

WELCOME

*Regional Science Consortium
17th Annual Research Symposium
November 3—5, 2021
Tom Ridge Environmental Center
At Presque Isle State Park*

Welcome... to the celebration of our 17th Annual Regional Science Consortium Research

Symposium! It is hard to believe it has been 17 years already. The first RSC Symposium was only half a day at the Stull Center on Presque Isle State Park, and I recall being a presenter discussing my research on Snapping Turtles and contaminants. This event has grown so much, and so has the RSC. The RSC now has a membership of 38 organizations which includes colleges and universities, state and federal agencies, school districts, and other non-profits. We have also grown geographically; RSC members are located across the state of Pennsylvania, in New York, Ohio, and South Carolina. The research conducted by RSC staff, collaborators, and members has also grown tremendously... as you will learn from the presentations over the next three days.

This has been a challenging year, impacting how and where we were able to work on research projects with our students and colleagues. It is exciting that we are able to offer an *in-person* Symposium this year! I am pleased to report that the next three days will include 26 Oral Presentations and 50 Poster Presentations highlighting the research being conducted in this region. It is great to hear that so many were able to continue their research over the last year. The RSC Symposium provides a venue to present scientific research and awareness by our RSC members. The Symposium is the one time each year that the scientists, naturalists, 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. We have a great variety of presentations that will interest everyone. Take advantage of this time to be in-person again and meet new people, say hello to old colleagues, and ask questions to students about their research. It is a great opportunity that we missed last year. If you cannot attend all three days, please tune-in to the RSC YouTube Channel (www.RegSciTV.com) to see all oral presentations live-streamed and take the opportunity to type questions into the chat box.

I would like to thank all the participants of the Symposium this year. I would like to thank the researchers, professors, and especially the students for their hard work in preparing their PowerPoint and Poster presentations. I would like to thank ETD Photography for supporting this event and the amazing RSC Team: Jen Salem, Sean Dalton, Sarah Magyan, and Jeremiah Covert for their hard work in making this event a great success... ***Thank you!***

I hope you all enjoy Symposium 2021! Please mark your calendar for next year's Regional Science Consortium Research Symposium on November 2 – 4, 2022.

Cheers!

Jeanette

Jeanette Schnars, Ph.D.
Executive Director
Regional Science Consortium

FACILITIES

*Regional Science Consortium
17th Annual Research Symposium
November 3-5, 2021
Tom Ridge Environmental Center
At Presque Isle State Park*

Welcome back to the Tom Ridge Environmental Center. This year's Research Symposium will be utilizing several areas of the Center. If you have any questions, please do not hesitate to ask at the Registration Table in the lobby.

- TREC Lobby – Registration Table
- Room 112 – Oral Presentations
 - Also Livestreamed at www.RegSciTV.com
- Room 108 – Meeting Room and Presentation Practice Area
- TREC and Theatre Lobby – Poster Presentations
- Sunset Café – Lunch

JERRY COVERT STUDENT RESEARCH AWARDS

*Regional Science Consortium
17th Annual Research Symposium
November 5th, 2021
Tom Ridge Environmental Center
At Presque Isle State Park
Livestreamed - www.RegSciTV.com*

Dr. Covert was the original Executive Director of the Regional Science Consortium and developed the foundation for the organization which still exist today. Dr. Covert believed in student research, the opportunity for students to participate in research, and the opportunity for students to present their research at conferences, such as the Symposium. This acknowledgement is in recognition of Dr. Covert's continued commitment to the Regional Science Consortium and the Scientific Research in this region. The Jerry Covert Student Research Awards are presented to those students demonstrating excellence in scientific research and presentation. Recipients are chosen by the RSC Annual Research Symposium Judges.

Undergraduate Awards

- 1st Place Overall in Undergraduate Oral Presentations
- 2nd Place Overall in Undergraduate Oral Presentations
- 1st Place Overall in Undergraduate Poster Presentations

Graduate Awards

- 1st Place Overall in Graduate Oral Presentations
- 2nd Place Overall in Graduate Oral Presentations
- 1st Place Overall in Graduate Poster Presentations

Watch the award ceremony in-person or live Friday, November 5 at 12:10 on www.RegSciTV.com

SCHEDULE OF TALKS

*Regional Science Consortium
17th Annual Research Symposium
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WEDNESDAY, NOVEMBER 3, 2021

10:00 – 10:10

Welcome

Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Jeanette Schnars, RSC Executive Director

10:10 – 10:30

Leveling up: a glycinergic olivogeniculate projection that circumvents the inferior colliculus

Alyson Burchell¹ (presenting), Yusra Mansour DO^{1,2}, Randy Kulesza PhD¹

¹Auditory Research Center, Lake Erie College of Osteopathic Medicine (LECOM), Erie, PA

²Department of Otolaryngology, Henry Ford Macomb Hospital, Detroit, MI

10:30 – 10:50

Reinforcing Comprehension of Medical Microbiology and Immunology Topics Through Online Drawing Workshops

Robert Waters MS*, Mark A. W. Andrews Ph. D., FNAOME, Delbert Abi Abdallah Ph. D., Nancy Carty Ph.D., Christopher C. Keller Ph.D., FNAOME

10:50 – 11:10

Factors Influencing COVID-19 Spread on a University Campus Setting: Insights from an Epidemiologic and Metagenomic Surveillance Analysis

Madison Heeter and Austin Hertel, Gannon University

11:10 – 11:30

Forensic Anthropological Investigation of a Recent Case in the City of Erie, PA

Dennis Dirkmaat, Department of Applied Forensic Sciences, Mercyhurst University

11:30 – 12:30

LUNCH

Session Chair: Sean Rafferty, RSC President

- 12:30 – 12:40 **Identifying taphonomic factors effecting the dispersal patterns of surface-scattered human remains: a study of a forensic sample from actual casework**
(Speed Talk)
Kristine A. Kortonick, B.S., Luis Cabo, M.S.
Department of Applied Forensic Sciences, Mercyhurst University
- 12:40 – 12:50 **Under the Microscope: A New Approach to Distinguishing Perimortem Trauma from Postmortem Damage in Osseous Material**
(Speed Talk)
Colleen Peters, M.S. Department of Applied Forensic Sciences,
Mercyhurst University
- 12:50 – 1:10 **The Application of 3D Models in Age-at-Death and Sex Estimation of the Pubic Symphyseal Face**
Anthony V. Lanfranchi, M.S.^{1*}, Luis L. Cabo, M.S.¹
¹ Department of Applied Forensic Sciences, Mercyhurst University
- 1:10 – 1:20 **The Utility of Forensic Odontology in Forensic Cases**
(Speed Talk)
Summer Shipley-Meeks*, B.S.¹, Holly Long*, B.S.¹, Joe Adserias-Garriga¹, DDS, Ph.D., D-ABFO
¹ Department of Applied Forensic Science, Mercyhurst University, Erie, PA 16546
- 1:20 – 1:40 **The value of personal identification: a forensic odontological approach**
Joe Adserias-Garriga¹, Victoria Cattano¹, Summer Shipley-Meeks¹, Holly Long¹, Ann McCracken¹, Savannah Sass¹
¹ Department of Applied Forensic Sciences, Mercyhurst University. Erie, PA.
- 1:40 – 1:50 **The Effects of an Acidic Environment on the Calcium and Collagen Concentrations in Bone**
(Speed Talk)
Kaitlyn Klein^{1*}
¹Mercyhurst University
- 1:50 – 2:30 **SOCIAL BREAK**
- 4:30 – 6:00 **RSC BOARD MEETING** (*Board Members only*)
- 6:30 – 9:00 **POSTER SESSION**
TREC Lobby
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THURSDAY, NOVEMBER 4, 2021

9:00 – 9:10 **Welcome**
 Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Holly Best, RSC Executive Committee

9:10 – 9:30 **Ins and outs of using iNaturalist for field/laboratory studies in biodiversity, and entry of Erie, PA in the international 2022 City Nature Challenge**
 Dr. J. Michael Campbell, Department of Biology, Mercyhurst University

9:30 – 9:50 **Enhanced Green Rooftop Design**
 Emily Breniser, Shania Petrush, Alexa Rogers, Varun Kasaraneni, Ph.D.
 Gannon University

9:50 – 10:10 **A Study of Insect, Plant and Mammal Diversity on Two Green Roofs of Differing ages on the Campus of Gannon University**
 Zechariah Gilbert*, Ashleigh Kelly*, Sarah Till, Libby Tirak* and Dr. Steven Ropski - Biology Department, Gannon University, Erie, Pennsylvania, 16541

10:10 – 10:30 **Analysis of insect diversity and small mammals on green roofs at Mercyhurst University in relation to microclimate and plant community development**
 Nicole Schwab*, Jenna Kunst*, Elizabeth Karlin, Katie Goodenow, and Connor Rust, Department of Biology, Mercyhurst University

10:30 – 10:50 **BREAK**

Session Chair: Jen Salem, RSC

10:50 – 11:10 **A Comparison Study of Insect Diversity and Quantity and Small Mammal Diversity on Green Roofs on the Campuses of Gannon University and Mercyhurst University, Erie PA**
 Zechariah Gilbert*, Ashleigh Kelly*, Elizabeth Tirak* and Sarah Till (Gannon University), Elizabeth Karlin*, Katie Goodenow*, Nicole Schwab, Jenna Kunst, and Connor Rust (Mercyhurst University)

11:10 – 11:30 **When A Duck Nests on Your Green Roof**
 Cassandra McLaughlin* and Dr. Steven Ropski, Biology Department, Gannon University, Erie, PA. 16541

