to study the effect of environmental stresses such as heat, salt, and sugar on these bacteria as well as identify potential mechanisms they use to survive. By exposing the bacteria to various stresses, we found that all *Bacillus* species, but not *Aurantimonas* were able to metabolize and tolerate high levels of glucose and fructose, sugars that are commonly found in honey. Interestingly, the high sugar tolerance of the *Bacillus* species correlated with high heat and salt tolerance as well, suggesting that general stress tolerance mechanisms may enable survival in honey. Using SDS-PAGE, and tandem mass spectrometry, we identified superoxide dismutase (SodA) as a sugar inducible protein, which we confirmed using Western blot analysis. Genetic analysis revealed that the SodA mutant of *B. subtilis* was unable to grow on honey and high sugar concentrations, indicating that bacteria surviving in honey have antioxidant capabilities that enable their survival. Understanding how bacteria survive the hostile environment of honey can help beekeepers maintain healthier hives. Future studies will investigate other types of SOD and the role they play in stress tolerance.

Trophic overlap between invasive round gobies and native benthic darters in a stream biodiversity hotspot

Mark A. Kirk*, Casey R. Bradshaw-Wilson, and Kelly J. Pearce

Watershed Conservation Research Center, Allegheny College

C Invasive species pose a global risk to native biodiversity, and their impacts and rates of spread are predicted to increase under future environmental change. While a great deal of research has been done studying what functional traits define a successful invader, less research has been done regarding what defines how susceptible an ecosystem is to biological invasions. The biotic resistance hypothesis postulates that ecosystems with high biological diversity offer fewer “open niches” for invasive species to establish because of high biotic interactions with native species. The round goby (*Neogobius melanostomus*) invaded the French Creek watershed in 2014, which harbors a renowned level of aquatic biodiversity. Yet, round gobies have exhibited a very weak range expansion with minimal impact to native diversity over the last decade. Using a rich darter community as our model (11 different *Etheostoma* and *Percina spp.*), we tested the biotic resistance hypothesis using a large-scale dataset on stomach and diet analysis combined with contemporary determinations of isotopic niches. We hypothesize that the high diversity of French Creek limits the invasion performance of round gobies, and hence, gobies will not induce any trophic changes in the diet and isotopic niche to native darters. Our results have important implications for understanding how native biodiversity can limit the performance and potential of biological invaders.

The Influence of Forest Structure on Species Diversity on Foundation for Sustainable Forests Properties in Northwestern Pennsylvania

Abigail Riedel^{1*}+, Dr. Kelly Pearce^{1,2}

¹ *Allegheny College*

² *Watershed Conservation Research Center*

During the summer of 2025, we deployed 3-5 camera traps at 9 Foundation for Sustainable Forests (FSF) properties across northwestern Pennsylvania. Each camera remained in place for 17 consecutive days, totaling 462 trap nights. To assess forest structure, we conducted habitat surveys at 3 sites, measuring shrub cover, tree type, and coarse woody debris (CWD) volume at each camera location. Wildlife detection rates varied significantly across sites and were influenced by forest structure factors such as property size and coarse woody debris (CWD) volume. Smaller properties and those with higher CWD volume tended to have higher detection rates, suggesting that both habitat structure and spatial scale play key roles in wildlife activity. Ongoing habitat surveys this fall will expand our dataset and further clarify the relationship between forest structure and species detection rates.

Dating Pawpaw Patches in Erie, PA: Assessing Light and Growth Rates

Tristen Robertson^{*}+

Mercyhurst University

Asimina triloba (pawpaw) patches can be found in the understory of deciduous forests with moist soils in the Midwest and Eastern North America. Although closely related to tropical species such as cherimoya, it is the only member of the Annonaceae family to reach far into temperate zones. Much research focuses on domesticated cultivars, but research is needed on the health and growth habits of wild pawpaw. There are also concerns that wild pawpaw cannot keep up with the pace of climate change and needs help expanding its range into hospitable areas. Literature indicates pawpaw prefers wet areas with deep soils within treefall gaps and that oldest and youngest trees require less light, while mature trees require more. I hypothesized that mature trees (7-20 years) and old trees (20+ years) will show vastly different growth rates based on how much light they receive. I sampled 4 subpopulations of a pawpaw metapopulation at Asbury Woods, Erie, PA. An average of 4 samples were taken across 5 patches for a total of 20 cores. I used standard dendrochronological field and laboratory procedures to collect and analyze cores of pawpaw trees. I also quantified canopy cover around for each tree. Results indicate that main stems in pawpaw patches can reach significantly greater ages (30-55 years) than the maximum age reached in orchards. Results are ongoing yet indicate variable growth rates throughout the lifespan of many specimens. It appears as if wild pawpaw can perform ecosystem services for much longer spans of time than literature suggests.

A Multidisciplinary Mathematical Modeling Approach to Studying Arachnids

Dr. Daniel J. Galiffa^{*}

Associate Professor of Mathematics, Penn State Erie, The Behrend College

In this talk, we discuss how a multidisciplinary mathematical modeling approach was developed and implemented for studying ecological aspects of wolf spiders and the silk properties of various tarantula species. Namely, we give an overview as to how mathematicians and biologists worked in conjunction to develop simulations to better understand the population dynamics and predator-prey interactions of wolf spiders, and how a polymer science approach was used to better understand the silk properties of various tarantula species. We will also discuss the future directions of this ongoing project and conclude the talk with a presentation of some of the wolf spiders and tarantulas that have been studied. This research was supported by the Penn State Behrend Seed Grant and Summer Undergraduate Research Grant.

Mathematical Models for Predator-Prey Interactions of Erie, PA Wolf Spiders & Extensions

Gavin Iocona*+, Daniel Galiffa, Amos Ong, Joseph Previte, Alexander Wood, Neil Ghandi
Penn State Erie, The Behrend College

In this talk, we will discuss how newly-developed mathematical models illustrate how a population of predators interacts with several populations of prey species. This talk also aims at showcasing how mathematics can be applied to biology to give insight into how populations of different species directly affect one another. We will further address how our model is dependent upon several parameters that are determined by real species attributes, such as growth rate, natural death rate, and predation rate. Furthermore, our model shows how predator and prey populations can both coexist and become extinct, depending on the aforementioned parameters. Throughout the presentation, we will showcase several of our population dynamics simulations. We conclude by discussing future goals and directions. This research was supported by the Penn State Behrend Seed Grant and Summer Undergraduate Research Grant.

From Coffee Rings to Capillary Forces: Unveiling Nanoparticle Behavior in Fluid Flow

Baiou Shi*

Assistant Professor, Department of Mechanical Engineering, Gannon University

The behavior of nano-fluids, or fluid suspensions containing nanoparticles in the realm of capillary fluid flow, has garnered tremendous attention recently for applications spanning from household/ personal care products to advanced targeted drug therapy and materials fabrication. The initial attention on particle suspensions arose from the famous “coffee-ring” effect. In this talk, results from molecular dynamics simulations are presented with emphasis on revealing forces on suspended particles. For increasing particle size, a transition from de-pinning to pinning is observed and interpreted in terms of the increasing capillary force between suspended nanoparticles and the solid/liquid/vapor interfaces.

Reinforcement Of Polyurethane Foams With Recycled Brewer’s Spent Grain Fillers: A Sustainable Approach For Aerospace Acoustic Insulation Applications

Christian Johnson*+, Leyre Berganzos Fernandez, Longyan Chen, Xiaoxu Ji
Gannon University Department of Biomedical Engineering

This study continues the development of sustainable acoustic insulation materials through the reinforcement of flexible polyurethane foams with lignin-rich biofillers derived from Brewer’s Spent Grains (BSG), a major byproduct of the brewing industry. In this phase, polyurethane foams were fabricated incorporating 5% and 10% BSG by weight into custom formulations. The BSG will be processed, characterized via SEM, and integrated into foam matrices to evaluate its effect on structure and performance. Acoustic characterization will be conducted using a low-cost (under \$1,500) custom-designed impedance tube, to measure sound absorption across white, pink, and brown noise profiles. Preliminary results indicate that BSG-infused foams maintain or exceed the acoustic attenuation of commercial counterparts while promoting increased porosity and reduced environmental impact. This work advances the use of recycled BSG in polymer foam fabrication, supporting circular economy principles and sustainable material innovation for aerospace applications.

The State-of-the-Art in Forensic Human Identification by Skeletal Means

Joe Adserias-Garriga*

Department of Applied Forensic Sciences, Mercyhurst University

The field of forensic human identification has experienced significant advancements in recent decades, combining classical techniques with innovative imaging and morphological approaches to obtain successful identifications under growing complex circumstances. Whereas DNA, fingerprints, and dental records are still the primary identifiers, many current cases require alternative or supplementary approaches due to fragmentation, decomposition, or poor quality of antemortem records.

This presentation explores state-of-the-art in forensic identification approaches with a particular focus on the comparative analysis of skeletal features, evaluating the forensic value of pathology, anatomical variation, and antemortem skeletal trauma.

Medical imaging developments have expanded the possibilities for available techniques for comparing antemortem to postmortem records. Therefore, forensic practitioners must have a clear knowledge of how images are produced and how they can be combined for identification purposes. Additionally, case applications of skeletal trait matching based on trabecular patterns, fracture repair, and surgical implantation contributing to identification will be presented.

This multidisciplinary synthesis underscores the expanding toolkit of forensic anthropologists and odontologists in their role of human identification, emphasizing versatility, objectivity, integration of different imaging modalities, and the value of anatomical traits as cornerstones of current forensic practice.

Reassociation of Commingled Tibiae and Tali Using Geometric Morphometrics

Nicole Wray, M.S.*, Stephanie Melillo, Ph.D.

Mercyhurst University

To combat the issue of commingled skeletal remains, methods to reassociate elements back to an individual have been studied. There are established pair-matching methods, both osteometric and virtual, which have been successful in reassociating antimeres. However, complete resolution of commingling requires matching across articulating joints surfaces. This study seeks to use geometric morphometric methods to determine whether a tibia shape configuration can be predicted using a talus landmark configuration. It is expected that joint surfaces that have closely corresponding surfaces, such as the tibiotalar joint, would covary significantly.

3D models of tibiae and tali were landmarked using a newly developed protocol, and a 2 Block Partial Least Squares analysis was run to create a statistical model that would produce a predicted tibia model. In regard to the tibiotalar joint, it was found that size accounts for 93% of the total covariation ($RV = 0.55$) in the joint, and the shape components only account for 3.09% of the total covariation. The results suggest that size is the primary aspect of morphological covariation at the tibiotalar joint, with shape being comparatively unimportant. Although the 2B PLS was successful in quantifying covariation in the tibia and talus, the covariation coefficients and our permutation analyses indicate shape alone was insufficiently strong to be a reliable predictive model. The most practical application of this method would be to exclude individuals as pairs from a large, commingled assemblage alongside standard osteometric and macromorphoscopic practices.

The Effects of Biological Factors on Femoral Fractures

Kendall Robinson-Jones*+, Rhiannon Toy*+, Kaz Denten, Sydney Carlson, Joe Adserias-Garriga

Department of Applied Forensic Sciences, Mercyhurst University

Femur fractures are common injuries that can significantly impact an individual's mobility and quality of life. Additionally, femur fractures may be present in forensic remains as either antemortem or perimortem trauma. This project aims to review the various types of femoral fractures and the biological factors that may affect their healing process. Biological factors such as a patient's age, systemic health, and fracture's location and severity can affect the healing time of femoral fractures. Studies involving femoral fractures in between infancy and geriatric age groups were studied to determine how these variables influence the healing process and long-term outcomes. This study explores the healing process of different antemortem femora fractures, which includes fractures of the femoral head, neck, shaft, and condyles. These fractures each have different treatment procedures, which can range from a simple splint, to pins that hold the bone fragments together, to entire hip prosthesis being inserted into the bone and secured with screws.

This information is significant not only clinically—but also from a forensic perspective, considering the variability in the appearance and healing of fractures. Forensic practitioners should be familiar with the different types of femoral fractures and their treatment since certain surgical devices can serve as a means

of identification in forensic investigations. Furthermore, the mechanism of fractures is key for the understanding of perimortem fractures, which can provide valuable information regarding the circumstances surrounding an individual's death.

Exploring the Use of Zygomatic Arch Extension as a Cranial Sex Indicator

Kelsey Cole*+, Rachel Becotte*+, Sydney Carlson, Joe Adserias-Garriga

Department of Applied Forensic Sciences, Mercyhurst University

An important part of the forensic anthropological analysis of human remains is the reconstruction of the biological profile, which includes estimating sex, population affinity, stature, and age at death. Sex estimation mainly relies on features observed in the os coxa and the cranium.

Walker (2008) developed a widely used method for sex estimation of the cranium that is based on five nonmetric cranial traits: the glabella, mastoid process, supraorbital margin, nuchal crest, and mental eminence. Some traits like the glabella and nuchal crest, are reliable for producing accurate results, while the mental eminence is known to perform poorly compared to the other traits.

This preliminary study evaluates the use of the zygomatic arch extension (ZAE) as an indicator for sex estimation. A sample of 30 skulls from the Dirkmaat and Symes skeletal collection at Mercyhurst University was scored following the established guidelines of Walker (2008), the presence or absence of the ZAE according to Adserias et al. (2017), and the ZAE scoring according to Langley et al. (2018).

This study highlights the importance of exploring reliable sex indicators that may have their value, especially in cases of fragmentary remains where other indicators might be damaged or missing.

From Reaction to Mechanism: Student Investigation of Isoamyl Acetate Formation and Characterization

Madhav Ellini*+, Dylan Crawford*+, Peyton Haight*+, Kaua Dos Santos Da Silva*+, Dr. Femi Oloye

Division of Physical and Computational Sciences, University of Pittsburgh at Bradford

This study describes the synthesis and characterization of isoamyl acetate via Fischer esterification, performed by a group of Organic Chemistry II students. Isoamyl acetate, an ester widely recognized for its banana-like fragrance, was prepared by reacting isoamyl alcohol with glacial acetic acid in the presence of concentrated sulfuric acid as a catalyst. The reaction was carried out under reflux for 60 minutes to maximize product yield. Following completion, the reaction mixture was transferred to a separatory funnel and subjected to successive aqueous washes with distilled water and saturated sodium bicarbonate solution. These purification steps removed residual acid and by-products, leaving the desired ester as the organic phase. Product identity was confirmed using spectroscopic techniques. Fourier-transform infrared (FTIR) spectroscopy revealed the disappearance of the broad O–H stretch of the starting alcohol and the presence of a strong ester carbonyl absorption near 1740 cm^{-1} . Gas chromatography–mass spectrometry (GC–MS) provided further structural confirmation, with the observed molecular ion peak and fragmentation pattern consistent with isoamyl acetate. Based on the experimental results, students proposed a detailed mechanism for the Fischer esterification, involving protonation of the acetic acid carbonyl group, nucleophilic attack by isoamyl alcohol, proton transfers, and subsequent water elimination to generate the ester. This project allowed students to integrate synthetic methodology, purification strategies, and instrumental analysis, while deepening their understanding of reaction mechanisms. The experiment effectively highlighted the importance of combining classical organic transformations with modern spectroscopic tools to confirm product structure and reinforce foundational concepts in organic chemistry.

Psychoneuroimmunology of Stress: Stress & Cortisol Regulation in Early Adolescent Girls

Isabella Udoko*¹⁺, Phelecia Udoko Ph.D.*²

¹*Pennsylvania State University, The Behrend College; Department of Biology Pre-med*

²*Gannon University, Department of Psychology & Organizational Learning and Leadership*

Adolescence is a critical developmental stage marked by heightened vulnerability to stress and related health outcomes. Psychoneuroimmunology (PNI) provides a valuable lens for examining how stress influences physiological processes, particularly the hypothalamic–pituitary–adrenal (HPA) axis and cortisol regulation. Elevated or dysregulated cortisol levels in youth have been linked to long-term risks, including immune dysfunction, mood disorders, and impaired cognitive development.