11:30 – 11:50 **Monitoring migration and tracking movements of songbirds at Presque Isle State Park**
 Sargent, S., J. Bojczyk, L.M. Koitsch - Erie Bird Observatory, Erie, PA

11:50 – 12:50 **LUNCH**

Session Chair: Sean Dalton, RSC

- 12:50 – 1:10 **Understanding remediation of DDT contaminated soils using in situ and laboratory experimentation**
Sam A. Nutile¹, Amanda D. Harwood², Adam M. Simpson¹
¹Department of Biology, Penn State Behrend, Erie PA
²Department of Biology and Environmental Studies, Alma College, Alma MI
- 1:10 – 1:30 **Device for Active Microplastic Removal (DAMPR)**
Erek Iwanenko, Colton Rashilla, Jade Clinton, Kyle Goodman, Varun Kasaraneni, Ph.D.
Gannon University
- 1:30 – 1:50 **Designing a Water Treatment Plant to Address Rural Community Needs**
Clara Almeter, Lydia Andraso, Ashley McClung, Ashlynn Uzl, Varun Kasaraneni, Ph.D.
Gannon University
- 1:50 – 2:30 **SOCIAL BREAK**

FRIDAY, NOVEMBER 5, 2021

- 9:00 – 9:10 **Welcome**
Jeanette Schnars, Ph.D., Executive Director, RSC

Presentations

Session Chair: Casey Bradshaw-Wilson, RSC Past-President

- 9:10 – 9:30 **Unsolved mysterysnails: The mystery continues**
Lynne Beaty*, Adam Simpson, and Sam Nutile
Penn State Erie – The Behrend College
- 9:30 – 9:50 **Juvenile Drift of Round Gobies in the French Creek Watershed as Means of Range Expansion**
Grace Hemmelgarn* and Dr. Casey Bradshaw-Wilson
Allegheny College
- 9:50 – 10:00 **Using eDNA as an Indicator of Presence/Absence of Round Gobies in the French Creek Watershed**
Danielle Studer*, Grace Hemmelgarn*, and Dr. Casey Bradshaw-Wilson, Allegheny College
Vicki Muller, Erie National Wildlife Refuge.
- 10:00 – 10:20 **Comparative Diet Preferences of Lake Erie White Perch and Yellow Perch**
Michelle Kuns, Gannon University

10:20 – 10:30	<p>Comparing Time Spent by Different Carnivore Species at River Otter Latrines <i>(Speed Talk)</i> Sam Hall*, Kelly Pearce Allegheny College</p>
10:30 – 10:50	<p>A Census of the Bat Population of Gannon University, Erie, PA Till, Sarah E.*; Ropski, Steven J. Gannon University, Erie, PA</p>
10:50 – 11:10	<p>Aerial Drone Surveys of Shoreline Change and Primary Wetland Habitats on Presque Isle State Park, Erie, PA Sean Dalton, Regional Science Consortium</p>
11:10 – 12:10	<p>LUNCH</p>
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12:10 – 12:30	<p>PRESENTATION OF THE JERRY COVERT STUDENT RESEARCH AWARDS Jeanette Schnars, Ph.D., Executive Director, RSC <i>Student Award Presentations</i> <i>Closing Remarks</i></p>
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ABSTRACTS

Regional Science Consortium
17th Annual Research Symposium
November 3-5, 2021
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ORAL PRESENTATIONS

Wednesday, November 3, 2021

Leveling up: a glycinergic olivogeniculate projection that circumvents the inferior colliculus

Alyson Burchell¹ (presenting), Yusra Mansour DO^{1,2}, Randy Kulesza PhD¹

¹Auditory Research Center, Lake Erie College of Osteopathic Medicine (LECOM), Erie, PA

²Department of Otolaryngology, Henry Ford Macomb Hospital, Detroit, MI

The medial nucleus of the trapezoid body (MNTB) plays essential roles in sound source localization and processing complex sounds. The MNTB is composed predominantly of calbindin-positive principal neurons that have known local and ascending glycinergic projections within the auditory brainstem. Preliminary work raised suspicion that MNTB principal neurons might send a direct projection to the auditory thalamus. To explore this novel projection to the MG, stereotaxic retrograde tract tracing using fluorogold (FG), anterograde tracing using biotinylated dextran (BD) and immunohistochemistry for calbindin (CB), the glycine receptor and the vesicular inhibitory amino acid transporter. Large injections of FG into the inferior colliculus revealed FG labeling in <1% of MNTB neurons. However, injections of FG that included the ventral (vMG), dorsal (dMG) and medial nuclei of the MG resulted in robust retrograde labelling in the MNTB. Smaller FG injections restricted to the vMG resulted in the highest number of FG+ MNTB neurons. Combining FG+ injections with CB immunolabeling, revealed nearly all MNTB neurons projecting to the vMG are CB+. Injections of BD into the MNTB resulted in labelled axons through the lateral lemniscus and numerous *en passant* boutons in the vMG. Together, these findings support the existence of a long-range, glycinergic projection from the MNTB to the vMG that bypasses the IC.

Reinforcing Comprehension of Medical Microbiology and Immunology Topics Through Online Drawing Workshops

Robert Waters MS*, Mark A. W. Andrews Ph. D., FNAOME, Delbert Abi Abdallah Ph. D.,

Nancy Carty Ph.D., Christopher C. Keller Ph.D., FNAOME

Introduction: During preclinical education students are required to learn numerous topics that must be retained. Studies have shown that drawing can improve retention. However, limited studies have been conducted on the use of drawing activities at the medical school level. Additionally, according to the contiguity effect learners comprehend information better when corresponding words are presented closer to the image. However, no studies have been performed that investigated the effectiveness of labeling drawings. The goal of this study was to utilize drawing with labeling to reinforce microbiology and immunology topics during online drawing workshops.

Methods: First year medical students attended 3 drawing workshops which they were required to draw several different topics, half of which were labeled with words, and half was labeled with numbers.

Multiple-choice questions evaluating comprehension of the topics that were covered during the drawing workshop were compared to questions that were not covered for three different course assessments.

Results: Students performed significantly better on topics covered during the drawing workshop compared to those that were not on the assessments. Students also performed significantly better on the assessments for questions on drawings they labeled with words when compared to those labeled with numbers.

Conclusions: Results presented here show that students perform significantly better when lecture material is reinforced during online drawing workshops and when they are labeled with the corresponding words. This is true for both microbiology and immunology topics. Future research should investigate the effectiveness of combining different generative learning techniques.

Factors Influencing COVID-19 Spread on a University Campus Setting: Insights from an Epidemiologic and Metagenomic Surveillance Analysis

Madison Heeter and Austin Hertel, Gannon University

COVID-19 has negatively impacted nearly every industry in some manner, and higher education is no exception. Nearly every institution of higher learning has issued responses to mitigate the spread of the virus to its campus community. Gannon University was one of the first institutions to develop their own in-house PCR based COVID-19 testing programs university-wide during the 2020-2021 academic year. In the past year and a half, we have tested over 25,000 samples in this surveillance program, which has been instrumental in allowing Gannon to continue to offer in-person classes and athletic competition for sports throughout fall and spring semesters of 2020 and 2021. Analysis of our results indicate a low overall rate of infectivity across campus, and suggests individual practices, not institutional safety procedures, drive COVID-19 presence within campus populations. To understand how localized microbial populations might contribute to or be impacted by COVID-19 infection, we also conducted a nasal and fecal bacterial metagenomic study and viral qPCR analysis of COVID-19 infected individuals. These results coupled with our characterization of routes of COVID-19 exposure reveal insights that can be used for the development of risk aversion strategies that can be applied to other higher education institutions and industrial workplaces.

Forensic Anthropological Investigation of a Recent Case in the City of Erie, PA

Dennis Dirkmaat, Department of Applied Forensic Sciences, Mercyhurst University

Skeletonized human remains were discovered in Frontier Park, Erie, PA in 2019 by individuals conducting a spring cleaning of Cascade Creek. Mercyhurst's Department of Applied Forensic Sciences' Forensic Scene Recovery Team was contacted by the Erie County Coroner's Office and Erie City Police for assistance in processing the outdoor forensic scene. Following assessment of forensic significance (human vs non-human, and if human, of recent origin?), a forensic archaeological search of the area was conducted in and around the creek. Additional human remains were recovered during multiple subsequent searches. This lecture will detail the forensic anthropological methods, practices and protocols used to locate, document and eventually interpret the past history of the remains. We will detail how biological profile (age, sex, age, and ancestry) is assessed from skeletal remains, as well as skeletal trauma (cause and manner of death), and forensic taphonomic history (postmortem interval, where were the remains originally deposited, and what natural factors have impacted the biological tissues from the time of death and emplacement on the scene, and recovery). The eventual positive identification of the remains through DNA analysis permits an evaluation of our forensic anthropological hypotheses.

Identifying taphonomic factors effecting the dispersal patterns of surface-scattered human remains: a study of a forensic sample from actual casework

Kristine A. Kortonick, B.S., Luis Cabo, M.S.

Department of Applied Forensic Sciences, Mercyhurst University

An understanding of a wide variety of taphonomic factors and their effect on the final deposition of human remains at the outdoor scene is crucial to forensic taphonomic interpretation and crime scene reconstruction. Although distribution patterns are commonly utilized in forensic taphonomic analysis to reconstruct the death event, there has been little applicable research into the subject. Research into the common dispersion patterns of surface-scattered human remains within the context of the scene can be used to identify the specific taphonomic variables and their effect on the final distribution patterns of human remains and associated evidence. In addition, quantifying the common distribution of surface-scattered remains would assist in structuring scene recoveries and training protocols. Many of the current studies on distribution patterns of surface-scattered remains have limited applicability to forensic cases due to the small, non-human samples with short post-mortem intervals (PMI). The goal of this study was to analyze the preservation and distribution patterns of human remains in a forensic anthropological sample in relation to specific taphonomic variables. This study utilized a forensic sample of 41 forensic anthropological cases with a known post-mortem interval range of approximately 2.5 months to 22 years. Each case was recovered through forensic archaeological methods and had full forensic osteological and taphonomic analyses. Spatial data was collected for each case by assigning cartesian coordinates to each individual skeletal element from scene maps using image processing software. The relationship between the dispersion and recovery of skeletal elements, and specific taphonomic variables were investigated using statistical analysis.

Under the Microscope: A New Approach to Distinguishing Perimortem Trauma from Postmortem Damage in Osseous Material

Colleen Peters, M.S. Department of Applied Forensic Sciences, Mercyhurst University

A vital component of forensic investigation lays in reconstructing the death event of the victim. Differentiating between perimortem trauma, meaning trauma occurring around or at the time of death, and postmortem damage which occurs after the victim has died, is of critical importance when attempting to accurately depict the crimes committed against the victim. While postmortem damage remains important, accurately identifying trauma to the living victim can change the type of charges brought against the perpetrator. While most forensic fields can draw the line between perimortem and postmortem within minutes of the victim's death, forensic anthropology has long been plagued with an inability to distinguish between the two when examining damage to bone. The organic components of bone decompose over long periods, making the transition from "fresh" bone to "dry" bone a long and protracted one. A multitude of studies have examined bone for macroscopic traits that can separate perimortem trauma from postmortem damage. Unfortunately, most have concluded that within six months of death, bone exhibits mixed traits of fresh and dry bone. Recent research has indicated that microscopic hemorrhagic staining may persist even after bone loses its organic components after death. As the biological processes which create this staining occur almost instantaneously after injury in living individuals, this could serve as a potential trait for identifying perimortem trauma. The proposed research seeks to identify how soon after death these hemorrhagic stains cease to occur in order to further elucidate whether this could be a key indicator of perimortem trauma.

The Application of 3D Models in Age-at-Death and Sex Estimation of the Pubic Symphyseal Face

Anthony V. Lanfranchi, M.S.^{1*}, Luis L. Cabo, M.S.¹

¹ Department of Applied Forensic Sciences, Mercyhurst University

The pubic symphyseal face provides one of the most reliable areas for age estimation of human skeletal remains from maturity to the mid fourth decade of age. Phase methods based on the evolution of the

morphology of this particular surface with age, and in particular, different variations of the Suchey-Brooks¹ method, are among the most trusted and utilized by forensic anthropologists.² However, quantifying the morphological traits utilized by traditional methods is the future to developing more objective metric methods, as well as being able to capture subtler morphological differences. The most auspicious recent attempts to quantify the evolution of the pubic symphyseal face with age are based on capturing the geometry of the area from 3D scans, utilizing classic or modified Geometric Morphometry (GM) techniques.³⁻⁵ The availability of increasingly precise 3D scanners, at much more affordable prices than classic micro-CT scan systems, have made them popular in anthropometric applications,⁶ making this approach even more promising. Among these, the *Artec Space Spider* is a high-resolution 3D scanner which produces point accuracies in the ± 0.1 mm range,⁷ which has caused it to become a particularly popular tool in anthropometric research, including studies on the evolution of the pubic face with age.⁴⁻⁵ However, studies discussing specific protocols for hardware and software configuration to allow for better inter-study comparisons are still scarce. This study establishes the best procedures for the *Artec Space Spider* and *Artec Studio Professional* software that produces the most accurate models for further analysis.

The Utility of Forensic Odontology in Forensic Cases

Summer Shipley-Meeks*, B.S.¹, Holly Long*, B.S.¹, Joe Adserias-Garriga¹, DDS, Ph.D., D-ABFO

¹ Department of Applied Forensic Science, Mercyhurst University, Erie, PA 16546

After attending this presentation, attendees will understand the importance of a forensic odontologists' expertise in positive identification methods and analyses in forensic cases.

This study highlights the utility of adding forensic odontology in forensic anthropological analyses in addition to the biological profile and trauma analysis. Forensic Odontologists provide almost instantaneous conclusions in dental identification through comparison between antemortem and postmortem dental records.

Forensic odontology is defined as the scientific application of dental knowledge to criminal and civil law. Forensic odontologists are called to compare antemortem and postmortem dental records to decide if the records provide a positive identification, a possible identification, if the records show insufficient dental evidence, or if it's an exclusion. This type of identification is much less expensive than DNA and much more efficient, provided antemortem records are available for comparison.

This project retrospectively evaluates forensic cases performed by Mercyhurst's Forensic Anthropology Laboratory since 2015, specifically focusing on the number of positive identifications that were made before incorporating forensic odontology in the Department of Applied Forensic Sciences.

The value of personal identification: a forensic odontological approach

Joe Adserias-Garriga¹, Victoria Cattano¹, Summer Shipley-Meeks¹, Holly Long¹, Ann McCracken¹, Savannah Sass¹.

¹ Department of Applied Forensic Sciences, Mercyhurst University. Erie, PA.

When human remains are found, the first priority of the investigation is to ascertain the identity of the deceased; actually, any forensic investigation involving human remains would be very difficult to solve without this information. Therefore, personal identification is necessary for social, legal and forensic reasons.

The first step in the identification process is to build up a biological profile, which is a general description of the individual's ancestry, sex, age-at-death and stature. This information is the post-mortem data. The ante-mortem data is any information concerning the individual (provided by the missing person's family or relatives) that could be used for identification. Comparisons between ante-mortem and post-mortem data can lead to a positive identification or an exclusion when enough antemortem and postmortem data can be compared.

Several methods and techniques from diverse fields, depending on the remains available, can be applied to human identification. Forensic odontology offers an expeditious method of identification based on dental traits, treatment and pathology. So that, dental analysis and comparison provide a very useful tool to assess personal identification by scientific means. Moreover, teeth are excellent samples for biochemical analysis and simultaneously the field of forensic odontology is evolving, introducing new technologies.

This presentation aims to introduce the audience how forensic odontological analyses are carried out in forensic cases and the great value of their results in the case investigation.

The Effects of an Acidic Environment on the Calcium and Collagen Concentrations in Bone

Kaitlyn Klein^{1*}

¹Mercyhurst University

One main question asked of a forensic specialist by law enforcement is “how long has this individual been dead?” While this determination can be fairly easy in recent deaths, the greater the increase in time since death, the greater the difficulty in providing this interval. For a specialist to estimate an accurate post-mortem interval, they must understand all of the contributing factors to decomposition in the surrounding area including climate, animal activity and even the pH of the surrounding environment or soil. The determination of the effects of pH on the decomposing body is particularly applicable to exposed skeletonized remains which contain proteins and minerals strongly affected by low pH, along with remains located outdoors in Pennsylvania; where acid rain is a strong environmental concern. In this experiment sections of human femurs are being exposed to aqueous environments covering a range of pH values. After thirty days they will be removed and samples will be taken to analyze their collagen and calcium concentrations. These amounts will be compared back to samples taken from the sections prior to exposure to determine if the acidic environments created a significant change in these levels. Collagen will be measured using a collagen dye kit, which will be read through a microscopic camera and analyzed using MATLAB™ to determine the values present. Calcium levels will be measured using an atomic absorption spectrometer. If a relationship is found to be present this could aid in an understanding of bone decomposition in acidic areas.

ORAL PRESENTATIONS

Thursday, November 4, 2021

Ins and outs of using iNaturalist for field/laboratory studies in biodiversity, and entry of Erie, PA in the international 2022 City Nature Challenge

Dr. J. Michael Campbell, Department of Biology, Mercyhurst University

For several years, the Biology faculty at Mercyhurst University have been using iNaturalist as a platform for field and laboratory activities in courses that investigate local biodiversity. The iNaturalist app provides a cellphone-based tool for recording, geo-referencing, and making identifications (IDs) of observations of creatures that have photographed by an observer. After a photograph taken through the app is submitted, an artificial intelligence database in iNaturalist suggests possible IDs for the observer to choose from. Selected IDs may subsequently be “verified” by external identifiers.

Exemplary biodiversity data obtained in “bioblitzes” conducted by Mercyhurst students at the Mercyhurst University campus and nearby parks will be demonstrated, and the limitations and potential for the data to be used for data-intensive comparative analyses of ecosystem biodiversity will be described. Preliminary plans for engaging Erie, PA iNaturalist users in a global City Nature Challenge in May 2022 will be described, with an invitation to other biologists in the area to join, including middle-and secondary school science teachers who would like to involve their students.

Enhanced Green Rooftop Design

Emily Breniser, Shania Petrush, Alexa Rogers

Advisor: Varun Kasaraneni, Ph.D.

Gannon University

Rooftop gardens, or green roofs, offer a wide array of benefits to urban centers where green space is limited and impervious surfaces are plentiful. Urban areas face challenges such as flooding from stormwater runoff as well as air and water pollution. Green rooftops can help to mitigate these issues, but benefits are seen more significantly when they are implemented on a larger scale. The research conducted considers the challenges associated with green roofs and climate change trends in order to develop an accessible and sustainable product. The project aims to provide improved drainage capabilities which can handle the predicted increase in precipitation, while being able to retain the water long enough for treatment of acidity and toxic metals. An aesthetically-pleasing garden model will be designed, constructed, and tested for its ability to balance those goals.