This study proposes to investigate the association between perceived stress and hair cortisol concentrations among early adolescent girls aged 11–16. Specifically, the research will examine whether higher self-reported stress predicts elevated hair cortisol levels, reflecting chronic activation of the stress response system. Girls were chosen because evidence suggests they experience higher levels of stress and anxiety during adolescence than boys, particularly in relation to academic, social, and body image pressures (Nolen-Hoeksema & Aldao, 2019; Rudolph et al., 2020). Moreover, adolescent girls show greater vulnerability to stress-related disorders such as depression and eating.

A cross-sectional design will be employed, with participants recruited from local schools. Data will be collected using validated stress questionnaires alongside hair samples. Hierarchical regression will test the predictive relationship. Findings are expected to advance understanding of adolescent stress biology by linking psychological measures with chronic endocrine markers. This research contributes to prevention and intervention science by identifying stress-related physiological risk patterns in adolescent girls.

Ultimately, the project seeks to inform school- and community-based programs aimed at promoting resilience, supporting healthy development, and reducing long-term health disparities.

A Lab-on-a-Filter immunoassay for Detecting Microplastics from Human Blood Samples

Nardos Bisrat*+, Robe Tefera, Liu Cao, Jun Lin, Andrew Hu, Longyan Chen

Gannon University

Microplastics (MPs), plastic particles smaller than 5 mm, are widespread in the environment and have recently been detected in human blood. Their small size allows them to enter biological systems, potentially causing blood flow blockage, inflammation, organ damage, and carcinogenesis. Current detection methods such as microscopy, FTIR, Raman spectroscopy, and pyrolysis GC-MS provide useful information but face major drawbacks: microscopy lacks quantification, spectroscopy is labor-intensive and costly, and GC-MS, while sensitive, requires specialized instrumentation and is unsuitable for routine clinical use. There is a pressing need for a rapid, sensitive, and cost-effective method that can be adapted to clinical laboratories.

We developed a lab-on-a-filter (LoF) immunoassay for polystyrene microplastics (PS-MPs). Samples were incubated with rabbit anti-PS serum, filtered through a gelatin-blocked 0.2 μm syringe filter, and detected using HRP-conjugated secondary antibodies with TMB substrate for colorimetric readout. SEM and fluorescence imaging confirmed efficient retention of PS-MPs (up to 95%). The assay showed a detection limit of ~ 1.62 ng/mL and a linear range of 1 ng/mL–1000 ng/mL, with strong reproducibility. Total assay time was under 3 hours. Ongoing studies are assessing performance across particle sizes and human blood samples. This LoF platform is a promising, low-cost tool for microplastic detection in both clinical and environmental settings.

Determining How Space Use Affects Exposure and Toxicity of Three Common Use Insecticides

Samuel Nutile^{1*}, Kody Klein¹, Lynne Beaty¹, Adam Simpson¹

¹*Biology Department, School of Science, Pennsylvania State University – The Behrend College*

Insecticides play a crucial role in agriculture, yet their runoff poses environmental risks to non-target areas. Evidence from laboratory and field toxicity assessments confirms the harmful effects of insecticides on diverse aquatic species. However, existing evaluations of insecticide toxicity often assume uniform exposure, an assumption that may not be accurate under field conditions. It is increasingly recognized that behavioral patterns can influence toxicity in the context of insecticide contamination, an aspect that remains understudied. Therefore, the objective of this study was to explore how space use influences toxicity of three widely used insecticides, bifenthrin, permethrin, and chlorpyrifos, on sediment toxicity to *Hyalella azteca*. Glass beakers were modified with steel rings to create exposure arenas with contaminated sediment placed either inside, outside, or both inside and outside the ring, resulting in three unique conditions for 48 h toxicity tests with *H. azteca*. For all insecticides, contaminant placement influenced exposure and resulting toxicity to *H. azteca*. Placing pesticides within the steel ring resulted in higher lethal concentration 50 (LC50) values, indicating reduced mortality rates. Conversely, lower LC50s were recorded when contaminated sediment was placed outside or both inside and outside the ring. This suggests that *H. azteca* preferentially spend time in contact with the outside edge of the beaker, leading to higher exposure and increased toxicity when insecticides were placed outside the steel ring. As such, our results suggest space use is a major factor in predicting insecticide exposure and toxicity and should be considered in the development of laboratory toxicity tests.

Investigation of Mixed Pollutant Degradation: A Study on Dye and Amoxicillin under UV and Dark Conditions

Cassidy D, Elton*+, Thomas M, Burk*+, Dr. Femi Oloye

University of Pittsburgh at Bradford

Aquatic environments are increasingly burdened with complex mixtures of pollutants originating from industrial, pharmaceutical, and domestic discharges. Among these, dyes and antibiotics represent a major concern due to their persistence, toxicity, and potential to induce antimicrobial resistance. Most previous studies have focused on the degradation kinetics of individual pollutants, which does not accurately reflect real environmental conditions where multiple contaminants coexist and may interact. This study investigates the simultaneous degradation of a model dye and the antibiotic amoxicillin under various

conditions to better understand their degradation behavior in mixed systems. Experiments were conducted under both UV-illuminated and dark conditions, with and without the addition of a hole scavenger (hydrogen peroxide). The results revealed that degradation occurred only in the presence of UV light, highlighting the critical role of photoactivation in the degradation process. The hole scavenger (peroxide) enhanced degradation efficiency under UV illumination but was inactive in the absence of light, confirming its photochemical dependence. Ongoing work is focused on the role of catalysts in promoting the degradation process, particularly titanium dioxide (TiO₂) supported on activated carbon derived from plantain peel waste. The structural and surface properties of the synthesized catalyst were characterized using Scanning Electron Microscopy (SEM) to assess its morphology and potential active sites. This integrated approach aims to develop an efficient, sustainable, and environmentally friendly photocatalytic system for the simultaneous removal of mixed organic pollutants, thereby providing valuable insight into real-world wastewater treatment challenges.

The Monitoring and Management of Cyanobacteria HABs in the Shallow, Nearshore Areas of Presque Isle

Fred S. Lubnow, Ph.D.*, Senior Technical Director of Ecological Services
Princeton Hydro, LLC

Cyanobacteria are a group of photosynthetic bacteria that have the potential to develop into large blooms in that can negatively impact the water quality, ecological, recreational, potable-use and economic value of freshwater ecosystems. Many cyanobacteria have the potential to produce cyanotoxins, a group of compounds that can negatively impact the health of people, pets, livestock, and wildlife. Such conditions are commonly described as Harmful Algal Blooms (HABs). The impact of HABs has been well documented in western Lake Erie; however, such HAB events also impact the eastern side of the lake, including Presque Isle. Additionally, the highest HAB-related impacts frequently occur in the nearshore areas, where there is a high degree of contact between people and the water. This presentation will describe the ecology of the cyanobacteria and how shallow, nearshore areas can serve as overwintering habitat for their cells. The presentation will also discuss monitoring actions that specifically identify the source(s) of the cyanobacteria as well as specific management measures that may serve to prevent, control, or mitigate the development of nearshore HABs around the Presque Isle area.

Using BloomOptix and ELISA to Monitor Multiple Cyanotoxins Along the Pennsylvania Coastline of Lake Erie

Sarah Magyan*
Aquatic Biologist, Regional Science Consortium

Although Lake Erie is known for its chronic HAB events in the western basin, the Pennsylvania waters of Lake Erie also frequently experience HAB events. The Regional Science Consortium has been monitoring cyanotoxins (Microcystins/Nodularins, Anatoxin-a, Saxitoxin, and Cylindrospermopsin) since 2014. Water samples were collected weekly from 33-42 sites along the PA shoreline of Lake Erie, Presque Isle Bay, inland lakes, and drinking water facilities. Samples were analyzed by algal toxin ELISA plates using Gold Standard Diagnostics kits. Results were typically provided the same day of sampling or within 24 hours to PA Department of Conservation and Natural Resources, Erie County Department of Health, Erie Water Works, and North East Drinking Water Facility. Signage was posted at sampling sites that exceeded safe dog, human advisory, and human restriction thresholds according to the Lake Erie Harmful Algal Bloom Monitoring and Response Strategy. The BloomOptix AI Model was implemented to identify algal species present in samples that exceeded safety thresholds.

Long term evaluation of three stream restoration projects in the French Creek Watershed

Bryan C. Winston*, Mark A. Kirk, Casey R. Bradshaw-Wilson, and Kelly J. Pearce
Watershed Conservation Research Center, Allegheny College

Woodcock Creek is a large tributary to French Creek located in Crawford County, PA. Despite the relative health and high biodiversity of the French Creek watershed, Woodcock Creek has a number of

anthropogenic stressors including a flood control dam, dozens of culverts, and poor riparian zone management that have altered flow regimes and have led to large amounts of sedimentation and erosion throughout the watershed. In order to prevent further environmental degradation, the Watershed Conservation Research Center has partnered with several local partners to complete three restoration projects on Woodcock Creek. These instream and streambank restorations were completed at Woodcock Creek at Craig Road, German Run – a tributary to Woodcock Creek, and Woodcock Creek at Stainbrook Park. The WCRC completed pre-restoration monitoring of fish and macroinvertebrate communities, water quality, and sediment loads at the restoration sites and is currently in the middle of a multi-year post-restoration monitoring program to determine the efficacy of these restoration projects. We hypothesize that the habitat restorations will elicit a long-term increase in fish and macroinvertebrate diversity, water quality, and habitat heterogeneity. Our results will help influence future riparian zone restorative practices in the French Creek watershed.

Assessment of Physicochemical and Microbial Quality of Natural Spring Water in McKean County, Pennsylvania

Madhav Ellini*+, Kenneth Alford*+, Ridge G, Gray*+, Melissa K. Odorisio, Dr. Oluwabunmi P. Femi-Oloye, Dr. Femi Oloye

University of Pittsburgh at Bradford

Natural springs are an important source of drinking water for many rural communities, often perceived as clean and safe due to their natural origin. However, variations in geological composition, land use, and microbial activity can significantly influence water quality. This study aimed to evaluate the physicochemical and microbial characteristics of selected natural springs in the McKean County area to assess their suitability for consumption. Water samples were analyzed for key physicochemical parameters including pH, total dissolved solids (TDS), electrical conductivity, resistivity, hardness, chlorine level, iron content, and salinity. In addition, microbial assessments were conducted to determine the presence and diversity of microbial communities. Results showed that the physicochemical properties of the spring water varied notably across different sampling locations, suggesting local environmental and geological influences. Of particular concern was the observation of dense algal growth within the delivery pipes from which residents collect drinking water, indicating potential biofilm formation and nutrient enrichment. Preliminary microbiological analysis revealed visible microbial growth on all culture plates, and ongoing work is focused on identifying and classifying the microbial communities present. The findings highlight the importance of routine monitoring of natural spring water to ensure public health safety and guide proper management practices for rural water sources.

Comparing the Water Quality and Microbial Ecology of an Urban and a Rural Stream

Andrew Samuels*+, Liu Cao

Environmental Science and Engineering, Gannon University

Urbanization has been shown to strongly correlate with the degradation of stream water quality. Parameters such as biochemical oxygen demand (BOD), total suspended solids (TSS), conductivity, and fecal coliform indicators typically occur at elevated levels in urban streams compared to rural streams. However, limited research has explored how urbanization influences microbial community composition in these ecosystems. This project aims to address this gap by comparing the water quality and microbial communities in two streams within the Lake Erie watershed: Mill Creek (urban) and Twelvemile Creek (rural), selected for their comparable lengths and watershed sizes. Water samples were collected from five sites along each stream and analyzed for pH, turbidity, conductivity, nutrient levels, and fecal coliform indicators. Samples were also filtered and preserved for DNA extraction and 16s rRNA gene sequencing to characterize bacterial community composition and diversity. By integrating chemical and microbial analyses, this project seeks to elucidate the relationship between urbanization, water quality and microbial ecology, providing valuable insight into how land use impacts stream health and inform future conservation and remediation strategies in the Lake Erie watershed.

Changes in Pollinator Communities in a Newly Restored Dune Habitat

Tyler Brooks*

Regional Science Consortium

Presque Isle State Park is home to many microhabitats and species that specialize in these habitats. One of the most prevalent and charismatic of these microhabitats is the sand dunes. Following a severe weather event, several dunes along Beach 8 at Presque Isle State Park were compromised by reducing the protection of a living shoreline. This restoration of this dune system was initiated by the placement of 2,400 tons of sand and planting of hundreds of native plants. As part of measuring the success of the restoration effort, pollinating insects were monitored at surrounding established dunes and the newly installed dunes. Blue-vane traps containing a soapy water solution were used to attract and capture pollinating insects. Collected insects were washed and preserved in alcohol, and will later be identified to genus. It is anticipated that these traps will attract a variety of insects, especially bees and flower flies. The temporal and spatial monitoring of these pollinators will provide insight into the reestablishment of pollinators and the role they may have in the success of a dune restoration.

Comparative Analysis of Antibiotics and Essential Oils on Classroom Surface Bacteria

Raquel Sewell*+, Dr. Bunmi Femi-Oloye

Division of Biological and Health Sciences, University of Pittsburgh at Bradford

This study examines the antimicrobial effectiveness of two conventional antibiotics, penicillin and cephalosporin, and two natural essential oils; tea tree and peppermint, against bacterial isolates collected from classroom desks. Bacteria will be obtained through surface swabbing, cultured on sterile agar plates, and the most prevalent bacterial species will be selected for testing. Each antimicrobial agent will be evaluated individually and in combination, yielding four single-agent tests (penicillin, cephalosporin, tea tree oil, and peppermint oil) and four combination treatments (penicillin + tea tree, penicillin + peppermint, cephalosporin + tea tree, and cephalosporin + peppermint), alongside an untreated control. Antimicrobial activity will be determined using the disk diffusion method, with zones of inhibition measured to compare relative effectiveness. All procedures will follow strict sterile and biosafety protocols. Results from this investigation will identify which treatments or combinations provide the highest antibacterial efficacy, offering insight into the potential of natural essential oils to enhance or complement conventional antibiotics in minimizing bacterial contamination on classroom surfaces.

Assessing Bacterial Proliferation in Swim Bags Over Time

Madison Foote*+; Professor: Dr. Bunmi Femi-Oloye

Division of Biological and Health Sciences, University of Pittsburgh at Bradford

Bacterial growth is strongly influenced by environmental factors such as temperature, light, and moisture. Swim bags, often damp and poorly ventilated, may provide favorable conditions for bacterial proliferation. This study aims to investigate how bacterial colony size changes over time in swim bags during a competitive swim season. We hypothesize that bacterial colony growth will increase as the season progresses due to repeated exposure to moisture and limited drying. Samples will be collected from swim bags at four time points over four months. Each sample will be swabbed onto nutrient growth plates and incubated under standard bacterial growth conditions. Colony sizes will be measured after incubation to quantify bacterial growth at each sampling period. The data collected across the four sampling periods will be compared to determine whether there is a measurable increase in bacterial colony size over time. Understanding these growth patterns will help identify whether swim bags act as reservoirs for bacteria during prolonged use. The findings of this research will provide insight into the role of swim bags as potential sources of bacterial exposure and highlight the importance of regular cleaning of swim equipment. Results could also inform hygiene recommendations for athletes to reduce potential health risks associated with microbial buildup in athletic gear.

Assessing Lead Paint Exposure in Campus Buildings Using XRF

Elizabeth Kibler*+, Madelyn Kruth*+, Hwidong Daniel Kim, Ph.D., P.E.