A Study of Insect, Plant and Mammal Diversity on Two Green Roofs of Differing ages on the Campus of Gannon University

Zechariah Gilbert*, Ashleigh Kelly*, Sarah Till, Libby Tirak* and Dr. Steven Ropski

Biology Department, Gannon University, Erie, Pennsylvania, 16541

This research project explored the advantages of having a green roof at Gannon University in relation to insect, plant, and small mammal diversity. Green roofs are designed to provide a natural environment for various insects and potentially mammals. Insect diversity was measured using fly ribbon on wooden stakes for an aerial setting and laid on the green roof surface for ground. Fly ribbons were also placed in a neutral grass area at ground level for a control. Sherman small mammal live traps were set. This was done over a three-day period through the months of September and October. The green roofs had an abundance of different plant species including indigenous and invasive. This project allowed us to investigate the benefits of green roofs and discuss the positive effects on the ecosystem.

Analysis of insect diversity and small mammals on green roofs at Mercyhurst University in relation to microclimate and plant community development

Nicole Schwab*, Jenna Kunst*, Elizabeth Karlin, Katie Goodenow, and Connor Rust,
Department of Biology, Mercyhurst University

Two 11-year old green roofs installed in 2010 on a building at Mercyhurst University (MU) were sampled for insects and small mammals in September and October 2021, in a concurrent investigation coordinated with Gannon University. The MU roofs were adjacent to each other, but situated in different microclimates. Insect communities and mammals were sampled in four replicate plots on each roof, using Sherman live traps for small mammals and fly strips set-up in paired aerial (vertical) and ground (horizontal) positions. The insect sampling was conducted twice over 3-day periods ending September 21 and October 1, including a control location on the front lawn of the MU campus.

Insects were identified to the family-level and counted to compare abundance and diversity among the roof and control sites. Insect diversity and abundance at the control site (lawn) was greater than on the green roofs, but a surprising variety of insects including several families in the Orders Diptera (flies), Hymenoptera (bees, wasps, ants), Coleoptera (beetles), and Orthoptera (crickets and grasshoppers) were detected in the green roof habitats. Wind exposure appeared to be more important than plant community diversity in affecting the insect numbers and variety detected among the MU sites.

A Comparison Study of Insect Diversity and Quantity and Small Mammal Diversity on Green Roofs on the Campuses of Gannon University and Mercyhurst University, Erie PA

Zechariah Gilbert*, Ashleigh Kelly*, Elizabeth Tirak* and Sarah Till (Gannon University),
Elizabeth Karlin*, Katie Goodenow*, Nicole Schwab, Jenna Kunst, and Connor Rust
(Mercyhurst University)

Two green roofs on the campus of Gannon University and another two on the Mercyhurst University campus were compared for insect and small mammal diversity. On two 3-day periods during September and October 2021, replicate sets fly strips were attached to poles for aerial sampling and also laid on the ground for surface sampling. Strips were also set up in nearby campus grass areas to serve as a control. Insects were counted and classified as specifically as possible (in most cases to the family level). Sherman small mammal live traps were also run.

Roofs will be compared based upon type, age, direction they face, and proximity to different adjacent habitats. In general, the insect communities on both Gannon and Mercyhurst green roofs had similar taxonomic composition dominated by families in the Order Diptera, with fewer numbers and types of Hymenoptera, Coleoptera and Hemiptera. Some distinct variations in insect communities attributable to microclimate effects were discernible and will be described.

When A Duck Nests on Your Green Roof

Cassandra McLaughlin* and Dr. Steven Ropski, Biology Department, Gannon University,
Erie, PA. 16541

When a curious waterfowl discovers a green roof, the possibilities are endless. Located atop Gannon University's Nash Library and Student Learning Commons, is a 4-year-old green roof. On May 23rd 2021, a nesting mallard was discovered during a routine clean out of the plant beds. With green rooves bringing nature closer than ever a mother mallard chose the area three stories high with no water source as her nest site. The nest, built only 3 ft away from the large window, resulted in almost no privacy. Normally nesting mallards choose a site low to the ground, near large water sources and containing multiple hiding places, making this mallard an anomaly. Through the use of video equipment and close observations from the library staff (daily) and researchers (2:00pm- 4:00pm nearly every afternoon) until June 20th, granted the ability to closely monitor the behaviors of the mallard. There were also questions early on about the safety of the young being so high up and without water, which eventually led to the decision

to aid in their removal from the roof only 1 day after hatching (with a big help from W.I.N.). While the mallard's subtle but various behaviors were a primary focus, the idea that animals would make use of a green roof as habitat is significant and not well documented

Monitoring migration and tracking movements of songbirds at Presque Isle State Park.

Sargent, S. , J. Bojczyk, L.M. Koitsch. Erie Bird Observatory, Erie, PA

Dozens of species of songbirds migrate annually between wintering ranges in the south and breeding ranges in the north. Typically flying at night, they are affected by migration barriers such as Lake Erie. Erie Bird Observatory has been banding migrating songbirds in spring and fall and in 2021 we also piloted a project of visually counting birds from the TREC tower just after dawn as they continue to move but at lower altitudes as daylight increases in a phenomenon known as morning flight. We will share information from morning flight counts this spring, as well as some highlights of radio tracking from birds tagged at Fry's Landing with small 433 MHz radios.

Understanding remediation of DDT contaminated soils using *in situ* and laboratory experimentation

Sam A. Nutile*¹, Amanda D. Harwood², Adam M. Simpson¹

¹Department of Biology, Penn State Behrend, Erie PA

²Department of Biology and Environmental Studies, Alma College, Alma MI

Laboratory experimentation is often used to evaluate factors affecting bioavailability during remediation of contaminated soils, but these studies are rarely compared to *in situ* applications. In 2019, a pilot study was conducted on the effectiveness of field application of activated carbon to reduce the bioavailability of DDT and its metabolites (DDX) within a superfund site, providing a unique opportunity to directly compare laboratory and field applications. Four grid areas within the contaminated floodplain were randomly selected, and the toxicity and bioaccumulation of DDX were evaluated in *Eisenia fetida* at 0-, 3-, and 9-months post carbon addition. While both laboratory and field soils showed declines in bioaccumulation of DDX by *E. fetida* with time, laboratory amended soils demonstrated a more rapid decline in bioavailable DDX compared to field amended soils. Differences in methods of carbon incorporation into soil and environmental conditions, such as temperature, may account for the differences in the rate of remediation. This study provides insight into the utility of laboratory studies in predicting remediation success *in situ*, as well as the need for laboratory studies to mimic *in situ* conditions as closely as possible.

Device for Active Microplastic Removal (DAMPR)

Erek Iwanenko, Colton Rashilla, Jade Clinton, Kyle Goodman

Advisor: Varun Kasaraneni, Ph.D.

Gannon University

Microplastics, which bioaccumulate through food chains and result in contaminated food supplies, have become a common pollutant in the Great Lakes. Of the Great Lakes, Lake Erie has the highest amount of microplastics and the worst water quality. Existing plastic removal devices are not capable of removing microplastics without disrupting or damaging the environment. These devices only remove microplastics greater than 2mm. The goal of the DAMPR project is to develop an active filtration system that will remove microplastics down to 300 microns in size. Over 80 percent of microplastics in the environment are less than 2mm, so this system will be the first step in solving the microplastics crisis in the Great Lakes. Ultimately, this functioning microplastic filtration system will achieve optimum removal of plastics with minimal impact to the aquatic environment. The system will be fairly inexpensive compared to competitors and thanks to its solar power system will be relatively self-sustaining.

Designing a Water Treatment Plant to Address Rural Community Needs

Clara Almeter, Lydia Andraso, Ashley McClung, Ashlynn Uzl

Advisor: Varun Kasaraneni, Ph.D.

Gannon University

Most people in rural communities get their drinking water from wells; this water is generally more susceptible to corroding pipes, contamination from septic tanks, and fertilizer, pesticide, and manure contamination from farmland. With outdated infrastructure, growing water demands, and increasing numbers of emerging contaminants, drinking water quality in rural communities of Pennsylvania is an area of concern. Several rural communities cannot afford a typical drinking water treatment plant costing millions of dollars. Using Northwestern Erie County communities including Girard, Avonia, Lake City, Springfield, and the western half of Fairview as a case study a water treatment plant (WTP) will be designed to address these issues. Designing a modern water treatment train would improve drinking water quality for the growing population in the service area. The design will draw water from Lake Erie and will address cost, maintenance, performance, sustainability, and emerging contaminants. After completion of the design, a tabletop model will be constructed.

ORAL PRESENTATIONS

Friday, November 5, 2021

Unsolved mysterysnails: The mystery continues

Lynne Beaty*, Adam Simpson, and Sam Nutile

Penn State Erie – The Behrend College

Invasive, nonindigenous species can influence native communities directly via consumption and indirectly through trophic cascades and accidental stowaways (e.g., parasites). Freshwater snails—because of their diet variety and obligatory role in trematode life cycles—can significantly affect the communities they invade. Western PA is currently home to four invasive, nonindigenous freshwater snail species: New Zealand mud snails (*Potamopyrgus antipodarum*), faucet snails (*Bithynia tentaculata*), Japanese mysterysnails (*Cipangopaludina japonica*), and Chinese mysterysnails (*Cipangopaludina chinensis*), all of which have the potential to negatively impact the coastal ecosystems of Lake Erie and other freshwater ecosystems in Western PA. Since 2019, we have been surveying waterbodies in Western PA to gather basic information about these populations. Here we present updates from our 2021 field season for invasive freshwater snails in Western PA and discuss additional future and on-going projects involving these species.

Juvenile Drift of Round Gobies in the French Creek Watershed as Means of Range Expansion

Grace Hemmelgarn* and Dr. Casey Bradshaw-Wilson

Allegheny College

A newly introduced invasive fish, the round goby (*Neogobius melanostomus*), was discovered in the French Creek watershed in 2014 and is threatening the unique biodiversity within the stream system. Successful management strategies of this invasive species depend on accurate information about many life history strategies, including dispersal mechanisms. Most research on round goby natural dispersal within the French Creek watershed focuses on adults, but juvenile drift may be a form of downstream dispersal in French Creek that has not been examined. The objective of this study was firstly, to document whether juveniles were utilizing drift as a means of range expansion, and secondly, to describe abiotic factors correlating with drift density. Drifting larval and juvenile fishes were collected by placing drift nets across stream transects twice a month from June to August 2021 in the French Creek watershed at an invaded site, the last known location of the invasion front, and an uninvaded site. Drift nets were set an

hour before sunset and sampled every hour for 5 hours. Preliminary results show drifting juvenile round gobies are present at the invaded site. Understanding the patterns of round goby larval drift is necessary to inform management strategies that limit the dispersal of round gobies in the French Creek watershed and beyond.

Using eDNA as an Indicator of Presence/Absence of Round Gobies in the French Creek Watershed

Danielle Studer*, Grace Hemmelgarn*, and Dr. Casey Bradshaw-Wilson, Allegheny College
Vicki Muller of the Erie National Wildlife Refuge

The round goby (*Neogobius melanostomus*) is an invasive fish species that was first discovered in the French Creek watershed in 2014. It is a threat to the unique biodiversity within the stream system, but it is still in the early stages of invasion. It can be difficult to efficiently monitor the range expansion of this species throughout the watershed with traditional collection methods. Environmental DNA (eDNA) offers an alternative monitoring strategy that does not require the capture of specimens. The objective of this study was to determine the current status of the round goby invasion and the feasibility of long-term eDNA monitoring in the French Creek watershed. Water samples were collected for eDNA analysis from 60 sites in the watershed on July 26-28, 2021. The samples are currently being processed at the US Fish and Wildlife Service's Northeast Fishery Center Conservation Genetics Lab. The results from this study will help researchers target which regions should be sampled through traditional collection methods (backpack electrofishing and seining) and aid in additional data for future investigations regarding impact to native species.

Comparative Diets of Lake Erie White Perch and Yellow Perch

Michelle Kuns, Gannon University

We examined differences in the diets of young of the year (YOY) non-native white perch and native yellow perch in Presque Isle Bay as part of a larger program to monitor the health of the Presque Isle Bay aquatic ecosystem. Perch are an important component of the fish community and zooplankton are an important part of the diet of YOY perch. Fish and zooplankton samples were collected in July, August and September of 2017. Perch made up 76-93% of all fish caught in these samples. YOY perch made up 45-71% of the total catch. Stomach contents from YOY white perch and YOY yellow perch were analyzed. Zooplankton were identified to species and counted. These values will be compared to zooplankton samples analyzed for species composition and abundance.

Comparing Time Spent by Different Carnivore Species at River Otter Latrines

Sam Hall and Kelly Pearce
Allegheny College

River otters, like some other carnivore species, communicate and interact with other otters through scent-marking. Otters mark their scent with urine and scat at latrines that are typically one to two meters from water within riparian zones. Otters use latrines as a way to communicate and interact with other otters. In addition, otters' scent-marking attracts other species, including red fox, raccoon, coyote, and long-tailed weasel, to investigate the latrines. Using information from camera traps which were deployed between October 2019 and March 2020 at 41 sites in North Western Pennsylvania, previous study found the time spent using camera traps by red foxes, coyotes, bobcats, gray foxes, black bears, and fishers at otter latrines. I will compare the time spent at otter latrines between these carnivores. The time spent at otter latrines could show how the carnivores are using the latrine. Many carnivores are declining due to habitat loss and hunting, so it is crucial to understand their patterns to aid in conservation.

A Census of the Bat Population of Gannon University, Erie, PA

Till, Sarah E.; Ropski, Steven J.

Gannon University, Erie, PA

For the past eleven summers, a census of the bat population has occurred on the Gannon University campus in Erie, PA. The numbers for the first three years held relatively steady, but the data for the past eight years indicates a dramatic decline. White Nose Syndrome was first reported in 2006 in a cave in New York. The disease has killed an estimated 7 million bats in the eastern United States since then and has spread throughout Pennsylvania and into northeastern Ohio. This fungal infection has killed 95% of bats in some caves and may result in the listing of three bat species as endangered in Pennsylvania, including the Little Brown Bat (*Myotis lucifugus*), the predominant bat on the Gannon campus. This study will compare yearly data by building, time of year, building side and species composition to determine how White Nose Syndrome has affected the Gannon campus bats. A decrease in numbers may be partially responsible for an increase in West Nile Virus in the area. The results will also be used to place bat houses at appropriate locations to encourage bat presence on campus.

Aerial Drone Surveys of Shoreline Change and Primary Wetland Habitats on Presque Isle State Park

Sean Dalton, Regional Science Consortium

Presque Isle State Park is composed of an unconsolidated sand spit reaching into Lake Erie. Because of its unique geological composition and location, it is subject to numerous natural forces which have resulted in greatly varied habitats that can change just as rapidly as the conditions that created them. Using an unmanned aerial drone fitted with multiple sensors, up-to-date high-resolution imagery is being collected, as well as surveys are being conducted both along Presque Isle's shoreline to monitor erosive features and change, as well as within primary wetland habitat for plant health and treatment accuracy. This data is then compiled and cataloged in a GIS database allowing for closer analysis of survey data, as well as creation of up to date aerial imagery of project areas.

ABSTRACTS

*Regional Science Consortium
17th Annual Research Symposium
November 3-5, 2021*

POSTER PRESENTATIONS

POSTER SESSION: Wednesday, November 3rd, 2021 at 6:30 - 9:00 PM

1. Effects of Frankincense Oil on Percent Viability of HPV16 Infected Keratinocytes When Compared to Healthy Control

Lindsey Schwanke* OMSIII, Gregory Delost DO, Diana Speelman PhD, Nancy Carty PhD,

Christopher Keller PhD, FNAOME, Lake Erie College of Osteopathic Medicine, Erie, Pa

Introduction: Human papilloma virus (HPV) is the causative agent of cutaneous warts and affects approximately 7-12% of the population. Recent observations have suggested that frankincense oil (FO) can act as a treatment for cutaneous warts. The goal of this study was to determine the effects of FO on percent viability of HPV-immortalized cells when compared to cells not infected with HPV.

Methods: Human keratinocyte cells infected with HPV16 (HEK001) were cultured in the absence and presence of varying concentrations of FO and no oil (untreated cells) and percent viability was determined after 72 hours in culture. Cellular morphological changes were observed using an inverted microscope. Percent viability of cells was measured on a cellometer and then compared between the different concentrations of FO and untreated cells. The same treatment was performed on an HPV-negative cell line, human embryonic kidney cells (HEK293). Statistical significance was determined by Kruskal Wallis test with a Tukey's post-hoc and results less than 0.05 were considered statistically significant.

Results: HEK001 cells exhibited a significant difference in percent viability when exposed to FO at a concentration of 1:1,000 compared to control. HEK293 cells did not show a significant difference in percent viability when treated with FO at any concentration.

Conclusions: Results presented demonstrate that FO significantly reduced the viability of cultured HEK001 cells. The results also suggest that FO does not alter the viability in cells that do not contain HPV. Further studies should be conducted to determine the mechanism of cell death in HEK001 cells.

2. Dysmorphology and auditory projections to the amygdalar in the animal model of autism spectrum disorder

*Tella, Jyoshitha; Kulesza, Randy PhD

Exposure to the antiepileptic valproic acid (VPA) during pregnancy is associated with increased risk of autism spectrum disorder (ASD) in humans and timed *in utero* exposure to VPA is a validated animal model of ASD. The current 'amygdala theory of autism' is based on decreased capability to assess social and emotional cues leading to decreased social interaction attributed to abnormal processing of environmental cues in the amygdala. Previous research indicates auditory stimulation can result in impaired sensorimotor gating, which could contribute to the hypersensitivity to sensory stimuli, commonly observed in ASD. However, it is unclear how VPA exposure impacts structure, function and connectivity of the amygdala. We hypothesized that VPA-exposed animals would have smaller neurons in the amygdala, reduced expression of the calcium binding protein calbindin (CB) and reduced inputs from the auditory thalamus. Our analysis revealed VPA-exposed animals had varying morphological changes in the amygdala, with significantly smaller round neurons in the basolateral anterior (BLa) nucleus, but larger round neurons in the basolateral ventral (BLv) nuclei. CB immunolabeling revealed decreased

expression in the La, BLp and BLv, but increased expression in the BLa in VPA-exposed animals. Finally, injections of the retrograde tracer fluorogold (FG) into the amygdala revealed an increase in the number of FG+ neurons in the MG of VPA-exposed animals. Together, these findings suggest increased connectivity with the auditory thalamus and may explain hypersensitivity to sound and impaired social interactions seen in ASD.

3. Autism Spectrum Disorder

Jenna Allen*, Diana Speelman, PhD, Randy J. Kulesza, PhD - LECOM College of Medicine
Autism spectrum disorder (ASD) is a neurodevelopmental disorder – characterized by restricted communication, social interaction skills, and the presence of repetitive or stereotyped behaviors, interests, or activities. In the United States, 1 out of 54 children will eventually be diagnosed along the autism spectrum, with boys being four times more likely to be diagnosed. ASD is linked to over 1000 different genes, but also has a strong association with environmental factors. One gene that has recently been linked to intellectual disability (ID) and ASD, is *GRIN2B*.