Gannon University

Lead-based paint remains a persistent environmental health hazard in older buildings, with risks amplified when paint deteriorates into dust and becomes easily inhalable. This research project employs X-ray fluorescence (XRF) technology to detect and quantify lead paint within buildings, consisting of both living and workspaces on Gannon University's Erie campus. XRF technology detects the presence of lead and delivers its concentration in mg/cm² by measuring X-ray fluorescence energy emitted by lead atoms when excited by an XRF device's beam. During data collection, the highest prevalence of lead paint was detected on wood surfaces, including doorframes, floorboards, and windowsills, especially in areas that have not been recently renovated. The study aims to evaluate the presence and of lead-based paint across different building environments and identify safety concerns related to deteriorating lead paint in residential and occupational spaces. Results from this work will provide critical insights into lead exposure risks and support the development of safer campus living and working conditions.

Mold in Campus Buildings: Environmental Drivers and Mitigation Approaches

Isaias Sanchez*+, Professor: Dr. Bunmi Femi-Oloye

Division of Biological and Health Sciences, University of Pittsburgh at Bradford

Mold exposure is a significant health concern on college campuses, especially in older buildings where persistent moisture, poor ventilation, and high humidity encourage growth. Mold can trigger respiratory problems, fatigue, and allergic reactions, particularly in individuals with asthma or weakened immune systems. This study aims to assess mold presence in selected campus buildings and evaluate mitigation strategies to reduce exposure risks. This research will follow a two-phase approach. In the first phase, environmental assessments will be conducted in 2–3 campus buildings suspected of mold issues. Mold levels will be measured using air quality monitors and test kits, while humidity will be tracked with hygrometers. Informal interviews with residents and staff may be conducted to gather reports of symptoms and exposure, pending ethics approval. A small-scale intervention using portable dehumidifiers and mold-cleaning agents will be implemented, followed by post-intervention testing to evaluate improvements in air quality. As a complementary method, a controlled laboratory experiment will expose mold samples on agar plates to varying environmental conditions; temperature, light, and humidity; to observe growth patterns. This approach provides a safer, controlled setting to study mold behavior without involving human subjects. The findings from this study are expected to improve understanding of how environmental factors influence mold proliferation and to identify effective strategies for mitigating mold-related health risks in campus buildings.

ORAL PRESENTATIONS

FRIDAY, NOVEMBER 7, 2025

Space...the Final Frontier: Tracking Desert and Western Purple Martins with Satellite Tags

Joe Siegrist*

Purple Martin Conservation Association

Since 2007 the eastern subspecies of Purple Martin (*Progne subis subis*) has been the subject of intensive movement ecology research via archival dataloggers deployed on individuals of this neotropical migrant aerial insectivore. We've developed a new understanding of the nonbreeding habitat use and movement phenology of this species which nests exclusively in artificial nesting structures east of the Rocky Mountains and winters in the Amazon Rainforest. However two smaller population subspecies: the Desert Purple Martin (*Progne subis hesperia*) and the Western Purple Martin (*Progne subis arboricola*) in western North America remain a mystery in part due to the challenging terrain in which they nest. In 2024, the Purple Martin Conservation Association and international partners began deploying tags integrated to the Argos Global Satellite Tracking System to gather live location data on these little known subspecies of Purple Martin. In this talk, we share for the first time a glimpse of the migration and overwintering habits of Western and Desert Purple Martins.

Piping Plovers in Pennsylvania: Monitoring a federally-listed species at Presque Isle State Park

Mary Birdsong, Sarah Sargent, Holley Short*

Erie Bird Observatory

Piping Plovers (PIPL) returned to NW Pennsylvania to nest in 2016, requiring monitoring of nesting during the spring and summer breeding season since. Under the direction of the Pennsylvania Game Commission (PGC) and USFWS, and in partnership with the Department of Conservation and Natural Resources (DCNR) and the USDA, Erie Bird Observatory has monitored and documented nesting success and threats. Monitoring followed strict protocols set by PGC and USFWS to observe PIPL nesting behavior without causing a disturbance. Threats to nesting included avian predators such as gulls and Common Ravens and mammalian predators such as raccoons. This year, Erie Bird Observatory's shorebird team monitored two pairs of Piping Plovers nesting, which resulted in the wild fledging of seven chicks. Future monitoring and continued partnerships will be critical for the assessment of PIPL nesting success at Presque Isle State Park.

Nine Years of Marsh Bird Monitoring at Presque Isle State Park: 2025 Update

Sarah Sargent*, Chris Lundberg and Ron Mumme

Erie Bird Observatory, 301 Peninsula Dr, Ste 14, Erie, PA 16505

Starting in 2017, we surveyed for secretive marsh breeding birds using a standardized protocol at approximately 50 points within open marsh habitats at Presque Isle SP. Six of the eight target species have been detected in at least one year. Least Bitterns have been the most abundant but are declining, with Common Gallinules second most abundant, Virginia Rails have become more abundant over the study period. Soras, Pied-billed Grebes and American Coots remain irregular breeders here. King Rails and American Bitterns have not been detected. Habitat surveys have been conducted since 2020 to quantify characteristics of the habitat that are important to the birds.

Aerial Drone Surveys of Shoreline and Primary Wetland Habitats on Presque Isle State Park, Erie, PA

Sean Dalton*

Regional Science Consortium

Presque Isle's shoreline and wetlands are dynamic environments subject to rapid change as a result of underlying geologic and biological conditions. These changes have direct impacts on the local economy and ecosystems of Erie, PA and Presque Isle State Park. The RSC has integrated drone surveys into monitoring projects for the last few years, including tracking erosional changes to Presque Isle's lakeside

shoreline over time, and indexing the health of primary wetland habitat vegetation. Updates from this past summer season include lagoon habitat surveys for Erie Bird Observatory, as well as dune restoration along Presque Isle's beaches.

Wetland Restoration at Presque Isle State Park – A Never-ending Story

Holly Best*, Ph.D.

Pennsylvania Department of Conservation and Natural Resources

Since the mid 1980's, the quantity of invasive plants found at Presque Isle State Park has increased substantially. The Park started battling the plants via mechanical means in the 1990's, but it wasn't enough. Fortunately, we were able to collaborate with many non-profit partners to receive a large amount of Great Lakes Restoration Initiative and Sustain our Great Lakes funding to be able to arm ourselves and win some of the battles on the Park to turn things around. This presentation will provide an overview of the work being done at the Park and why Presque Isle State Park is such an important place to preserve. This presentation will be about invasive plants, partnerships, and will provide an update on what we have been able to accomplish.

Wetland and Dune Restoration Updates

Jen Salem*

Regional Science Consortium

Since 2016, plant propagation has been an integral part of the wetland restoration project on Presque Isle State Park. Over the years, many refinements have been made to this program to improve plant production, quality and plant diversity. In 2024, Rock Sock technology was incorporated into the Regional Science Consortium's restoration efforts, and this year, a Beach 8 dune re-establishment project was added to our existing restoration projects. Learn how these efforts evolved and the direction these projects will take in the future.

Erie County's 2025 International Coastal Cleanup (ICC)

Audrey Knight*

Erie County Department of Planning and Community Development

This past September, Erie County once again joined the global effort to protect waterways through the annual International Coastal Cleanup (ICC). This presentation will highlight the success and impact of the event, which united hundreds of volunteers, community organizations, and local partners in removing litter from Lake Erie's shoreline and surrounding waterways. In addition to sharing data and cleanup results, this presentation will emphasize the long-term environmental and educational value of the ICC, demonstrating how local action contributes to global change and reinforces Erie County's commitment to protecting its waterways.

Litter in Waterways and Marine Debris Infrastructure

Don Benczkowski*

Program Coordinator – Lake Erie Region, Keep PA Beautiful

A pilot project was initiated in 2023 to determine the effectiveness of specifically-designed litter booms to capture marine debris from outflow pipes discharging into the Presque Isle Bay in the City of Erie, Pennsylvania. In June of 2023, two litter booms were installed on the campus of Lakeshore Towing Services Inc. (34 State Street, Erie, PA 15607). Litter was collected from those two litter booms 1-2 times per week and after storm events from June – December 2023, from June – October 2024, and from June -- present in 2025. In May 2025, an additional litter boom was located in an unnamed short tributary to Presque Isle Bay on property owned by Erie Water Works, at the foot of Myrtle Street in the City of Erie. Litter was collected from that boom beginning in May 2025 -- present 2025. Floating litter was collected by staff and interns from the Regional Science Consortium and AmeriCorps volunteers, while using long-handled nets. The litter was categorized and quantified by type. Other data collected included basic physical, biological and chemical parameters on many sampling dates for each location. The

importance of this study was to determine the effectiveness of the litter booms in collecting and removing the litter from entering Presque Isle Bay. The study sites also revealed unexpected pollution events via runoff. The litter booms proved to be very successful in capturing small pieces of litter, which pose the greatest threat of being mistaken as food and ingested by fish, shorebirds, and other wildlife. The future of this project could include the installation of additional litter booms on the Presque Isle Bayfront at other appropriate and acceptable locations. In addition to the litter boom collection efforts, Keep Pennsylvania Beautiful (KPB) staff has been working with local marinas, businesses and organizations in an attempt to prevent and control the transport of cigarette butts and tobacco products into Lake Erie and Presque Isle Bay. Through the Cigarette Litter Prevention and Recycling Program (CLPR), KPB has offered these entities a choice of cigarette butt collection receptacles that can be installed at busy/public locations within their campuses. Marinas and businesses are encouraged to recycle tobacco waste products in coordination with Terracycle, a New Jersey company that encourages and facilitates recycling efforts throughout the US. The ultimate goals of these projects are to supplement litter collection efforts conducted by volunteers taking part in the annual International Coastal Cleanup effort that takes place in September of each year.

The Regional Science Consortium's Pennsylvania Clean Marinas and Lake Friendly Program

Jeanette Schnars*, Ph.D.

Regional Science Consortium

The Clean Marina program is a voluntary program that encourages marina operators and recreational boaters to protect the boating environment by practicing environmentally sound operating and maintenance procedures. This program focuses on reducing or eliminating pollution from entering the Great Lakes through boating and marina activities using best management practices (BMPs) and encouraging stewardship. Currently there are 36 states that have a Clean Marina program. Pennsylvania is the only state on the Great Lakes coastline to not have a Clean Marina program. As an initiative to launch this program, the Regional Science Consortium implemented a boat shrink wrap recycling project in April – June 2025 at the Erie-Western PA Port Authority and Presque Isle State Park marinas. In its inaugural year, approximately 100 boat shrink wraps, equivalent to 148,464 plastic bags, weighing 1,800 pounds, were diverted from the landfill. These shrink wraps are transported to Firelands Local LLC in Ohio, a nonprofit boat wrap recycling service, where they will be prepared for recycling into guardrail offset blocks by Mondo Polymer Technologies. The boat shrink wrap recycling program will continue in 2026, expanding to additional marinas. The PA Clean Marina Program will continue to grow by including more programs, in addition to the boat shrink wrap recycling.

Mosaicking the PASST: Photogrammetry with the Pennsylvania Archaeology Shipwreck Survey Team

Sarah Magyan*, Sean Dalton*

Regional Science Consortium

PASST, The Pennsylvania Archaeology Shipwreck Survey Team, is a group composed of representatives from the RSC, Diver's World, Indiana University of PA, Mercyhurst University, NOAA National Marine Sanctuary Foundation, PA DCNR, PA DEP – Coastal Management Program, and S.O.N.S. of Lake Erie. This volunteer working group is dedicated to the documentation, preservation, scientific study, and educational promotion of Pennsylvania's underwater archeological resources. The PASST Team utilizes photogrammetry, which allows photography to be used for surveying and mapping purposes, and in this application can allow the development of three-dimensional models. For the 2025 season, the PASST team focused on the Phillip Armour and Susquehanna shipwrecks and collecting photogrammetry, survey measurements, photos and fish data for both. Using this data, two 3D models will be constructed and utilized to preserve these wrecks.

Coding for Climate Change: An Adaptable STEAM Curriculum

Jacob Korte*

Regional Science Consortium

The process of computer programming provides several cognitive benefits to students including improving problem solving, logical thinking, verbal acuity, and determination. The Regional Science Consortium (RSC) is developing curriculum that teaches the basics of coding, robotics, and AI and asks students to apply that knowledge to formulate solutions to climate change and water quality related problems. Our program uses BBC micro:bit single board computers and Forward Education robotics kits as hardware platforms and Microsoft MakeCode programming language. This oral presentation covers the basics of the hardware and software we are using and outlines our curricula. Additionally, listeners will have the opportunity to observe several exercises that make up this program. This curriculum provides numerous benefits including its versatility – it can be adapted to almost any grade or experience level.

School of Sustainability and Experiential Learning (SS&EL) Summer Camps

Hailey Dahl*

Regional Science Consortium

The Regional Science Consortium's School of Sustainability & Experiential Learning provides students with hands-on, learning experiences rooted in nature and centered on the topic of Sustainability. As part of this initiative, the RSC introduced its first year of summer camps in 2025. As the RSC continues to expand its K-12 Education programs, the value of immersing students in experiential learning becomes even more important. Students had the opportunity to experience a plethora of science, art, and investigations throughout multiple weeks over the summer. Each week encompassed different themes under sustainability, such as Science of Food, Science of Fashion, Science of Sustainability, and Science of Art. In collaboration with Grounded Printshop and Erie Arts and Culture, students experienced the seamless blend of Science and Art in unique ways. This program was made possible through grant funding from a PA Creative Catalyst grant and the PA DEP Environmental Education grant.

ABSTRACTS

*Regional Science Consortium
21st Annual Research Symposium
November 5-7, 2025
Tom Ridge Environmental Center
At Presque Isle State Park*

POSTER PRESENTATIONS

POSTER SESSION: Wednesday, November 5, 2025, 6pm—8pm

1. Optimization of Mushroom Based Biomaterials

Emily Dlugozima*+, Matt Gacura (Dept. of Biology), Gary Vanderlaan (Dept. of Biology),
Davide Piovesan (Dept. of Biomedical Engineering)
Gannon University

Fungi have been investigated for their potential to be used in the construction industry, particularly in the production of biomaterials. The creation and disposal of current construction materials, such as those made from petrochemicals, have had destructive effects on the environment. The usage of fungi for biomaterials can reduce costs and be beneficial for the environment. White-rot fungi can be cultivated on waste products composed of high amounts of lignin and cellulose. If grown in the right conditions, the hyphae and filamentous networks can increase the strength and rigidity of the biomaterial. The purpose of this project is to develop the optimal treatment/substrate/reinforcement mix to produce large quantities of white-rot fungi biomaterials that satisfy physical properties testing requirements. Spawn jars inoculated with *Pleurotus ostreatus* (oyster mushroom) and *Trametes versicolor* (turkey tail mushroom) were created and tested during the Fall of 2025. The materials selected for substrate mix were oak sawdust, rye berries, and vermiculite (heat-treated clay). Reinforcements selected for this study were blue spruce needles, straw, and corn leaves. Fungi were grown on these substrates at room temperature for 3 weeks in darkness to allow for the maximum amount of biomass to be produced. After the fungal materials were allowed to colonize substrates completely, they were deactivated using ovens for heating/drying. The mechanical properties (such as strength) of the completed fungal materials will be tested using an MTI-10k. Future experiments will include investigating the benefits of adding various essential oils, including calendula oil, peppermint oil, clove oil, and pepper oil.

2. Turning Coffee Waste into Biochar for Sustainable Water and Soil Management

Anjali Navinkumar Patel*+, Liu Cao
Environmental Science and Engineering, Gannon University

By converting coffee waste into biochar for wastewater treatment and subsequent soil enrichment, this study explores a cyclical and sustainable method to waste management. Two temperatures [300°C and 700°C] were used to pyrolyze coffee residues, producing biochar with distinct physicochemical characteristics. A synthetic wastewater solution containing glucose, ammonium nitrate, potassium phosphate monobasic, magnesium sulfate, calcium chloride, and sodium bicarbonate was prepared to simulate organic and nutrient pollution. Biochar was tested at various concentrations (0.5–2 g/L for 700 °C biochar and 1–4 g/L for 300 °C biochar) under continuous agitation for 24 hours to ensure sufficient contact with contaminants. Following treatment, the solutions were filtered and analyzed for total organic carbons (TOC), phosphate, and nitrate concentrations. The used biochar, enriched with nitrogen, phosphate, and organic residues, is proposed to use as a soil amendment to promote plant development.