GRIN2B encodes the protein GRIN2B, which is found in NMDA receptors (NMDAR). The expression of *GRIN2B* depends on time and location during embryologic development, with the GRIN2B subunit found nearly exclusively in Purkinje cells of the cerebellum. Studies have shown that loss-of-function mutations in *GRIN2B* can lead to neurodevelopmental disorders over a broad spectrum, with ID being found in all affected individuals. Other common findings for children with *GRIN2B* mutation include microcephaly, muscle tone abnormalities (dystonia, hypotonia), and drug-resistant epilepsy. Due to the cerebellar localization of GRIN2B, we hypothesized that *GRIN2B* mutations will result in developmental delay and cerebellar ataxia. Specifically, we hypothesize that GRIN2B mutants have lower body weights, delayed eye and ear opening, perform significantly worse on tests of coordination and balance and have abnormal cerebellar morphology.

Preliminary data showed no difference in the body weight, ear or eye opening between wildtype and *GRIN2B* mutant animals. Further, it was found that there was no difference in motor responses, as tested by the motor and balance testing. Interestingly, it was found that the *GRIN2B* animals were quicker at righting themselves during the negative geotaxis challenge.

4. Altered Auditory Brainstem Responses and Binaural Interaction Component in Animals Exposed to Valproic Acid

Oh, Joanna*, Kulesza, Randy, PhD - LECOM College of Medicine
Valproic acid (VPA) is an antiepileptic used to treat seizures, migraines and bipolar disorder. Mothers who take VPA during pregnancy have an elevated risk for having a child diagnosed with autism spectrum disorder (ASD). Accordingly, in utero exposure to VPA is used as an animal model of autism. Both human subjects with ASD and VPA-exposed animals have significantly fewer neurons in their auditory brainstem and abnormal auditory brainstem responses (ABR). Moreover, VPA-exposed animals have reduced expression of the calcium binding protein calbindin, elevated neuronal activation after pure tone stimuli, and reduced ascending projections to the auditory midbrain and thalamus. Given these drastic structural changes, we hypothesized that young VPA-exposed animals would have abnormal ABR responses and abnormal binaural interaction components (BIC) of the ABR. Accordingly, the DN1 peak, the first negative peak of the binaural interaction component (BIC), has been hypothesized to have diagnostic value as a biomarker for binaural hearing abilities. Herein, we used both monaural and binaural wide-band click stimuli to study thresholds, latency of the ABR and amplitude of the BIC. Examination of monaural responses revealed higher thresholds in VPA-exposed animals for both right and left ear, but no significant difference in threshold with age. Our analysis revealed that the amplitude of the DN1 component was relatively higher when the interaural time difference was at 0 dB, and the VPA-exposed animals had a relatively lower amplitude compared to the control animals. Together, these findings suggest abnormal ABR responses and BIC of the ABR in VPA-exposed animals.

5. An Exploration of the Changes Seen in the Oculomotor, Trochlear, and Abducens Nuclei of GRIN2B Mutated Rats

Ross, Jason*; Upton, K; Kulesza, RJ – all affiliated with the LECOM Auditory Research Center
A member of the N-Methyl-D-aspartate receptor (NMDAR) gene family, GRIN2B codes for the GluN2B subunit of NMDA receptors. Studies have shown that mutations in these NMDAR subunits associated with GRIN2B have been linked to various neurodevelopmental disorders in humans such as intellectual disability (ID), developmental delay (DD), microcephaly, autism spectrum disorder (ASD), epileptic encephalopathy (EE), Schizophrenia (SCZ), attention deficit hyperactive disorder (ADHD) and, of particular relevance to this study, cortical visual impairment (CVI). Furthermore, the expression of this GluN2B subunit has been shown to be at high levels during the prenatal period, but then decline across most brain regions after birth. Together, this evidence suggests that GluN2B may play a significant role in early brain development. Currently, it has not yet been fully determined how GRIN2B mutations cause these various conditions. As such, to further understand the mechanism behind GRIN2B disorder, this study aimed to investigate motor neurons within the cranial nerve nuclei specifically associated with eye movements in rats with a GRIN2B mutation. The oculomotor, trochlear, and abducens nuclei were compared between control and mutated rats to elucidate any differences in the number of neurons within each nucleus or in the morphology of the cell bodies. Preliminary results demonstrated a significant difference in the areas of stellate neurons within the trochlear nucleus, suggesting a possible role of GRIN2B in the development and maturation of those brainstem nuclei. The GRIN2B mutation did not elicit any significant change in size or count within the oculomotor or abducens nuclei.

6. Morphological study of trigeminal and facial nuclei in CRISPR knockout GRIN2B Rat Models

Kristen Upton*; Ross, J; Kulesza, RJ

Lake Erie College of Osteopathic Medicine, Auditory Research Center
Autism Spectrum Disorder (ASD) is a complex neurodevelopment disorder characterized by deficits in social communication, repetitive sensory-motor behaviors, and altered connectivity within the brain. Identification of genes underlying ASD has recently been expanded using genome-wide microarray studies which have found *de novo* mutations in genes such as *GRIN2B*. The *GRIN2B* gene encodes the GluN2B subunit of N-methyl-D-aspartate receptors (NMDARs), a family of receptors that mediate excitatory synaptic transmission in the central nervous system. The GluN2B receptor plays an important role in brain development, circuit formation and synaptic plasticity. Loss or dysfunction of NMDARs has been implicated in the pathogenesis of autism spectrum disorder. Individuals diagnosed with a GRIN2B-related neurodevelopmental disorder are all characterized with mild to profound developmental delay or intellectual disability. In addition, these individuals present with epilepsy (51%), ASD (26%), muscle tone abnormality (56%), dystonic/dyskinetic/or choreiform movement disorders (10%), and cortical visual impairment (10%). The mechanism by which these *GRIN2B* mutations cause these impairments has yet to be determined. In this study we characterize the structure and morphology of the facial and trigeminal motor nuclei in rats with a CRISPR induced heterozygous *GRIN2B* loss of function mutation. Our studies found a significant difference in the cell body size of stellate neurons in the facial nucleus. The *GRIN2B* mutation did not impact the neuron size in the trigeminal motor nucleus of *GRIN2B* mutated rats. These results suggest that *GRIN2B* may play a role in the development and maturation of brainstem motor neurons.

7. The CXC-Chemokine Receptor

Mia Jang*, Catalina Ordornez – Gannon University

The CXC-Chemokine Receptor Type 4, CXCR4 is a G-protein coupled receptor that helps regulate cell growth and division, differentiation, and migration. CXCR4 can be overexpressed when its trafficking to the lysosome is decreased. Overexpression of CXCR4 is associated with metastasis in cancer and promotes HIV infection. When bound to its CXCL12, CXCR4 is ubiquitinated and downregulated via endocytosis. At the early endosomes, CXCR4 is ubiquitinated by the ubiquitin ligase ITCH and then sorted into multivesicular bodies by the ubiquitin adaptor proteins Hrs and Tsg101. Degradation of

CXCR4 occurs in the lysosomes. This project is interested in whether Secretory Carrier Membrane Protein (SCAMP) 3, which interacts with Hrs and Tsg101, regulates CXCR4 trafficking. RNA interference will be used to knockdown SCAMP3 and monitored CXCR4's localization relative to markers of the early endosome and lysosomes. Control immunofluorescence assays were performed with pulse chase time of 15, 30, 60, 120, and 180 minutes to examine CXCR4 localization in the presence or absence of SCAMP3. In 30 minutes, co-localization between CXCR4 and EEA1 was spotted. While in 60 minutes, CXCR4 was co-localized with late endosomal lysosome.

8. Deletion of *Skn7* and *Yap1* Reduces Delayed Oxidative Stress Responses in *Saccharomyces cerevisiae* .

Zoe Snyder*, Ilyaz Veysalov, Ammar Krso, Quyen Aoh, Ph.D.

Department of Biology, Gannon University, Erie, PA 16501

In this experiment we removed two genes from yeast cells, *Yap1* and *Skn7*, to identify their affect in the pathway responsible for oxidative stress response. Oxidative stress is a result of oxygen metabolism and the buildup of reactive oxygen species. Reactive oxygen species can damage important biological processes by oxidizing lipids, DNA proteins, lipids, and nucleic acids, causing a decrease in enzyme efficiency, protein function, fluidity of membranes, reduced gene expression, and inhibits anabolic processes in the cells. Reactive oxygen species activate two pathways required for defending against oxidative stress. These pathways stop reversible nonessential functions, inhibiting protein synthesis, focusing on antioxidant defenses. One pathway is essential for immediate oxidative stress response, the other for delayed oxidative stress response. The *Yap1* and *Skn7* genes are both located in quick oxidative stress response. Unlike any research done previously we tested the effects of single and double deletions of *Yap1* and *Skn7* in the opposite pathway from which they are located. We performed a cross to create the double deletion then we used reporter assay to observe the cell response. For our experiment our hypothesis was that the two pathways are both independent of each other, due to their separate activation. If the two pathways are independent, then the single and double deletion of *Yap1* and *Skn7* will have no effect delayed oxidative stress. Our preliminary results proved our hypothesis incorrect suggesting that the *Yap1* pathway may influence delayed oxidative stress response, and they are not as independent as they seem.