By linking waste conversion, water purification, and soil restoration, this study demonstrates the potential of coffee waste–derived biochar to advance zero-waste and circular agriculture systems.

3. Evaluating Beer Grain–Derived Biochar for Nutrient and Pollutant Removal from Water

Madeline Endler*+, Liu Cao

Environmental Science and Engineering, Gannon University

Biochar is a carbon-rich material produced through the pyrolysis of organic matter, thermal decomposition at high temperatures in the absence of oxygen. Its porous structure, extensive surface area, and abundant functional groups like carboxylic and phenolic make biochar highly effective at adsorbing pollutants and nutrients. These properties confer a high cation exchange capacity, enabling the removal of contaminants such as excessive nitrate and phosphate, and heavy metals from water. This study aims to assess the adsorption capacity of biochar derived from spent beer grains in artificial wastewater and nutrient-enriched freshwater systems. Spent beer grains were selected as a sustainable feedstock due to their local abundance and potential for waste valorization. Adsorption capacity is evaluated using standard water quality testing methods like nitrate, phosphate, and total organic carbon (TOC) measurements before and after biochar treatment. The recovered biochar will be subsequently applied as a soil amendment to promote crop growth, advancing circular agriculture practices and environmentally sustainable water treatment solutions.

4. The Geomorphic Consequences of the Centerville Dam Breach on Oil Creek Stream Channels

Ryan Cox*+, Ian Dombach, Meghan Wolfarth, Tamara Misner, PhD, Claire Griffin, PhD

Allegheny College

We investigated how the breach of a long-standing dam influences stream morphology and substrate composition. Following the 2021 breach of the Centerville Dam in Oil Creek (Centerville, PA), we collected baseline geomorphological and substrate data at multiple reaches upstream and downstream of the site. This data provided insight into how breached dams reshape stream-bank structure and affect broader ecosystem dynamics. Substrate analysis revealed a distinct difference between the reaches. Upstream of the dam, both directly above the former impoundment and further up, the streambed was composed primarily of silt and clay. In contrast, the main stem and eastern branch were dominated by cobble ranging from 30-80mm. This variation highlighted how dams influence sediment deposition patterns, with fine sediments accumulating in impounded areas and coarser material persisting in non-impounded reaches where flow is consistent. Establishing this baseline allowed us to generate predictions about post-breach changes to stream morphology and sediment distribution. By documenting these dynamics in Oil Creek, this study contributes to broader efforts to understand the ecological and geomorphological consequences of dam removal.

5. Assessing the Pre-Planting Soil Conditions and Early Succession of a Newly Planted Tiny Forest

Malachi Boyle*+, Madelyn Kruth*+, Hwidong Kim, Ph.D., PE

Gannon University, Erie, PA

Tiny forests represent an innovative model of urban ecological restoration. They offer compact green spaces to the community that enhance biodiversity, support wildlife, and strengthen ecosystem resilience within heavily developed environments. By introducing a diverse assemblage of tree and understory species, tiny forests promote ecological interactions that improve survivability and foster long-term ecosystem stability. This study examines the initial establishment and ecological functions of a tiny forest newly planted on Gannon University's campus in Erie, Pennsylvania. Throughout this research, the following four objectives will be addressed: (1) to monitor the growth and survival rates of planted trees, setting a precedent for further research, (2) to characterize soil microbial communities, (3) to investigate the availability of nutrient, such as nitrogen and phosphorous, and (4) to assess early-stage O-horizon development as an indicator of soil formation and forest floor processes. By integrating ecological

monitoring with soil chemistry and microbiological analysis, this project aims to improve understanding of how tiny forests interact with urban soils and contribute to sustainable environmental restoration.

6. Fungal Diversity on the Penn State Behrend Campus

Elise Kelly*+, Matthew Gruwell

Penn State Behrend

Biodiversity is an excellent marker of environmental conditions, as robust environments are able to support a diverse number of species. Fungal diversity, in particular, is indicative of multiple environmental factors such as nutrient composition, moisture levels, and air quality. Representations of biodiversity, like field guides and catalogs, simultaneously promote the beauty and importance of biodiversity, while providing information on environmental conditions. The goal of this research is to create a Fungal Diversity catalog of the Penn State Behrend campus, including Wintergreen Gorge, to describe the fungal community and its role in the environment. This will be executed by collecting fungal samples, extracting, amplifying, and sequencing the DNA, and classifying each fungal species. Upon its completion, the catalog will feature each fungus' morphology, location, possible ecological interactions, and phylogeny. This is an ongoing project that will continue until a confident representation of the fungal community has been reached. This research will provide insight into fungal diversity of the environment on the Penn State Behrend campus and encourage students to spend time outdoors identifying fungi and observing biodiversity in nature.

7. Integrative Modeling and Analysis of Arachnid Systems: Biomechanics, Predator-Prey Dynamics, and Population Trends

Alex V. Wood*+4, Gavin W. Iocona*+4, Grey P. Diley⁴, Neil P. Gandhi⁴, Daniel Galiffa¹, Beth Last², Joseph Previte¹, Amos Ong¹, Lynne Beaty³

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This research explores the ecological and physiological mechanisms driving arachnid behavior and survival by integrating biomechanical silk analysis, predator-prey dynamics, and population modeling. First, we developed a three-species predator-prey model inspired by the diverse diet of wolf spiders, modeling one predator and two prey species. Using Jacobian analysis, Center Manifold Theorem, invariant surfaces, and trapping regions, we identify critical parameter relationships governing species coexistence or extinction. Results indicate that while one prey species typically dies out, coexistence emerges when this ratio in our initial parameters is met: $(\alpha_1/\beta_1) = (\alpha_2/\beta_2)$. Also, we investigated the biomechanical properties of silk from various tarantula species. Silk samples collected from terrariums were formed into rolled cylinders and tested using a DMA Q800 to produce stress-strain curves. Trials accounted for anomalies due to substrate or non-uniformity. Findings reveal distinct mechanical patterns between species and age groups, suggesting underlying differences in silk structure that could inform taxonomic classification. Also, we modeled population dynamics of wolf spiders in Erie woodland ecosystems, dividing the population into spiderlings, juveniles, and mature adults. Parameters reflect stage-specific mortality, survival, development rates, fecundity, and environmental carrying capacity. The model provides insight into lifecycle dynamics and population stability under ecological constraints. Future directions in our research include generalizing predator-prey models to n-species systems, exploring symmetry in Lotka-Volterra frameworks, extending biomechanical analysis using wave equations, and expanding silk testing across broader tarantula populations. This research was supported by the Penn State Behrend Seed Grant and Summer Undergraduate Research Grant.

8. Not a picky eater: Re-documenting the feeding habits of the grape berry moth, *Paralobesia viteana* (Lepidoptera: Tortricidae)

Norah F. Dana*+, Flor E. Acevedo
Penn State Behrend

The grape berry moth (GBM), *Paralobesia viteana* (Lepidoptera: Tortricidae), is one of the most important pests of grapes in Eastern North America. The insect is native to this region and established its association with wild grapes well before the advent of grape cultivation. For over a century, it has been documented that GBM feeds and develops exclusively on grape berries. However, GBM larvae were found on galled wild grape (*Vitis riparia*) leaves infested with phylloxera (*Daktulosphaira vitifoliae*) in field conditions in Erie, Pennsylvania. This study tested GBM development on alternative diets consisting of ungalled leaves, galled leaves, and fruit from commercial and wild grape species. GBM neonates from a laboratory colony were individualized in cups and reared on each of the following treatments: phylloxera galls from *V. riparia* leaves (with and without phylloxera eggs), ungalled *V. riparia* leaves, phylloxera eggs only, Concord (*Vitis x Labruscana*) leaves, Riesling (*Vitis vinifera*) leaves, and grapes from *V. riparia* and Concord (control). Larval mortality and development were monitored daily, along with pupae development, pupae weight, and adult emergence. GBM larvae successfully developed into adults when fed on all diet treatments, except for those provided with Concord leaves and phylloxera eggs only. GBM larvae developed faster when fed on all diet treatments compared with those fed on Concord grape; furthermore, larvae fed on galled *V. riparia* leaves developed faster than those fed on any other treatment. There were no differences in pupa development or pupa weight among treatments. Viable eggs were produced from adults reared on both gall diets, *V. riparia* leaves, Riesling leaves, and grapes. These results demonstrate that GBM can develop and reproduce when feeding on phylloxera galls and leaves from wild and cultivated grapevines, broadening our understanding of GBM ecology with potential vineyard management implications.

9. Determining Spread and Density of Banded Mystery Snails

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Pennsylvania State University, The Behrend College

Invasive species pose an increasing threat to freshwater systems worldwide, altering water chemistry, outcompeting native species, and disrupting food webs, thereby decreasing native species diversity. New species are introduced regularly into the Great Lakes, and little is known about their impacts on communities and ecosystem dynamics. A recent invasive taxon are mystery snails. Mystery snails are large, quickly reproducing species that give birth to live young. Amongst this group are the banded mystery snails (*Viviparus georgianus*). Banded mystery snails are native to the southern United States but were introduced into the Hudson River in 1867 and have since spread throughout the region. They were discovered in Erie County in 4, and their current distribution in the county was unknown. This study aimed to determine the spread and density of banded mystery snails in the Pennsylvania Lake Erie and French Creek watersheds. Thirteen bodies of water and streams/creeks around Erie County and French Creek were searched for banded mystery snails. If snails were found, ten .5m by .5m quadrats were used to estimate density. Quadrat sampling occurred three times over the summer to estimate seasonal population fluctuations. Snails were found at two locations (Findley Lake and Eaton Reservoir), and we used a two-way ANOVA to compare snail densities at these locations over time. Snail density varied between locations, over time, and had significantly different temporal patterns of density. Controlling invasive species relies on quick action at low populations and limited ranges. The indication of a growing population at Eaton reservoir permits action to prevent further infiltration and ecosystem damage.

10. Tracking Invasive Mystery Snail Movement at Presque Isle State Park

Emma Carrier*+, Abigail Miller, Samuel Nutile, Lynne Beaty

Pennsylvania State University, The Behrend College

Chinese mystery snails (*Cipangopaludina chinensis*) are an aquatic invasive species introduced to Lake Erie. Identified by its operculum, spherical shell, and large size, these snails jeopardize local biodiversity by disrupting nutrient cycling, altering the food web, and outcompeting native filter-feeding species. However, little is known about their movement and dispersal patterns. Leveraging an ongoing transect-based mark-recapture study at Presque Isle State Park, snails were captured, marked with a unique identification code, measured, and returned to their original location. Sampling occurred for three one-week sampling periods in July and August 2025. Of the transects with recaptured snails, 8 of 14 showed a 100% recapture rate, indicating limited snail movement (<5-10 meters). The most movement occurred in Thompson Bay, with 50-67% of snails moving between transects. One snail moved from Leo's Landing to Graveyard Pond between 2024 and 2025. These findings suggest that, in general, Chinese mystery snails exhibit minimal movement. However, the variation of this movement across locations suggests small-scale environmental factors, such as sediment type or vegetation, may influence this behavior. These factors could be investigated further to better develop effective removal strategies, mitigate spread, and predict snail dispersal, thereby facilitating effective management.

11. A New Approach to Mystery Snail Collection: Bait Preferences in Passive Sampling as a Control Strategy

Abigail Miller*+, Emma Carrier, Lynne Beaty, Samuel Nutile

Pennsylvania State University, The Behrend College

The Chinese mystery snail (*Cipangopaludina chinensis*) is an invasive freshwater gastropod that has established itself across North America, posing a threat to native aquatic ecosystems, including Lake Erie's Presque Isle State Park. Traditional active sampling methods for mystery snail populations are labor-intensive and ineffective, particularly in deep or turbid waters. However, the efficacy of passive sampling (i.e., trapping) has not been extensively researched. My study investigated passive sampling as a potential alternative for capturing mystery snails and aimed to determine whether the type of bait affects capture success. Field experiments were conducted from June to August 2025 at Presque Isle State Park, Pennsylvania, using modified cylinder traps with five bait types: moist cat food, cucumbers, algae pellets, boiled spinach, and an unbaited control. Traps were set up at five locations: Feather Point, Lily Pond, The Bridge, Graveyard Pond, and Thompson Bay. Across trials, the average snail captures were low, with algae having the highest mean (0.083 snails/trap), followed by moist cat food (0.042), boiled spinach (0.042), control (0.042), and cucumber (0.028). These results suggest that bait type had little effect on snail capture, potentially because the baits were not strong enough, the traps were not left in the water long enough, or because the snails preferred different food sources. Despite low capture rates, passive sampling was able to capture snails, indicating that it may be a useful method for monitoring snail populations. Testing more aromatic baits and using alternative trap designs could improve capture efficiency and inform future sampling strategies.

12. Pharyngeal Morphology of Mottled Sculpin (*Cottus bairdii*), Largemouth Bass (*Micropterus nigricans*), and Creek Chub (*Semotilus atromaculatus*) from Erie County, Pennsylvania

Kayla Thompson*+, Greg Andraso

Gannon University, Biology Department

Teleost fish possess a pharyngeal feeding apparatus, comprised of modified gill arches, used to process food. Pharyngeal morphology has diverged remarkably, contributing to speciation due to differences in habitat use and diet. The objective of this pilot study was to compare pharyngeal morphology of mottled sculpin (*Cottus bairdii*), largemouth bass (*Micropterus nigricans*), and creek chub (*Semotilus atromaculatus*) which are native to the northeastern United States. Specimens were collected in fall 2024 by Gannon University's Fisheries Biology (BIOL 396) course. Following dissection, pharyngeal structures were processed by bleaching in hydrogen peroxide and potassium hydroxide, initial clearing in

buffered trypsin, staining with Alizarin Red S, and final clearing in glycerol. Specimens were viewed on a stereoscope under reflected light and photographed. The mandibular arch, hyoid arch, and branchial arches consisting of basibranchial, hypobranchial, ceratobranchial, epibranchial, and pharyngobranchial bones were apparent in all three species. However, notable variation was observed in the morphology of ceratobranchial 5 (CB5) ventrally and pharyngobranchials 2-4 (PB2-4) dorsally. *M. nigricans* has abundant cardiform teeth on both CB5 and PB2-4, while *S. atromaculatus* exhibits 5-6 robust, elongated, medially oriented teeth on CB5 and lacks toothed plates on PB2-4. *C. bairdii*, whose pharyngeal morphology appears to be undescribed in the literature, possesses well-developed CB5 with cardiform teeth as well as toothed PB2 and PB3. These morphological differences are consistent with distinct feeding strategies and dietary niches, which in turn reflect the ecological habitats occupied by each species.

13. Age and Growth of Walleye (*Sander vitreus*) from Pennsylvania Waters of Lake Erie Using a Cost-Effective Method for Processing Otoliths

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Otoliths are calcified structures of the inner ear that are frequently used by fisheries biologists to determine age and growth rates of fish. The objectives of this study were to determine age at capture and estimate growth rates of walleye (*Sander vitreus*) using a cost-effective method of analyzing otoliths. This work was part of a larger study that investigated concentrations of heavy metals in walleye that differed in age. Sagittal otoliths were removed, embedded in epoxy, and sectioned using a hand-held rotary power tool (Dremel, Inc.). Otolith sections were thinned and polished using 1-inch belt sanders equipped with 400 and 800-grit belts. Sectioned otoliths were photographed under transmitted light, annuli were counted, and distances from the nucleus to each annulus were measured. Total length (TL) at age was estimated for each walleye using the direct proportion method. Otoliths were analyzed from 64 walleye ranging in TL from 30.6 to 69.5cm. Age of walleye at capture ranged from 1+ to 11+ years. Rapid growth was observed through the first three growing seasons before slowing in subsequent years. After the first few growing seasons, growth rates of males were slower than those of females. This is typical for species in which males mature early in life and females invest heavily in body growth in order to produce more eggs.