9. Applications of Transportable and Traditional Radiography for Forensic Identifications

Kaitlyn Klein^{1*}, Victoria Cattano^{1*}, & Joe Adserias-Garriga¹

¹Mercyhurst University

Radiology is a valuable resource to forensic odontologists and forensic anthropologist when they are asked to assist in the identification of remains that are decomposed or skeletonized. An identification can be made either by DNA, fingerprints, dental record comparison, or identifiable surgical implants. However, fingerprints and DNA are not always possible to apply due to the state of decomposition or a lack of antemortem data. Dental x-ray comparison is a expedited method to compare antemortem and postmortem records for identification purposes. Panoramic x-ray machines are stationary devices, whereas portable devices such as the handheld Cocoon x-ray can be taken anywhere for consultation and use. This combination of intraoral and extraoral radiographs will provide the forensic odontologist with sufficient information about the teeth and the surrounding anatomical structures to perform their comparison. Dental radiographs are also used to estimate the age of a deceased individual, based on the development and eruption of the dentition, which will narrow the identification. Besides dental application, radiographs can also be used to compare antemortem records of past healed trauma, surgical devices, implants, and frontal sinus morphology which can contribute to a positive identification. As such it is a valuable resource that all forensic anthropologists and odontologists should be trained in. This presentation will summarize the usefulness of radiology in the forensic context.

10. Cranial Asymmetry and its Effects on Ancestry Estimation: A Pilot Study

Summer Shipley-Meeks*, B.S., Mercyhurst University, Erie, PA 16546

¹ Department of Applied Forensic Science, Mercyhurst University, Erie, PA 16546

In forensic anthropology, ancestry estimation is defined as a phenotypic variation that can be reflected in the skeleton. The cranium has been established as the best indicator for ancestry estimation specifically the midfacial region. Asymmetry is defined as lack of equality between parts or aspects of something. There is a lack in the scientific literature addressing asymmetry the cranium. When measuring, anthropologists use both sides as measurements typically cross the midline but differing sides may affect the ancestry. When scoring non-metric traits, anthropologists typically score the left side unless it is damaged, in which case, the right is used which may affect the ancestry output.

This pilot study analyzed bilateral cranial traits, assessed the asymmetry, and addressed the implications that cranial asymmetry has on ancestry estimation outputs. The results of this study will be used later on in a larger research project.

Ten white male crania were taken from the Mercyhurst University Donated Body Collection to assess preliminary findings in cranial asymmetry. Each cranium was photographed in six views; left lateral, anterior, right lateral, superior, posterior, and inferior. Each cranium was digitized using a Microscribe digitizer to obtain cranial measurements and the overall morphology. Six cranial traits from each side were scored according to Hefner (2009) and Hefner and Ousley (2014).

11. Asymmetry of Cranial Traits and their Effects on Ancestry Estimation: Pilot Study

Holly Long*, BS, Mercyhurst University, Erie, PA 16546

After this presentation, attendees will understand the importance of examining asymmetry of cranial traits and their impact on ancestry estimation.

Forensic Anthropologists construct a biological profile from human skeletal remains for law enforcement/coroners to aid in identification efforts. The biological profile includes sex, age, stature, and ancestry estimation. Much research has been conducted on different methods for assessing ancestry through the cranium which include both metric and non-metric methods. However, not much research has been noted on the effects of asymmetrical cranial traits on the ancestry output. Asymmetry is defined as measurements or scores that are not the same on both sides of midline. When measuring, we use both sides as measurements tend to cross the midline but differing sides may affect the ancestry. When using non-metric scores, we use the left side unless it is damaged, in which case, we use the right, which may affect the ancestry output. This presentation exams the effects asymmetrical traits may present on a sample of three Black crania. These results will also be compared to a pilot study completed on 10 White individuals to see if asymmetry effects ancestries differently.

The samples will be taken from the Mercyhurst University Donated Body. Each cranium will be photographed on the left lateral, anterior, right lateral, superior, posterior, and inferior views. The crania will be digitized using a Microscribe digitizer for metrics and morphology. Six cranial traits from each side will be scored according to Hefner (2009) and Hefner and Ousley (2014).

12. The Use of 3D Scanning Technologies in Detecting the Effects of Thermal Alteration on Human Skeletal Tissue

Kaitlyn Schoonover* & Leah Vanderbush*- MS Students in Biological and Forensic Anthropology at Mercyhurst University

The use of 3D scanning is still an ever-growing section of research within the Forensic Anthropological field. There are many methods and applications yet to be discovered. Utilization of 3D scanning technologies allows for the capability to not only capture objects in a three-dimensional space but also to further analyze these captured images to calculate things like surface area. The goal of this project is to use the surface area analysis function in the Artec Studio 3D software to determine the degree of which 60 bones (metatarsal and pedal phalanges) shrink or expand after being exposed to extreme heat. Half of the bones have been baked in a conventional oven, and the other half will be burned in an open flame. Through collecting the surface area measurements before and after exposure to heat, it is possible to

record any significant changes that were related to the thermal alteration of the pedal bones. Of the initial 30 bones that were heated in the conventional oven, 24 shrunk by between 3.22 – 102.67 mm². The significant changes recorded prove that human bone does typically shrink after being exposed to high heat in a conventional oven. The future for this project will be to expose 30 new bones to an open flame and compare the differences in surface area changes to those bones that were heated in the conventional oven.

13. Forensic Methods of Personal Identification

Ann McCracken* - Forensic Anthropology at Mercyhurst University

In the field of forensics we strive to identify unknown individuals, to give a name back to those who have passed and lost them. Unfortunately, there are countless situations where individuals pass away and their identities are completely unknown. In these situations, there are three main methods of personal identification: DNA, fingerprints, and odontology.

However, before a personal identification is achieved, forensic scientists must reconstruct a biological profile of the individual. This biological profile (which is a broad description of the deceased in terms of age, ancestry, stature, and sex) will help investigators to narrow down their suspected victims or missing persons list and identify possible candidates for their identity.

Dental analysis can contribute to this biological profile in several ways. Certain traits observed are more prevalent in certain ancestry groups. Dental age estimation methods can provide accurate estimations of the age-at-death, particularly in juvenile cases. It also contributes greatly to confirming individualizing characteristics about a person, such as teeth that were pulled and have healed or a gold filling. In addition to the biological profile, forensic odontologists can compare antemortem records of individuals to the postmortem data they gather from the remains.

The aim of this poster is to illustrate what information we can get from dentition and how forensic odontology can play a vital role in identifying unknown human remains.

14. The Relationship Between Marital Status and Cause of Death in Adult Males

Sheana Ramcharan*, State University of New York (SUNY) College at Buffalo

A correlation between marital status and cause of death can reveal a deeper understanding of the effects that losing a life partner has on an individual. The widowhood effect, more often found in males, refers to the premature death of an individual after death of their spouse. Using scans of the Death Register from the Margaret L. Wendt Archives and Resource Center at Forest Lawn Cemetery, I collected causes of death for 102 adult males 20 years or older of each marital status (34 married, 34 unmarried, and 34 widowed) to determine if there was a difference in causes of death based on marital status. The causes of death were grouped into categories based on the type of death/associated organs (heart, brain, lung, kidney, cancer, medical/infectious, other). The most common cause of death for each marital status were married males: heart related (23.5%), unmarried males: lung related (32.4%), and widowed males: heart related (32.4%). These percentages mean that there were not separate causes of death associated with each marital status. The results indicate that there was no definitive correlation between marital status and cause of death in adult males 20 years or older. These results do not support the widowhood effect in which individuals suffer from a decline in immune response and engage in unhealthy behaviors after loss of a spouse leading to premature death. Future studies may indicate a relationship between marital status and cause of death by controlling for age to get a clearer result.

15. Promoting Knowledge and Understanding of Local Ecosystems through Education at the Regional Science Consortium

Sarah Magyan and Jeanette Schnars, Regional Science Consortium

Abstract: The mission of the Regional Science Consortium is to promote and enhance our knowledge and understanding of the Lake Erie and Ohio River Basin ecosystems through research and education. One of the many ways we work towards this mission is through our engagement with member school districts, colleges and universities. The RSC works with 9 school districts and 14 colleges and universities each year to provide education on our local ecosystems and research via field trips, lessons, activities, and our

annual education events. This presentation will explore some of our most popular education lessons and events such as our Online Education Initiative, NOAA Bay Watershed Education and Training Program, Problem Solving Hack-a-Thon, Forensic Science Escape Room, and College and Career Fair.

16. Environmental Education on Wetlands

Robin Forsha* and Eric Pallant – Allegheny College

Environmental education is important, because it can lead to environmental action that helps to conserve ecosystems such as wetlands that provide many valuable ecosystem services. However, environmental education does not always lead to environmental action, as this may be difficult for teachers whose expertise lies elsewhere. Wetlands along with schools and organizations that work toward environmental education would all benefit from a blog that teaches students about wetlands and encourages them to take environmental action. I plan to create an educational wetlands blog that uses descriptive writing, pictures, and audio to foster an interest in wetlands among high school students; educate students about the organisms, ecology, value of and threats to wetlands; and ultimately encourage some form of environmental action that will benefit wetlands. To accomplish this, I will educate myself on the best techniques for blogging, environmental education, and inspiring environmental action through a review of literature. I will make weekly posts throughout the fall 2021 semester that make use of my observations at a small wetland and scientific resources. I will evaluate my results through an analysis of feedback in the form of comments on my blog posts.