14. How Round Goby Affect Native Fish Communities in Pennsylvania Tributaries to Lake Erie

Owen Carter*+, Samuel Nutile, Lynne Beaty
Penn State Behrend

Lake Erie and its tributaries are home to numerous native species that maintain aquatic ecosystem health. Invasive species cause irreversible ecological damage to these same aquatic communities, with the round goby (*Neogobius melanostomus*) being a prevalent example in Lake Erie and its connecting tributaries. Round gobies affect the community assemblages of native fish by displacing native populations from habitat and niche space, while also consuming essential biomass. Beyond their presence in the main lake, little is currently known about their effect on tributary systems and the delicate ecosystems they contain. Analysis of four major Pennsylvania tributaries to Lake Erie (Raccoon Creek, Elk Creek, Walnut Creek, and Cascade Creek) has revealed the effect round gobies have on native fish species in tributary ecosystems. Biotic integrity scores, round goby density comparisons to the presence of native species, and overall fish biodiversity surveys have shown that the presence of round goby negatively affects native fish community assemblages. This baseline study of Lake Erie tributaries underscores the ecological threat this invasive species poses to tributary ecosystems connected to invaded waterbodies.

15. Developing an enzymatic biomarker for cyanotoxin exposure in the round goby (*Neogobius melanostomus*)

JT Blum*+, Sam Nutile
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The presence of harmful algal blooms (HABs) in the Lake Erie watershed has repercussions for humans and wildlife. Due to the negative health effects of HAB cyanotoxins, local waterbodies are frequently sampled to prevent human exposure, but this does not account for impacts on aquatic wildlife. One way to estimate this is by measuring a trait that is directly affected by exposure, also known as a biomarker. Because exposure to cyanotoxins is known to affect the liver, the quantification of detoxifying liver enzymes like glutathione S transferase (GST) could be a biomarker. The objective of this project is to determine if GST activity is a good biomarker for cyanotoxin exposure in the invasive round goby (*Neogobius melanostomus*). Round gobies will be collected from six different sites in Lake Erie and its tributaries as well as an additional site at an inland lake (LeBoeuf Lake). The activity of GST from homogenized liver tissue will be measured in vitro using a plate reader. If GST activity is a good biomarker for cyanotoxin exposure, then these measurements should have a positive correlation with the reported HAB levels across the sites. This research is an important step toward understanding the consequences of HABs in affected waterbodies.

16. Investigating alternative solvents for Polychlorinated Biphenyl Extractions of Fish Tissue

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Dichloromethane (DCM) is used in laboratories to extract and quantify the accumulation of carcinogenic polychlorinated biphenyls (PCBs) in fish tissue—which is common in some waterfront areas due to past chemical pollution. However, handling DCM presents notable health risks, and the Environmental Protection Agency (EPA) has restricted its usage accordingly. This study's objective is to investigate the use of less hazardous Ethylene Acetate (EA) as a possible substitute solvent to DCM when extracting PCBs from fish tissue by comparing the extraction efficiencies of PCBs using both solvents. Storebought tilapia filets were spiked with known quantities of PCBs and then extracted using proven extraction techniques using either DCM or EA. Extraction efficiencies using both solvents were then compared. Extraction efficiencies were also compared using PCB contaminated, wild caught walleye filets. Results of these tests will be presented at the Regional Science Consortium once data analysis is complete. If EA proves to be an effective replacement solvent to DCM, then research into the abundance of PCBs in fish will become significantly safer and more accessible. With reduced health concerns regarding the use of hazardous solvents, investigators will be better equipped to examine the negative effects of historical chemical pollution in aquatic ecosystems.

17. Concentrations of Heavy Metals in Yellow Perch (*Perca flavescens*) from Chautauqua Lake and Presque Isle Bay

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Gannon University, Biology Department

The yellow perch (*Perca flavescens*) is recreationally and commercially important to local communities. Considered a keystone species in many ecosystems, it acts as a link between lower and higher trophic levels. It therefore is likely an important intermediate in transferring heavy metals through the food web, ultimately into humans. The primary objective of this work was to compare concentrations of heavy metals in tissues of yellow perch from Chautauqua Lake (Chautauqua Co., NY) and Presque Isle Bay (Erie Co., PA), two locations with important yellow perch fisheries that differ in industrialization and urbanization. We also sought to compare heavy metal concentrations among tissues. We used ICP-MS to assess concentrations of seven RCRA 8 metals (Ag, As, Ba, Cd, Cr, Pb, Se) as well as Ni in liver, muscle, and otoliths from yellow perch collected in early 2025. Multivariate PERMANOVAs and post-hoc Mann-Whitney U tests revealed differences in metal concentrations between sites in all three tissues. For

example, yellow perch from Chautauqua Lake had higher barium in all three tissues, whereas Presque Isle Bay yellow perch had higher selenium in muscle tissue. Metal concentrations also varied by tissue, with barium being up to three orders of magnitude higher in otoliths than in liver or muscle. Our results show differences in heavy metals between sites, which may be due to differences in industrialization, urbanization, or geology. Differences in concentrations among organs suggest care should be taken when selecting tissues for analysis because they appear to accumulate and retain metals differently.

18. Assessing Toxic Heavy Metal Contamination in Erie's Public Parks and Potential Health Risks

Haleigh Manning*+, Hwidong Kim, Ph.D., PE.

Gannon University, Erie, PA.

Public parks in Erie, Pennsylvania, are vital spaces for recreation, yet they may also serve as reservoirs of toxic heavy metals such as lead (Pb), arsenic (As), chromium (Cr), and copper (Cu), linked to the region's industrial past and the use of leaded fuels, lead-based paints, and chromated copper arsenate (CCA)-treated wood. This study investigates the presence and distribution of these metals in park soils and any equipment potentially exposed to the public, contaminants of concern due to their toxicity, persistence, and potential impact on community health.

Soil samples were collected from playgrounds, walking paths, and recreational fields where children, pets, and elderly residents frequently interact with the environment. Concentrations of these metals were analyzed and compared with established public health and environmental safety thresholds. The goals of this work are to quantify contamination levels, identify likely sources, and assess implications for human and ecological exposure.

The results of this research have critical importance for risk assessment in vulnerable populations. Children are especially sensitive to lead and arsenic exposure, pets can directly contact contaminated soil, and elderly residents often spend extended time in these areas. Recognizing the lasting environmental effects of Erie's industrial past, it is necessary to evaluate contamination in green spaces as a step toward safeguarding public health. This work provides data to support future remediation strategies, community education, and policy decisions aimed at safeguarding public health while ensuring Erie's parks remain safe and accessible spaces for all residents.

19. Assessing the impact of microplastics on Lettuce (*Lactuca sativa*) seeds germination

Anthony Sinito*+, Liu Cao

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Microplastics (MPs) and nanoplastics (NPs) have emerged as pervasive environmental pollutants with growing evidence of adverse effects on terrestrial and aquatic ecosystems. Recent studies indicate that MPs can impair seed germination, photosynthetic activity, and overall plant vigor, posing a serious threat to agricultural productivity and food security. Given their widespread presence in soil, air, and water, MPs and NPs represent an escalating global concern with no feasible large-scale remediation methods currently available. This study investigates the impact of microplastic exposure on seed germination in *Lactuca sativa* (lettuce), a widely cultivated crop species. Seeds from two commercial sources (Mesculla and Burpee) were exposed to varying MP concentrations to assess dose-dependent responses. Results demonstrated a clear inverse relationship between MP concentration and germination success: at the highest concentrations, no germination occurred in either group, while at the lowest concentration, an average of 70% of seeds successfully germinated. These findings provide further evidence that microplastic contamination can directly inhibit seed germination, highlighting its potential to disrupt crop establishment and contribute to agricultural decline under increasing plastic pollution.

20. Microplastic fibers removal

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Microplastic pollution is a growing water quality challenge, with PVC fragments particularly difficult to remove due to their durability. Conventional coagulants like alum offer limited effectiveness against

microplastics and raise environmental concerns such as toxic sludge generation. This study evaluates orange peel powder (OPP) as a biodegradable alternative for PVC microplastic removal. Crushed PVC tubing was added to tap water to simulate contamination, and twenty experiments were conducted using OPP, aloe vera gel, alum, clay, and synthetic polymers under varying dosages, pH, and mixing conditions. OPP consistently achieved the highest turbidity reduction and strongest floc formation, outperforming all other materials. Aloe vera gel showed potential but remained less effective. These results highlight OPP as a low-cost, sustainable coagulant that supports circular economy principles by repurposing agricultural waste for water treatment applications.

21. Soil Analysis of a Prospective Urban Community Garden

Andrew Samuels*+, Liu Cao

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Food insecurity remains a critical issue across Erie County, in which tens of thousands of Erie Residents live within food deserts, areas where at least a third of the population is located one or more miles from a grocery store. To address this challenge, a community partner of Gannon University sought to develop an urban community garden at a site at Downing Ave between 18th St and Paragon St, a site adjacent to a former heavy industrial facility. We conducted soil analysis for pH, nutrients, heavy metal contamination using inductively coupled plasma mass spectrometry (ICP-MS). Results indicated elevated concentrations of arsenic, chromium, cadmium, cobalt, and thallium, each exceeding the US EPA's Regional Screening Levels (RSLs) of noncarcinogenic childhood exposure. Additionally, nitrogen depletion was observed, suggesting poor soil fertility. Given these findings, the site was deemed unsuitable for immediate food production. To provide a sustainable remediation strategy, a follow-up study is proposed to evaluate the effectiveness of phytoremediation using two plant species (*Helianthus annuus* and *Pteris vittata*) and one fungal species (*Pleurotus ostreatus*). Contaminated soil will be transferred to Gannon University's greenhouse for controlled experiments assessing the capacity of these species to sequester or degrade heavy metals. This study aims to develop a scalable remediation model applicable to other contaminated community garden sites, supporting both environmental restoration and equitable access to safe, locally grown food.

22. Community Air Monitoring in Erie's Industrial Corridor

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The Erie Air Watch Project is a community-based environmental justice initiative jointly led by Groundwork Erie, Gannon University, and RISE Communities. This ongoing collaboration seeks to expand neighborhood-level air quality monitoring and empower residents through community science. This project focuses on the experimental deployment of ten PurpleAir Flex monitors across Erie's most pollution-affected neighborhoods, with a particular emphasis on Census Tract 15, an area north of Buffalo Road where public housing is sandwiched between heavy manufacturing and industrial facilities, and youth make up nearly half (45.7%) of all residents. This project emphasizes sensor placement at community hubs such as schools, homes, and centers, enabling continuous measurement of fine particulate matter (PM_{2.5}) in real time. These low-cost, high-accuracy sensors generate localized data visualized on publicly available air quality maps, offering unprecedented neighborhood-level insight into air quality variations. Given the close proximity of children and families to emission sources, the project may inform potential long-term health risks, including respiratory and cardiovascular impacts. The project also integrates educational outreach, teaching residents and students how to interpret air quality data and apply it to daily health and environmental decisions. Although data collection is forthcoming, this research is significant for its combination of environmental monitoring, citizen engagement, and data transparency, all working towards long-term improvements in Erie's environmental health.

23. Construction Water Treatment

Amy Poole*+, Amanda Smith*+, Luciano Vasquez*+, Dylan Flinchbaugh*+, Christian Scheller*+, Varun Kasaraneni Ph.D., P.E.

Department of Environmental Science and Engineering, Gannon University

This project addresses the limitations of conventional pump filtration systems in removing fine suspended solids from extracted groundwater. The proposed solution involves the development of an auxiliary treatment module positioned downstream of traditional filter bags, which currently remove only larger particulates. The system will be approximately 8 feet by 40 feet in size and designed to accommodate a flow rate of roughly 250 gallons per minute. Targeted water quality parameters include turbidity, total suspended solids (TSS), hardness, and iron. To achieve these treatment goals, the system will incorporate a combination of specialized filtration media and natural adsorption materials. The objective is to provide a cost-effective solution that reduces reliance on disposable filter bags while minimizing environmental impact.

24. SunDrop: Water treatment systems

Zara Tommaney*+, Jessica McCracken*+, William Retsch*+, and Giovanni Delorenzi*+, Varun Kasaraneni Ph.D., P.E.

Department of Environmental Science and Engineering, Gannon University

In disaster-affected areas, access to clean drinking water is often limited due to damaged infrastructure and scarce freshwater sources. SunDrop will address this challenge by developing a compact, solar-powered desalination system that will convert saltwater into potable water using renewable energy. The project will focus on creating a low-cost, portable, and efficient solar still capable of producing a minimum of 12 liters of clean water per day, enough for a family of four. By leveraging an acrylic Fresnel lens to concentrate sunlight, the system will heat saltwater to generate vapor, which will then condense into potable water. Key design considerations will include the use of sanitary, heat-resistant materials such as stainless steel, food-grade HDPE, and treated metals, along with integrated features like a flow control valve, automated salt-cleaning mechanism, and reflective interior linings to optimize heat retention. The prototype will be tested across various climatic conditions and saltwater compositions to ensure consistent performance and safety. Through careful research, material selection, and iterative testing, SunDrop will offer a sustainable, scalable solution to water scarcity in emergency situations, combining practicality, affordability, and ecological responsibility.

25. Stormwater Management Plan for Gannon Campus

Amanda Smith*+, Varun Kasaraneni Ph. D., P.E., Jeanette Schnars Ph.D.

Gannon University

The Stormwater Maintenance Plan outlines the procedures for maintaining Gannon University's stormwater infrastructure to ensure regulatory compliance, protect water quality, and reduce localized flooding. The plan focuses on the inspection, cleaning, and upkeep of storm drains, inlets, catch basins, and associated conveyance systems across campus. Regular maintenance of storm drains is critical to prevent blockages from sediment, debris, and pollutants. Key activities include scheduled inspections at least twice annually and after major storm events, removal of accumulated debris and sediment using vacuum or manual methods and ensuring that inlet grates and conveyance structures remain unobstructed. Illicit discharges will be monitored and reported in accordance with local stormwater regulations and the university's Municipal Separate Storm Sewer System (MS4) permit requirements. By implementing a proactive maintenance program, Gannon University can extend the lifespan of its stormwater infrastructure and protect the health of local waterways such as Lake Erie.

26. Detection of cTEP in Erie County Water Sources and Its Implications for the Local Community

Madeline Endler*+, Valerie Burawa*+, Hwidong Kim. Ph.D., PE

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Colloidal transparent exopolymer polymers (cTEP) are organic by-products from plankton in aquatic environments. This substance is gel-like making it highly adherent. This characteristic allows it to bind with heavy metals and particulates found in the water column. While this attribute can be beneficial in those circumstances, it can have negative effects as well. Erie Water Works filters, used to purify drinking water for the community, are prone to becoming clogged by cTEP particles. To address these recurring issues, it is crucial to understand cTEP in Erie's aquatic environments. This project aims to quantify cTEP concentrations in water samples collected from sources throughout Erie County. Utilizing spectroanalysis, the study will assess the potential impacts of cTEP on public health and the environment, thereby supporting efforts to ensure the safety of local drinking water supplies.

27. The Impact of Road Proximity on Soil Fungal Communities

Zachery Chismar*+, Carlo Tabaro, Matt Gacura, Gary Vanderlaan

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Salting roadways is a critical method for ensuring winter safety in areas such as Erie, PA. However, salt, along with other chemical contaminants associated with roads, may negatively affect soil microbes, including the ecologically significant fungi. Soil fungi play key roles in the environment such as nutrient cycling, acting as plant symbionts, and in the degradation of pollutants. Taxonomic groups of fungi found in the soil may potentially serve as indicators for assessing environmental quality and for the presence of pollutants. In this ongoing study we are investigating how the environmental conditions of roads, including salting regimens, influence soil fungal community composition and diversity near roadways. We hypothesize that closer proximity to salted roads alters fungal community structure, particularly in urban environments with heavy salt use compared to rural areas with minimal salt application. To test this, we sampled soil at three urban and three rural sites in the early spring of 2025. Triplicate soil cores from the A horizon were collected at 5-meter intervals away from roadsides. DNA extractions were performed on a subsample of each soil core. Illumina sequencing the ITS region was performed to measure fungal community composition and diversity. Furthermore, measurements of pH, electroconductivity, moisture content, and organic material content were gathered. Our data analysis highlights the difference in microbial composition differences due to salting practices disturbing fungal communities near and far from the roads. Contrasts were also found between the urban and rural sampling sites, presumed from the differences in salting practices between the two areas.

28. Bacterial Microbiome Diversity Within Vineyard Groundwater

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The application of fertilizers and pesticides on farms can have impact on ecosystems by changing soil and water chemistry. Many studies have focused on the impact of runoff from farm fields on surface watersheds, but farm applications can also modify sediment and ground water sources particularly thorough alteration of microbial communities. The objective of this study is to observe the microbiomes of six wells located on the Lake Erie Regional Grape Research and Extension Center vineyards to create an overall view of the groundwater composition during the summer season (June-August). Six wells from across the property were sampled from once every month (June 16th, July 17th, and Aug. 13th). Sediment was separated from the groundwater, both being used for DNA extraction, for a total of 36 samples. Bacterial 16S region V4 was amplified in 34 of the samples using PCR. Amplicons were sent to Novogene for Illumina sequencing. Preliminary sequencing data has shown the presence of bacterial communities within the groundwater and variation between the wells. This study looks at the diversity of groundwater and sediment-based microbial life at a working vineyard. Changes to bacterial colonies will be compared between well locations and times they were sampled. Microbiome analysis will be paired

with chemical analysis of the water to assess if there is correlation between chemical makeup and species diversity.

29. From Streets to Streams: Anthropogenic and Seasonal Effects on Erie, PA Stream Bacterial Communities

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Anthropogenic activities, such as pollution and river channelization, can negatively impact aquatic community composition and diversity. While these changes are often evident in macroscopic organisms, microorganisms are understudied, and little is known on how they respond to anthropogenic change. Alterations in microbial community structure can lead to reduced ecosystem resilience, affecting biodiversity, human pathogen prevalence, food security, and water quality. Erie, PA, with its long history of industry, provides an ideal environment to assess the impact that these activities have on stream bacteria and identify potential sources of waterborne disease. In our study, we analyzed four streams near or in the city of Erie to assess the impacts of urbanization on stream bacteria community composition and diversity. Triplicate water samples were collected from four streams in December 2023 and September 2024. West Cascade and McDaniels Run flow primarily through urbanized areas, whereas Crooked Creek and Racoon Creek are in more rural and forested watersheds. A YSI water quality sonde was used to collect environmental characteristics at each site. DNA extractions were performed on filters from each sample using a commercial kit. Illumina barcoding was then performed on the 16s rRNA gene from each sample. Both December and September data sets indicate a diverse bacterial community at all four sampling locations. Differences were clearly detected between the communities found in the urban streams versus rural streams. Seasonal trends in our data sets suggest colder conditions result in more detectable levels of pathogenic bacteria.

30. Prevalence and Severity of Fibropapillomatosis (FP) in Stranded Sea Turtles in Indian River County, Florida between 2020 and 2024

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Conservation efforts are positively impacting global sea turtle populations, yet thousands of strandings occur annually. Fibropapillomatosis (FP) is a tumor-causing disease that frequently manifests in sea turtles. This study analyzed FP prevalence and severity in stranded sea turtles in Indian River County, Florida from 2020 to 2024. Standardized stranding reports were evaluated for stranding location and date, presence of FP, species, and size class. FP severity was scored using images of five body regions and ranged from 0 to 10. A total of N=178 strandings were analyzed: n=117 *Chelonia mydas*, n=60 *Caretta caretta*, and n=1 *Lepidochelys kempii*. FP was only observed in *C. mydas* (n=36). Two-sample proportion tests were used to test effects of location, size class, and season on prevalence of FP. Severity of FP was compared between sites and across seasons using 2-sample t-test and single factor ANOVA, respectively. FP prevalence was significantly higher in *C. mydas* stranded in the Indian River Lagoon compared to oceanside ($p = 0.0003$) and in those stranded in winter compared to summer ($p = 0.037$). Prevalence of FP did not differ significantly across size classes ($p < 0.307$). FP severity was documented for n=27 *C. mydas*, was highly variable (range = 1-10, variance = 11.0, s.d. = 3.3), and did not differ by site ($p = 0.647$) or season ($p = 0.583$). This study contributes to baseline data on FP in sea turtles and underscores the necessity of broader datasets and long-term monitoring to better understand disease trends and their ecological implications.

31. Characterization & Antimicrobial Properties Of Bacterial Isolates From Fresh Honey

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As a beekeeper in Erie, Pennsylvania, my husband and I produce raw, organic honey that's beloved in our community. This hands-on experience has sparked my interest in honey's health benefits, particularly its antimicrobial potential. While research exists on honey's microbiota and chemical composition, less is known about how these properties differ between fresh and mature honey. I isolated bacteria from fresh honey that differ markedly from *Bacillus* species previously found in mature samples. Using DNA sequencing, biochemical, morphological, and tolerance-based assays, I aim to characterize these bacteria and assess their ability to thrive in high-sugar environments. Additionally, I'm investigating their capacity to inhibit pathogens. Preliminary results show that fresh honey bacteria can suppress *Staphylococcus aureus* and *Pseudomonas syringae*. I will further evaluate their ability to reduce disease in tomato plants. Future research will expand to other bee products propolis, honey cream, and royal jelly and include chemical analysis of fresh raw honey. This work seeks to uncover novel bioactive agents and sustainable agricultural applications derived from honey and its microbiota.

32. Characterization of Normal Flora of Chicken Eggs

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Understanding food microbiomes and their impact on human health is essential to improving food safety. The microbes associated with raw eggs are an area of interest due to the potential impact on human health, especially with rising popularity of raw dairy and eggs on social media. The bacteria commonly associated with undercooked eggs are *Salmonella* and *Campylobacter*, but little is known about the normal flora on and inside eggs, and how they may be different in farm-raised and commercially produced eggs. In this study we isolated, characterized and identified bacteria from eggshells and egg white and yolk of various commercial and local farm eggs to address this knowledge gap. In a pilot experiment, using serial dilution plating on tryptic soy agar, we isolated and characterized bacteria using morphology assessment, and Gram staining, and identified them using 16S rRNA sequencing. In a preliminary analysis, we identified multiple *Acinetobacter* species from the yolk and white and, not surprisingly, typical animal-associated bacteria, *Staphylococcus argenteus* and *Macrococcus caseolyticus* from the eggshell. In general, the eggshell bacteria exhibited higher tolerance to heat and salt stresses compared to endogenous bacteria. These results suggest that the surface and endogenous bacteria may have unique adaptations to survive in their distinct environments. It's interesting to note that the *Acinetobacter* species are potentially medical pathogens and expansion of this study will reveal if they're commonly found in egg yolks and if this could be a concern to raw egg consumers, especially if the bacteria are found to be antimicrobial resistant.

33. Study of Gene Expression For FLOWERING LOCUS T and SEPALLATA 2-like Genes in

Solanum tuberosum

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In *Solanum tuberosum* (potatoes), flowering serves as a visual indicator that tubers have begun to develop underground. FLOWERING LOCUS T (StFT) proteins are known to act as mobile signals to initiate flowering. While researching more homologous genes with similar functions, a SEPALLATA 2-like gene (StSEP2) was identified in the potato genomic databases but was discovered to be mostly uncharacterized. This study aims to determine the location and quantity of expression for StFT and StSEP2 across different developmental stages in Caribou potatoes. Tissue samples were taken from both reproductive (buds, sepals, petals, stamens, ovaries, pedicles, fruits) and vegetative tissues (roots, stems, stolons, leaves, meristems) of the plant across five major stages of development: pre-planting, bud formation, flowering, post-flowering, and fruiting (which was a fruit-only sampling). Additionally, floral

bud samples were collected from ten distinct size-based developmental stages. All samples will undergo RNA extraction and be analyzed using quantitative PCR (qPCR) analysis to assess gene expression levels across all tissues and timepoints. The goal is to generate a timeline of StFT and StSEP2 expressions to provide insight into their roles in both reproductive signaling and floral organ development.

34. Simple Mushroom Identification Using DNA Sequencing

Arna Dhar*+

Mercyhurst University

Foraging and consumption of mushrooms has gained popularity in recent years, especially post-pandemic. While many mushrooms are edible, some of them may contain toxins and other compounds that could require medical attention and, in some cases, could be lethal. Mushrooms are typically identified visually, and genetic tests could be used to confirm their identity. The genetic tests, however, are not standardized and not accessible for general use. In this study, we seek to standardize a method to identify 15 representative mushrooms rapidly through the amplification of 18S rRNA gene and internal transcribed spacer (ITS) from diverse mushrooms. We will sequence the amplicons using Sanger sequencing to determine possible universal primer sets. We will then try to simplify the DNA extraction procedure to optimize a low-cost genotyping procedure. The simple genotyping method could be used for rapid and inexpensive identification of mushroom samples and possibly be combined with visual identification to determine safety of edibility of mushrooms.

35. Optimizing Growth and Extraction of Neuroprotective Compounds from Lion's Mane Mushroom

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Gannon University Dept. of Biology

Lion's mane, *Hericium erinaceus* (HE), is an edible mushroom, with documented neuroprotective properties. HE produces two main bioactive compounds, hericenones and erinacines, that can improve brain function. Previous studies suggested that the consumption of HE has a direct correlation to promoting neuronal growth and nerve repair. In addition to its medicinal value, HE is a sought-after gourmet mushroom, enriched in dietary fiber and protein. Despite growing interest in its medicinal potential, little is known about how nutrient availability influences HE growth and metabolite production. In this study we aim to optimize the growth of HE, using several different nutrient substrates. Afterwards we will utilize solvent extraction using ethanol to remove bioactive compounds from mushroom tissue. To optimize HE growth we will test the presence of several substrates enriched in limiting nutrients on the overall growth rate of HE. The substrates selected are seaweed, gypsum, bloodmeal, and potato dextrose broth. To test these substrates, agar media will be produced enriched in each type of nutrient. The growth rates of HE will then be measured, to determine their effects on mycelial expansion over a two-week period. The optimized substrate will be used for scaled mushroom cultivation and subsequent alcohol extraction of hericenones and erinacines for neurobiological testing. After allowing growth of the mushrooms, bioactive compounds will be extracted, and the isolated compounds will be used for testing their effects on mammalian neuronal cell growth and survival. We anticipate that nutrient enrichment will accelerate HE growth and potentially increase the concentration of neuroactive metabolites.

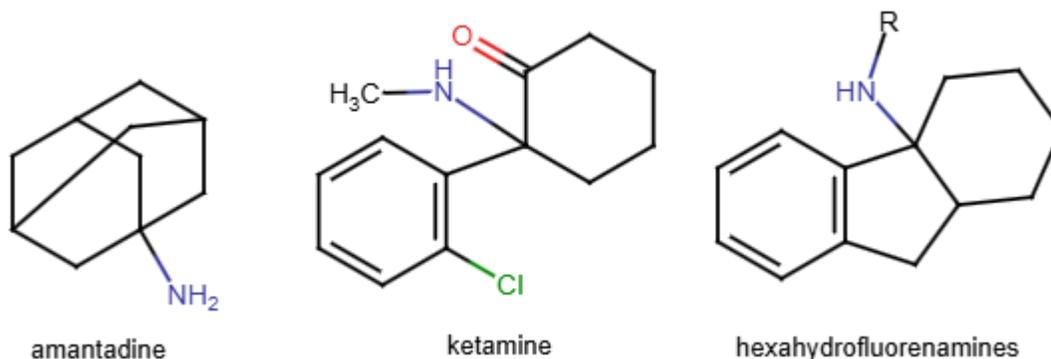
36. The Impact of N-Alkyl Branching on Hexahydrofluorenamine NMDAR Affinity

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SUNY Fredonia

A growing body of evidence implicates dysregulation of glutamatergic neurotransmission, particularly through N-Methyl-D-Aspartate (NMDA) receptors, in the pathophysiology of ailments such as Alzheimer's, Parkinson's, and Amyotrophic Lateral Sclerosis.¹ Hexahydrofluorenamines (HHFs) are a synthetically accessible class of compounds with promising NMDA inhibitory effects.² Minimal information exists on the relationship between the length of amine substituent *R* and binding affinity, and no pharmacodynamic data or syntheses have been reported for branched alkyl chains (i.e. isopropyl, sec-

butyl, tert-butyl, etc.). Thus, this research aims to elucidate the structure-activity relationships of HHFs via docking analyses.



The cryo-EM structure of the human GluN1-GluN2A NMDA receptor (PDB ID: 7EU7) was selected as the basis for *in silico* studies. Due to poor resolution, the model was first reconstructed to attenuate various structural flaws such as Ramachandran outliers, disfavored rotamers, and missing amino acids. Six HHFs were docked and ranked by their highest-affinity poses. Unlike the structure-activity relationship of the related arylcyclohexylamine NMDA antagonists, results hint that branching increases affinity in HHFs with four-carbon alkylamines, but not in their three-carbon counterparts. Additionally, four-carbon alkylamines are evidenced to be more potent than their three-carbon counterparts, further contrasting with arylcyclohexylamines. A plausible explanation is that the conformationally constrained nature of the HHF rings cause unique binding interactions. Each HHF has markedly more affinity *in silico* than the quintessential NMDA antagonist esketamine, further establishing the promise of these drugs.

37. Short-Term Effect of Epinephrine on Cancer Cell Growth and Actin Expression

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The movement of cells is accomplished by the assistance of actin, a globular multi-functional protein that is found in all eukaryotic cells. Actin is also a major component of the cytoskeleton, allowing a cell to repair its tissues, transport proteins, and sense environmental forces. Hormones affect the cellular dynamics and responses of actin. Epinephrine, also known as adrenaline, is a hormone and neurotransmitter and is an important cell signaling molecule in stress response. This study plans to investigate the short-term effects of epinephrine on the growth of prostate and brain cancer cells by the use of MTT assays as well as the expression of actin, utilizing ELISA and quantitative RT-PCR.

38. The effect of Norepinephrine on Netrin1 and EFNB2 expression in the pancreatic ductal adenocarcinoma cell line AsPc-1

Madelyn Scarmack*+, Dr. Noelle Thielman

Lake Erie College of Osteopathic Medicine

Pancreatic ductal adenocarcinoma (PDAC) is an aggressive malignancy that utilizes neuroendocrine signaling for tumor growth and invasion. The AsPc-1 cell line, carrying a KRAS G12D mutation, is used to study changes in PDAC. Norepinephrine (NE), released under sympathetic stimulation, promotes PDAC growth via α_2 adrenergic signaling. Netrin1 and EFNB2, axon guidance genes, and have recently been linked to an aggressive PDAC phenotype when overexpressed. Although NE is elevated in the tumor microenvironment, its effect on Netrin1 and EFNB2 expression remains unclear. The aim of this study is to analyze the gene expression of Netrin1 and EFNB2 in AsPc-1 cells after NE treatment. AsPc-1 cells were cultured in RPMI-1640 with 10% FBS and 1% Pen/Strep at 37°C, 5% CO₂. At 70% confluence, cells were switched to serum free media and subsequently treated with 10 μ M NE or water for 24 or 48 hours. RNA was isolated using TRIzol, quantified by NanoDrop spectrophotometry, converted to cDNA, and analyzed by qPCR using SYBR green. Cell images were taken at 24- and 48-hours post treatment.

Results were analyzed using GraphPad Prism; groups were compared by t-test or Mann-Whitney U test based on normality. At 24 hours, Netrin1 expression was significantly higher in the NE treated cells compared to the control treatment. This increase was still present, but not significant after 48 hours post NE treatment. EFNB2 gene expression at 24- and 48-hours post treatment was significantly reduced in the NE treated group compared to the control treated group. NE may alter axon guidance gene expression in AsPc-1 cells. Netrin1 was upregulated after NE treatment, and Netrin1 protein signaling has previously been found to contribute to PDAC progression and metastasis. Interestingly, EFNB2 expression was significantly reduced after NE treatment compared to control treatment; lower amounts of ERNB2 expression are generally associated with better PDAC prognosis. These findings suggest the sympathetic pathway alters axon guidance signaling, potentially influencing malignant traits of PCAC cells.

39. Regulation of Cell Proliferation and Cytoskeleton Protein Expression by Hydrocortisone

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Actin is one of the main cellular cytoskeleton proteins that is found in all eukaryotic cells to support cell structure and enable cell movement. Actin plays crucial role in tissue repair, protein trafficking, and sensing environmental forces. Hormones have been linked to regulate expression of actin through various mechanisms. Hydrocortisone is a corticosteroid and a synthetic version of human hormone cortisol that has been found to affect cell proliferation. In this study, we plan to investigate how hydrocortisone affects the growth of neuroblastoma-derived epithelial cells using MTT assays and the overall expression of actin utilizing ELISA and quantitative RT-PCR.

40. Effects of Cortisol on Ferroportin & Transferrin Expression in BeWo Cells

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Iron is an essential micronutrient that supports fetal growth and development. During pregnancy, the placenta plays a vital role in taking iron from the maternal bloodstream and delivering it to the fetus. Chronic stress during pregnancy leads to adverse pregnancy outcomes like those associated with low iron. Insufficient amounts of iron levels have been linked to complications such as low birth weight and premature birth for the fetus. The purpose of this research is to investigate how stress influences placental iron transport by examining the effects of elevated cortisol levels on the expression of two key iron transporters, ferroportin (FPN) and transferrin receptor 1 (TFR-1). Using a trophoblastic placental cell line, BeWo, cells are treated with 0, 500nM, and 1000nM concentrations of cortisol for 24 hours, levels that correspond to those observed in stressed individuals. Cells are collected, lysed and then subjected to western blotting, to allow for semi-quantitative analysis of FPN and TFR-1 protein expression. Thus far, the results indicate that cortisol exposure leads to a dose-dependent reduction in the expression of iron transport proteins TFR-1 and FPN in BeWo cells. Additionally, we are beginning fluorescence-microscopy based experiments to determine the localization of these proteins at baseline and after cortisol exposure. Our findings suggest that maternal stress may impair placental iron transport to the fetus, providing a possible explanation for the overlap between stress and iron-related complications during pregnancy.

41. Impact of Norepinephrine on Macrophage Differentiation and Phenotype in HL-60 Cells

Kelsey Gengo*+
Lake Erie College of Osteopathic Medicine

Stress-related catecholamines such as Norepinephrine (NE) are elevated in chronic illnesses and tumor-promoting microenvironments. While many cell types and secretions contribute to these pathogenic microenvironments, macrophages are a dynamic cell type which influences disease progression.

Inflammation triggers monocyte differentiation into macrophages; however, the differentiation environment can influence macrophage polarization to pro-inflammatory, M1 or anti-inflammatory, M2 phenotypes. The effects of NE on macrophage differentiation remain unclear. This research aimed to measure M1- and M2-associated gene expression markers after differentiation of HL60 cells to macrophage-like cells treated with NE. HL60 cells were treated with Phorbol-12-myristate-13-acetate (PMA) or control DMSO with NE or water. After 48 hours, cells were stained, viability measured, and RT-qPCR performed. Macrophage differentiation markers assessed PMA efficacy; RPL30 was an internal control for RNA expression. Statistical analysis used unpaired t-tests and Mann Whitney U tests for parametric/nonparametric data via GraphPad Prism. PMA induced HL60 differentiation - shown by cell adhesion, Wright Giemsa stain, and significantly increased CD11b expression. Cells treated with PMA + NE had significantly higher expression of NOS2, TNF α , IL-1 β , Arg-1, IL-10, and CD206 than PMA + control. This shows that NE treatment not only influences classical genes involved with M1 macrophage phenotypes, but also M2 phenotypes. Also, undifferentiated cells treated with NE expressed significantly more CD163 than undifferentiated cells treated with control, suggesting NE can affect progenitor cell gene expression. NE induces tumor-promoting and inflammatory gene expression changes in PMA-induced macrophage-like HL60 cells. This indicates stress signaling drives a mixed macrophage phenotype, contributing to the complex immune regulation in many disease states.

42. Evaluation of Norepinephrine Treatment and its Impact on Axon Guidance Gene Expression in BXPC-3 cell line

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Pancreatic ductal adenocarcinoma (PDAC) is an aggressive form of cancer with a complex immunosuppressive tumor microenvironment. Norepinephrine (NE) has been shown to promote tumor growth and angiogenesis in pancreatic cancer through β -adrenergic receptors, but very little is known about its effect on axon guidance molecules expression and their influence on tumor cell progression. This experiment analyzed how NE influences the expression of axon guidance genes in the wild-type KRAS expressing pancreatic cancer cell line BXPC-3. BXPC-3 cells were cultured in RPMI-1640 media with fetal bovine serum and 1% Penicillin/Streptomycin at 37°C. Before treatment, cells were serum starved and treated with 10 μ M NE and collected at 24- and 48-hours later. RT-qPCR amplification was conducted to analyze gene expression. Primers for SEMA3D, Netrin1 and EFNB2 were created using NCBI Primer-BLAST. Four trials were run, and data was analyzed using GraphPad Prism. Overall, NE treatment did not dramatically alter axon guidance gene expression in the wild-type KRAS cell line. However, Netrin1 was found to have significantly higher expression after 24-hour NE treatment compared to control cells, while SEMA3D was found to have significantly lower expression. The BXPC-3 cells post 48-hour NE treatments showed significantly increased expression of SEMA3D and significantly decreased expression of EFNB2. Treatment of BXPC-3 cells, which express wild-type KRAS, did not have significantly altered axon guidance gene expression after one 24- or 48-hour treatment of NE, as previously found in mutant G12D KRAS expressing cell types. A few genes had altered expression which could suggest a potential role of NE in PDAC progression through axon guidance signaling changes.

43. The Role of SCAMP3 in APP trafficking and amyloid production

Jared Marchiori, Saradha Gautum*+, Brayden Robicheau*+, Ryan Fisher, Mariam Alkhafaji, Quyen Aoh, Ph.D.

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According to the Journal of the Alzheimer's Association (2024), approximately seven million individuals in America are living with Alzheimer's Disease (AD), a number projected to rise to 13.8 million by 2060 [1]. The pathogenesis of AD is linked to the abnormal accumulation of β -amyloid plaques in the extracellular matrix of the brain. β -amyloid is generated from the amyloid precursor protein (APP), and its production is intimately associated with its trafficking within the TGN-endolysosomal system [2]. Our

findings indicate that the Secretory Carrier Membrane Protein (SCAMP) 3 colocalizes with APP in the trans-Golgi Network (TGN) and early endosomes. Additionally, SCAMP3 has been shown to interact with the endosomal sorting complexes required for transport (ESCRT) proteins Hrs and Tsg101, both of which have been implicated in APP trafficking and β -amyloid production [3]. In this study, we will investigate the effects of SCAMP3 knockdown on both β -amyloid production and APP trafficking within the TGN-endolysosomal system.

44. The Role of SCAMP3 in CXCR4 Trafficking

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The CXCR4 Chemokine Receptor Type 4 (CXCR4) is a G-protein coupled receptor involved in regulating cell growth, division, differentiation, movement, and migration. When the agonist CXCL12 binds to CXCR4, it initiates ubiquitin-dependent endocytosis, directing CXCR4 through the endolysosomal pathway for degradation. Failure to degrade CXCR4 in the lysosome can lead to its overexpression, which is associated with cancer metastasis. This study investigates the role of Secretory Carrier Membrane Protein (SCAMP) 3 in the endolysosomal trafficking of CXCR4. SCAMP3 interacts with AIP4/ITCH, a ubiquitin ligase that regulates CXCR4, as well as with the ESCRT proteins Hrs and Tsg101, which facilitate CXCR4's transport from the early endosome to the lysosome. To evaluate SCAMP3's impact on CXCR4 trafficking, we will use RNA interference (RNAi) to knock down SCAMP3 and then examine effects on CXCR4 following agonist stimulation. Two assays will be used: immunofluorescence to track CXCR4 trafficking to lysosomes and western blotting to assess receptor degradation.

45. Impact of standard forensic processing practices on the accuracy of dental age estimation methods

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Applied Forensic Sciences, Mercyhurst University

Dental age estimation based on tooth growth and development is standard for subadults. However, adult methods are less predictable and yield broader age ranges. This study focuses on secondary dentin apposition and root translucency, two of the most reliable post-formation age indicators. Secondary dentin apposition reduces the pulp cavity from crown to apex, which is observable in radiographs. Root translucency begins at the apex and extends coronally due to peritubular dentin deposits of hydroxyapatite, altering the refractive index. In forensic practice, remains may be exposed to high heat or low temperatures during recovery, processing, or storage. Odontological analysis typically occurs after such exposures. This study continues previous work on temperature effects on dental age markers (Adserias-Garriga, 2025). 41 permanent upper and lower canines were processed in hot water (52°C) and freezing temperatures (-4°C) for different times. Translucency and pulp area were measured before and after treatments. Root translucency showed increased dispersion at high temperatures, and significant decreases over time in freezing conditions. Pulp dimensions decreased significantly over time only with high temperatures. However, whether these dimensional changes alter age estimation accuracy remained unclear. To address this question, pulp dimensions and root translucency measurements were applied into the age estimation formulae, and the estimates compared to the chronological ages of the individuals through mean comparisons of the observed errors and frequency tests of the accuracies obtained at different treatment times. Our results show that age estimations from root translucency-based methods are minimally to not affected by the observed temperature-induced changes, while pulp-based age estimations can be more affected by both heat and cold treatments.

46. Examining Readmission Patterns in Geriatric Patients Following Hip Fracture Surgery

Literature Review

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Hip fractures are a devastating injury primarily sustained by the geriatric population. These patients pose as a vulnerable population to post-surgery complications such as the development of delirium, infections, and impaired mobility leading to increased hospital readmissions. Complication risk combined with the projected rise in hip fracture rates (240% in women, 310% in men by 2050) drives a compelling need for optimized healthcare management. This literature review will evaluate the current literature for the most effective patient care practices to reduce the risk of readmission after hip fracture surgery. The odds of readmission increases with age. Women experience hip fractures more frequently due to postmenopausal osteoporosis while men are affected at younger ages due to increased comorbidities leading to increased readmission rates. Although caucasian individuals have a higher incidence of hip fractures, African Americans are more likely to be readmitted especially if they are low income. The most commonly reported conditions associated with readmission are exacerbations of diabetes mellitus and congestive heart failure. Other commonly associated conditions are chronic obstructive pulmonary disease, hypertension, cognitive disorders and ischemic heart disease. Hip fracture rates follow the obesity paradox in which patients who are overweight have better outcomes than normal weight. Patients vaccinated for COVID-19 have a reduced need for ICU stay. Patients with increased mental health and behavioral abnormalities including delirium have an increased risk of readmission. Prompt surgical intervention after a hip fracture reduces the likelihood of readmission. Treatment involving co-management between orthopedic surgeons and geriatricians has reduced delays to surgery and in hospital mortality. Implant related factors may increase dislocation rates post-operatively. Post-operative delirium is often seen in patients with advanced age, that are female, that have comorbid dimension, or that have prolonged ICU stays and may be a reason for readmission. Improved patient experience with staff may reduce 30-day readmissions. Inpatient rehabilitation as early as 24 hours post-operatively have been shown to reduce the risk of long term poor outcomes. Using appropriate discharge protocols is vital to reducing bundled payments. Personalized care post-operatively including appointments, medication and transmission of discharge summaries have been shown to be successful in discharge planning. Appropriate self-care and rehabilitation upon discharge are vital to guide patients to healing. No difference has been seen in rates of delirium between spinal and general anesthesia. Fascia iliac compartment blocks have shown to reduce post-operative delirium, decrease morbidity and mortality, and increase satisfaction. Project BOOST has been shown to be a positive protocol to reduce hospital interventions by addressing the 8P's : problems with medication, psychological concerns, principal diagnosis, physical limitations, poor health literacy, poor social support, prior hospitalization, and palliative care needs.

47. AI in Healthcare

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Artificial Intelligence (AI) refers to computer systems designed to perform tasks that typically require human intelligence, including learning, reasoning, and decision-making. Healthcare, by contrast, is the multidisciplinary practice of maintaining and improving human health through medicine, nursing, pharmacology, and public health. When integrated, AI and healthcare form a powerful synergy: AI can analyze medical images, support pharmacological decisions, predict disease outcomes, and optimize hospital operations. This study presents AI not only as a clinical tool but also as an educational resource for medical, nursing, and healthcare students. By linking AI's applications in diagnostics, treatment planning, and patient management, it provides students with practical insights into real-world use cases. Furthermore, this study differentiates between conventional AI and explainable AI (XAI), with XAI offering transparency into algorithmic decision-making—an essential factor for clinical trust. The study also addresses challenges such as data privacy, algorithmic bias, workflow integration, and ethical

governance. Comparisons between AI-assisted and traditional workflows reveal that AI can reduce diagnostic time and improve efficiency, though limitations include high implementation costs, data dependency, and uneven accuracy across specialties. Future growth lies in developing more explainable, ethical, and widely accessible AI solutions. Importantly, while AI enhances healthcare delivery, it does not replace human professionals. Instead, it augments clinical expertise, leaving critical judgment, empathy, and ethical responsibility to practitioners. Preparing future health professionals to collaborate with AI ensures these technologies advance patient outcomes while reinforcing human roles in medicine.

48. Nutritional Education Through Technology

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The Open Food Facts App is a nutritional assessment tool that can benefit the community of Erie allowing them to have access to reliable nutritional and environmental information about the food they consume. Reading food labels without proper nutritional education can be confusing, but this app aims to simplify eating healthy. The objective of this research is to increase nutritional knowledge and accessibility for the population of Erie about the features, benefits, and practical uses of the Open Food Facts App. We aim to educate using the iPhone App, the Open Food Facts App created by The Open Food Facts Team, and the resources it offers. Our data source depends on the Nutri-Score and Green-Score that the app reports to the population of the city of Erie. The Open Food Facts App provides research-based insights on nutritional quality scores, ultra-processed food classification, and detailed ingredient analysis. The app also highlights the environmental impact of food choices, giving users a broader understanding of how their food choices affect both health and sustainability. Overall, the app helps users make more informed and mindful food decisions. The Open Food App offers Erie a resource to use technology to improve their food choices that will help them better nourish their bodies while leaving a minimal impact on the environment.

49. Barriers to Healthy Eating in Erie: Food Deserts, UPFs, and Community Solutions

Alexis Gausman*+, Taylor Friello*+
Gannon University

Communities in Erie, Pennsylvania face disparities in access to nutritious food. In neighborhoods with limited availability of fresh fruits and vegetables, residents struggle to meet dietary recommendations. At the same time, inexpensive, highly marketed, and convenient ultra-processed foods (UPFs) often serve as the most accessible option. Research conducted by students at Gannon University confirmed the prevalence of food deserts in the county, while the Erie County Community Health Needs Assessment (2018) found that fruit and vegetable intake, though slightly improved since 2016–2017, remains low overall. These trends suggest that modest gains in produce consumption are overshadowed by structural barriers that reinforce dependence on UPFs. The intersection of restricted access, low produce intake, and UPF dominance emphasized the need for community-based education and intervention. Expanding programs that connect farms to neighborhoods, while developing strategies to reduce reliance on UPFs, has the potential to strengthen Erie's food system and improve long-term health outcomes.

50. The Hidden Cost of Ultra-processed Foods on Our Planet

Javier De Angel*+, Brad Delphia*+
Gannon University

Ultra-processed foods (UPFs) like chips, soda, and packaged snacks are everywhere. While they are easy to buy and eat, research shows they harm not only our health but also the environment. The effect of UPFs on the Earth when compared to less-processed foods is more than we imagine. They are responsible for 19.6% of the world's energy intake, ~12% of carbon footprint and ~15% of water footprint. UPFs often require more energy, packaging, and long-distance shipping. Their production creates more greenhouse gases than fresh fruits, vegetables, and grains. UPFs also drive deforestation, packaging waste, resource depletion, waste & pollution, land degradation & eutrophication and biodiversity loss.

Eating too many UPFs harms both people and the planet. By choosing more fresh and minimally processed foods, we can lower pollution, reduce waste, and save resources. Small changes; like eating more home-cooked meals or choosing fresh snacks, can make a big difference for the Earth's future.

51. Crawford County Pedal Power

Samantha Adams*+, Prakriti Shrestha*+

Allegheny College

PEDAL POWER is a program operated through the Family, Children, and Community Association (FCCA) that provides refurbished bikes to youth and young adults. Participants build important STEM skills with the instruction of bike experts through real-life application, allowing them to learn and build independence in a safe and guided manner. Thus far, we have gathered and inventoried approximately 50 bikes, assembled a team of experienced bike mechanics, and developed a protocol for providing bikes to recipients. We are now developing outreach activities to find participants who wish to receive a bike.

52. DIRT

Samantha Adams*+, Prakriti Shrestha*+

Allegheny College

Forests are major storage components of global carbon (C), with soils containing approximately three-quarters of all carbon stored in forests. Carbon inputs into forest soil are derived from microbial processing of leaves and roots, and the rate of carbon inputs is dependent on forest productivity. For three decades, the Bousson Detritus Input and Removal Treatments Experiment (DIRT) has been examining controls on soil C through the removal or addition of leaf litter and roots, driven by the need to understand the role of forest ecosystems in reducing atmospheric climate pollution. Variation in annual weather can result in variability of tree growth and hence leaf litter production. Similarly, differences in tree species response to annual weather can result in annual variability in the relative contribution of tree species composition. To estimate this litter variability, we routinely measure tree biomass and production to quantify forest productivity and organic matter inputs to soil. We found considerable annual variability in total inputs, indicating that long-term monitoring is necessary to accurately estimate organic matter inputs to soil. We also found that black cherry, a fast-growing tree, shows a high biomass gain per unit leaf litter, indicating a high growth efficiency. In contrast, the mid-shade tolerant sugar maple has a much lower growth efficiency, producing a large amount of litter per unit growth.

ABSTRACTS

*Regional Science Consortium
21st Annual Research Symposium
November 5-7, 2025
Tom Ridge Environmental Center
At Presque Isle State Park*

ART EXHIBITION

ART EXHIBITION: Wednesday, November 5, 2025, 6pm—8pm

Gyotaku Study of Local Fishes

Greg Andraso*

Gannon University, Biology Department

Media: Sumi ink and watercolor on rice paper and tempura paint on newsprint

Dimensions: Variable

Description: Gyotaku is a traditional Japanese art of printing real fish to create detailed, one-of-a-kind images. Translated to “fish rubbing”, gyotaku can be used to document one’s catch, express oneself artistically, and to educate others about fish anatomy, morphology, and diversity. The process involves cleaning and preparing a fish to reveal fins, applying ink (often sumi ink) with brushes, and carefully pressing paper or fabric onto the inked surface to transfer details of the fish. After drying, eyes are typically painted and color is often added. Although I have been around fish most of my life through angling, preparing fish for the table, and conducting research, I have found that gyotaku enables me to appreciate fish form in a novel way. The artform also provides opportunity for students to become familiar with fish, refine their dexterity, and express themselves artistically. Here, I will be exhibiting framed gyotaku of a number species that are recreationally and commercially important to the Erie Area.

Apex Avian: The Secretary Bird & Its Prey

Spencer Boesch*

PennWest Edinboro

Media: Watercolor

Dimensions: 20” x 39”

Description: For a unit on ornithology in my Scientific Illustration class at PennWest Edinboro, I chose to paint a single, information-rich image of the secretary bird and its fascinating adaptations. It’s composed with a large central bird providing clear and detailed information about its anatomy and surface features, while creative license it is used to portray other activities throughout the landscape. I’ve included visual and textual information about its habitat, food sources, hunting behavior, camouflage, mating, physiology, and the unique fact that its main food source is the highly poisonous Puff Adder. The goal of this kind of scientific illustration is to provide as much accurate information about a subject as possible in an engaging and visual delivery method. I find Secretary Birds interesting and hoped to inspire the same interest for others with this illustration

Firefly

Kylee Czarkowski*
PennWest Edinboro

Media: Ink

Size: 14" x 11"

Description: For an entomology project in a scientific illustration class, I chose two insects, one of which was the firefly. Since they are one of my favorite insects, I wanted to treat the subject matter delicately to show the beauty of such a common bug. My main goal however was to capture the scientific view as if it were pinned in a case, as well as a natural view that you would find out in the world. Through this process, I gained information about their structure and anatomy that was new to me. I look at them differently after having gone through this close inspection requiring research beyond their structure.

Wax-Tailed Hopper

Kylee Czarkowski*
PennWest Edinboro

Media: Ink and Scratchboard

Dimensions: 11" x 14"

Description: For an entomology project in a scientific illustration class, I chose two insects, one of which was the wax-tailed hopper. I found the form of this insect to be very unique with its long waxy tails. My main goal was to capture a scientific view as if it were pinned in a case, as well as a natural view that you would find in the environment. Through this process, I gained information about their structure and anatomy that was new to me. I look at them differently after having gone through this close inspection requiring research beyond their structure.

Desert Life

Kylee Czarkowski*
PennWest Edinboro

Media: Graphite and Gesso

Dimensions: 18" x 24"

Description: For a personal project, I wanted to explore a more abstract composition to display basic information on the fennec fox and its environment. With the form of the fennec fox being the center subject, I incorporated flowers you would commonly find in their biome, as well as common prey/food sources for them. I was pushing to illustrate the beauty of the animal and it's life in the desert while revealing other aspects of its structure and life in a freeform and unified drawing.

Avian Beauty

Kylee Czarkowski*
PennWest Edinboro

Media: Graphite and Ink

Dimensions: 18" x 24"

Description: For a drawing course, we were tasked with compositing different animals in a single composition from taxidermy specimens. I decided to use a peacock and a golden pheasant in my composition. I found the regal form the birds to be related and interesting, and I wanted to illustrate their powerful presence while experimenting with formal composition.

African Fat-Tailed Gecko

Kylee Czarkowski*
PennWest Edinboro

Media: Watercolor

Dimensions: 14" x 11"

Description: For a herpetology project for a scientific illustration class, I chose to illustrate the life cycle of the African fat-tailed gecko. The main goal was to show the different life stages of the gecko, as well as its diet and environmental dangers. Geckos store energy in their tail. They are capable of shedding their tail when in danger as a distraction to escape predators. In the composition, we can see one shedding its tail to escape a civet, its predator. In the foreground, a baby gecko beside the nest prepares to run away from the adult fat-tailed gecko, as baby geckos are afraid of larger ones even from the same species. Gecko eggs, food source, behaviors, habitat and predator are all represented in a single image.

Polecat

Kylee Czarkowski*
PennWest Edinboro

Media: Graphite and Gesso

Dimensions: 9" x 12"

Description: For a personal project, I wanted to study the form of the polecat and how it differs from weasels and ferrets. Although they are lesser known, they are distinct. Their form and coloring are uniquely suited to blend in with their environment. I took this opportunity to study them and plan to do more.

Nature's Imprints

Heather Denning*
Mercyhurst University

Media: Botanical printing with vinegar and ferrous sulfate mordants, colored paper carriers, gel medium, watercolor paper

Dimensions: 1" x 3 "
3" x 2 "

Description: This botanical print mixed media piece explores themes of eco art, impermanence, and permanence. These themes emerged as I researched art methods for an upcoming course, *Eco Art*, and deepened my personal reflection on nature's cycles—of which we are intrinsically a part. As an art therapist engaged in studies of eco-therapy, this creative process offered a meaningful way to integrate concepts from both art therapy and eco therapy. Processes involved experimenting with botanical printing by collecting plants from my environment, layering them between sheets of watercolor paper to form bundles, and steaming them to transfer the natural pigments. I explored variables such as soaking papers in different mordants and adjusting steaming durations to achieve varied images and color intensities. Then, I incorporated paper carriers printed with gel medium and added burlap ribbon to the bundles, introducing new textures. This process encouraged mindfulness and reflection—on how we can honor fleeting moments in nature, heighten our awareness of the beauty around us, and incorporate natural, sustainable material into our creative practices.

Twenty Fish of Erie

Alaina Devlin*
Penn State Behrend

Media: Watercolor and ballpoint on heavy-weight paper, hand-bound.

Dimensions: 11" x 7" x 3/4"

Description: This book was created for a Field Ichthyology course at Penn State Behrend. The objective was to produce 20 sketches of fish caught in local creeks and on the lake during the course. Each sketch

includes a brief identifying description and the fish's full nomenclature. The book takes creative liberties rather than serving as a practical field guide, since watercolor doesn't hold up when wet.

Southern Tamandua (*Tamandua tetradactyla*)

Evelyn Emswiler*

PennWest Edinboro

Media: Acrylic Paint

Dimensions: 11'' x 14''

Description: For a unit on mammals in my Scientific Illustration class at PennWest Edinboro, I painted a composition of the southern tamandua. It contains multiple images of the mammal providing different insights into its life. There is a depiction of its form and features, as well as the animal eating, carrying a juvenile, and standing up against prey. The poster includes two additions of information, one being ants on its textured tongue and the other an image of the foot used for climbing. Information on the habitat and environment is included in this illustration.

Rugged Flower Weevil (*Odontocorynus salebrosus*)

Evelyn Emswiler*

PennWest Edinboro

Media: Ink on Bristol

Dimensions: 11'' x 14''

Description: For a unit on entomology in my Scientific Illustration class at PennWest Edinboro, I used the method of stippling with ink on bristol to compose an image of the rugged flower weevil. This piece is composed of the scientific view and an active pose of the insect. The scientific view shows clear anatomy and detail of the weevil. The active pose shows how it may be found in its environment on a plant and attempts to express its size.

Nudibranchs of the Pacific

Evelyn Emswiler*

PennWest Edinboro

Media: Watercolor

Dimensions: 11'' x 14.5''

Description: As a semester-long project in my Scientific Illustration class at PennWest Edinboro, I chose to make a poster exploring different nudibranchs that are in the Pacific ocean. This poster shares twelve different sea slugs, showing how they come in a wide range of colors, patterns, and textures. Anatomy such as rhinophores, mantle, and gills vary in size and shape between each nudibranch.

Tarantula Aesthetics

Dr. Daniel J. Galiffa*

Associate Professor of Mathematics, Penn State Erie, The Behrend College

Media: Digital

Dimensions: Two 8.5" x 11" framed images

Description: This work showcases the diversity, elegance and visual appeal of a variety of tarantulas; some of which are currently being used in research studies. The foci are the brilliant patterns and colorations that are characteristic of various species.

A Journey Across Prythian

Sarah Magyan*

Aquatic Biologist, Regional Science Consortium

Media: Books, Watercolor & Marker

Dimensions: Five books, 11" x 6" x 8"

Description: As a lover of reading, I find myself purchasing many books and find that I am especially drawn to the most unique and colorful editions. The resurgence of decorative edges in today's market inspired me to attempt my own painted edges across an entire book series. The process begins with arranging the books to create a flush surface, clamping them tightly together in a press and sanding the edges to create a smooth, even surface. Once the edges are prepared, the design is sketched with pencil and traced with marker. Then, watercolors are applied. Once the design is complete and dry, the books are released from the press and rearranged to paint the next edge.

Common Eastern Firefly

Megan Povich*

PennWest Edinboro

Media: Scratch board

Dimensions: 14" x 11"

Description: For a unit on entomology in my Scientific Illustration class at PennWest Edinboro, we were asked to show two different views of an insect of our choice. I decided to do the Common Eastern Firefly to learn more about this common, but diminishing. The first view is a scientific view to clarify its features and silhouette, while aiming for clarity about its anatomical structures. The second is a naturalistic view of how it may present in the environment.

The research phase of this assignment brought me to understand a great deal more about the Common Eastern Firefly and to appreciate its structure and some of its functions in the environment. It further motivated me to investigate why its numbers are shrinking and what can be done to mitigate it.

Common Silverfish

Megan Povich*

PennWest Edinboro

Media: Pen and Ink

Dimensions: 11" x 14"

Description: For a unit on entomology in my Scientific Illustration class at PennWest Edinboro, we were asked to show two different views of an insect of our choice. I decided on the Common Silverfish, for reasons similar to the Firefly. It's fascinating to really examine insects that are commonly found in our lives and wanted to take this opportunity to learn more about them. The first view is the scientific, or "pinned" view, and the second is a naturalistic view of how it would present in the environment, giving hints about its slithery movement referenced in its name.

Snow Leopards and Their Adaptations

Megan Povich*

PennWest Edinboro

Media: Acrylic

Dimensions: 14" x 16"

Description: For a unit on mammals in my Scientific Illustration class at PennWest Edinboro, we were asked to choose a mammal and provide two different inset views that elucidated key natural adaptations of how they survive in their harsh environment. For the insets, one shows how a snow leopard's nasal cavity is larger than other cats to survive in the cold weather. A larger capacity permits the warming of the air that enters it. The other inset shows their retractable claws that help them grip the ground and catch prey with relative ease. Aiming to provide as information-rich an image as possible, I also show a family

group and demonstrate a common food source, the ibex, being eaten by one of the snow leopards. All this takes place in the desolate and frigid environment presented as a backdrop in this illustration.

From Wag to Drag: The Hidden Burden of Hip Dysplasia

Megan Povich*

PennWest Edinboro

Media: Acrylic and Digital

Dimensions: 22" x 30"

Description: For our final project in my Scientific Illustration class at PennWest Edinboro, we were tasked with rendering a process – something that happened over time to animals, plants, or fungi. My decision to show the process of how hip dysplasia starts and can progressively get worse over time comes from my deep interest in veterinary interest and to provide visuals for animal carers to see what is hidden. This poster demonstrates how the hip joint appears normal in the beginning of the process, then goes to a moderate stage, and then the severe stage where the dog is in the most discomfort. It also shows what causes this condition, such as genetics, diet/nutrition, weight, and exercise. The last panel of the poster provides information on what types of dog breeds are most susceptible to hip dysplasia. My hope is that this poster is a more engaging and memorable way of understanding mitigating a problem.

Chambered Nautilus

Celia Stein*

PennWest Edinboro

Media: Acrylic

Dimensions: 14" x 11"

Description: For a unit on marine biology in my Scientific Illustration class at PennWest Edinboro, I painted a single, information-rich image of the chambered nautilus and its fascinating adaptations. It features two creatures presenting in different ways, as well as a cutaway view in an inset (or separate) illustration which I've included for additional visual and contextual information about its habitat, self-protection, and physiology. The goal of this kind of scientific illustration is to present accurate information about a subject in an engaging poster. With this chambered nautilus, I hope to inspire the same fascination about this animal in others.

Madagascar Sunset Moth

Montana Welton*

PennWest Edinboro

Media: Scratch Board

Dimensions: 11" X 14"

Description: I chose the Sunset Moth as the topic for our unit on entomology in Scientific Illustration at PennWest Edinboro. The camouflaging pattern and striking appearance of this insect made an interesting study for both the symmetrical and natural views.