17. Queering Conservation: how LGBTQ+ Leaders are Enhancing Conservation

Lizzy Russo – Allegheny College

One of the largest environmental problems facing our world is massive species loss and declining biodiversity. Another issue is the continued oppression of LGBTQ+ people. Despite more progressive equality laws being passed and people becoming more accepting, LGBTQ+ people still face oppression and inequality. Even though these issues seem unrelated, there are strong connections between them. LGBTQ+ leaders have abilities to enhance conservation in distinct ways through different ideas and unique perspectives that reflect critical thinking about wildlife conservation. LGBTQ+ people have the ability to think in non-heteronormative ways and lead conservation efforts unlike others. Heteronormative thinking means business as usual, not taking creative approaches to conservation. Heteronormativity is binary, where a queer approach is more creative and challenges binary thinking. Additionally, queer people are more likely to be impacted by species loss. Biodiversity loss will create shortages of fresh water and food, making it harder for low-income people to access these resources, including LGBTQ+ people, who are more likely to be low-income. To learn more about LGBTQ+ people in conservation, I will interview LGBTQ+ scientists to learn about their experiences in the field. I will also ask them about how they uniquely contribute to species conservation. My project will contextualize this qualitative research on LGBTQ+ conservation leadership through critical analysis informed by queer ecology and queer studies to examine how LGBTQ+ leaders can enhance wildlife conservation.

18. Douglas Veterinary Clinic Internship

Ashley Beyers* and Dr. Steve Ropski, Biology Department,
Gannon University, Erie, Pa. 16541

Through an independent study at a The Douglas Veterinary Clinic I observed routine appointments, surgeries, and farm calls. I was able to assist in many activities while interning there and I was able to learn a great deal.

19. Detecting Microbial Contamination in Ground Beef Products in local grocery stores of Erie, PA

Valeria Torres*, Garett Mately, Laruen Lambert, Olivia Wirfel - Dept. of Biology, Gannon University

Mentors: Matt Gacura and Gary Vanderlaan - Dept. of Biology, Gannon University

With the advent of modern sanitation methods, ground beef is seen as a largely safe food source, however sporadic outbreaks still occur. *Clostridium perfringens* bacteria is one of the most common causes of foodborne illness, with an estimated 1 in 6 Americans getting sick from foodborne diseases each year resulting in 3,000 deaths (CDC). Food safety is also a socioeconomic issue. The pattern of poverty and disease incidence, including foodborne botulism has been well documented. We hypothesize that ground beef of lower quality (i.e., lower % lean and lower cost) will have a higher occurrence of microbial contamination. Additionally, we hypothesize that varying socioeconomic conditions in regions will yield differences in the incidence of microorganisms.

For analysis, ground beef samples, of three different qualities, were sampled from several stores in multiple locations around the Erie, PA area. Locations were selected based upon the overall socioeconomics of the surrounding area. Both aerobic and anaerobic bacteria from each sample were quantified through the use of serial dilution and spread plate inoculation. For aerobic bacteria, LB (Luria-Bretani) agar was used for culturing under aerobic conditions. While anaerobic bacteria were cultured using LB agar plates incubated in anerobic growth chambers. Afterwards colonies were counted and cfu/g of sample were calculated. Statistical analyses were used to determine if quality, location, and store impact the overall concentration of aerobic/anaerobic bacteria per sample. Preliminary analyses show a significant impact of quality on the number of both aerobic and anaerobic bacteria.

20. The Microbiome of Erie, PA Sour Dough Bread Starter Cultures

Michaela Smith* - Dept. of Biology, Gannon University

Mentor: Matt Gacura - Dept. of Biology, Gannon University

Microbial communities are complex dynamic systems that can be influenced by a variety of environmental conditions and other mechanisms. One such community can be found within sourdough starters. Sourdough starters are cultures used in the production of sour dough bread, originating from the local environment, containing primarily yeasts, pollens, and native bacteria. However, these communities may be highly dynamic and influenced by not only the surrounding environment, but the substrate they are grown in (i.e., the dough itself). The purpose of this study is to quantify/identify this microbial community. It is hypothesized that substrate and surrounding community will influence the microbial community found within starters.

Sourdough bread starters were produced during the Summer of 2021. Starters were created using flour from two grains types, wheat or barley. These two were selected due to differences in grain structure, endosperm, bran percentage, and protein synthesis. After sourdough starters were created, triplicates of each starter were incubated in one of two environments. An indoor environment, a kitchen, or an outdoor environment, the green roof found on the Nash Library in the Gannon Campus. DNA was extracted from all 12 samples and quantified. Starter cultures were incubated and maintained in each environment for 14 days. DNA was sent to be analyzed through Illimuna sequencing of the 16s rRNA gene for bacteria and ITS (Internal Transcribed Spacer) region for fungi. It is expected, that unique microbial communities will be found in each sample, with higher diversity being detected within samples incubated in outdoor environments.

21. Examining the role of Phase III metabolism in insecticide susceptibility of *Chironomus dilutus*

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The economy of northwestern Pennsylvania relies heavily on the production of the viticulture industry. To ensure adequate harvests, viticulturists utilize synthetic insecticides to control pest numbers and prevent the destruction of crops. Due to the frequent use of these chemicals, there is concern that local populations of the grape pest, grape berry moth (GBM; *Endopiza viteana*), have developed resistance to

commonly used insecticides. Although pesticide resistance in *E. viteana* is well-documented, the exact mechanisms of resistance are unknown. Due to limited availability of *E. viteana* larvae, *Chironomus dilutus* was selected as a model organism to explore the role of ATP-Binding Cassette (ABC) transporters in the development of resistance in invertebrates. ABC transporters are a mechanism of Phase III metabolism that utilizes active transport to translocate potentially harmful metabolites out of a cell. To address this objective, acute toxicity tests were conducted using second-instar larvae (collected from lab populations) and baseline sensitivity to the common-use insecticide imidacloprid was assayed. The median lethal concentration (LC₅₀) for this 48-hour test was 4.029 ng/mL. Once the baseline toxicity was calculated, the tests were repeated with the addition of a sublethal concentration (100 ng/mL) of verapamil, an ABC transport inhibitor. This test yielded an LC₅₀ of 1.125 ng/mL, resulting in a 3.58-fold increase in toxicity. These results will provide potentially valuable information that may aid pest control efforts in Pennsylvania and abroad.

22. Near-Earth, Investigative Mycological & Bacteriological Ubiquity Surveyor (NIMBUS)

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Traditional biosignature gases, such as oxygen (O₂), ozone (O₃), nitrous oxide (N₂O), & methane (CH₄) are gases that accumulate in Earth's atmosphere in a fashion primarily driven by living entities. Biosignature gases are particularly important to astrobiologists in their search for evidence of life on other planets. On Earth, phosphine (PH₃) gas is produced primarily by either human activity or anaerobic microbial action. Recently, astrobiologists detected high levels (parts per billion, ppb) of PH₃ in the atmosphere of Venus. Such PH₃ concentrations suggest the possibility of microbial life on our sister planet. On Earth, microbes are masterfully ubiquitous. They broadly occupy numerous ecological niches, via their impressive metabolic diversities. If microbes truly do occupy the Venusian clouds, can we say the same of our very own skyline? Here we describe our efforts to construct an aerial drone (NIMBUS) that is capable of hauling payload canisters axenically laden with a customized collection of nutrient media. Canisters are extensively sterilized via an ethanol wash followed by overnight ultraviolet bombardment. Our canister lids utilize magnetic seals to prevent in-transit contamination, and upon arriving at altitudinal destinations, a servo-motor breaches magnetic seals to permit ambient exposure to payload media. Our current experimental design will collect aerial samples in 100-foot altitudinal increments, up to a 400-foot ceiling per FAA regulations. Retrieved payload media will be incubated in aerobic and anaerobic conditions, followed by DNA extractions of cultured microbes for species identification via 16S rDNA (bacterial) or ITS (fungal) profiling.

23. Water quality and microbial diversity in Lake Pleasant, PA

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Eukaryotic organisms contain mitochondria, organelles which generate ATP through aerobic respiration. These mitochondria likely developed from free-living bacteria which were endocytosed by a eukaryote and then lived within it (i.e. endosymbiotic theory). However, not all eukaryotes live in environments rich in the oxygen necessary for aerobic respiration, yet they must still generate ATP in order to carry out their metabolic functions. Recently, a bacterium which uses nitrate rather than oxygen as the final electron acceptor in its ETC, was found living symbiotically within an anaerobic ciliate in a lake in Switzerland. Perhaps such an organism could be found in our local Lake Pleasant (Union City, PA). We collected water samples at various depths in September 2021, when the lake was stratified. Oxygen was available (> 2 mg/L) down to 6 meters, suggesting that anaerobic bacteria may be present near the bottom of the lake.

Water samples will be filtered through 0.2 µm filters to collect bacteria. We will then sequence the eukaryotic and prokaryotic genomes on the filters to determine the overall microbial signature at each depth. Microbial data can be compared to water quality data that was collected during sampling. In doing so, we might find hints of nitrate-utilizing endosymbionts reminiscent of Swiss lake systems.

24. The Prevalence of Pathogenic Bacterial Growth on Cell Phones in Hospital and Medical School Staff

Samantha L. Yearwood MS*, Cole Smith, Stepan Shumyak DO, Robert Waters MS, Nancy Carty Ph.D., Christopher C. Keller Ph.D. FNAOME

Introduction: Healthcare-associated infections (HAI) are infections not present on admission but obtained while receiving healthcare services. During hospitalization, patients are exposed to microbes through the environment, healthcare staff, and other patients. Phones with suboptimal hygiene have potential to harbor pathogens. The current study aimed to identify the prevalence of bacteria found on operating room (OR) staff's personal cell phones as compared to those in the community.

Methods: Convenience selection of OR personnel in a community hospital and medical school faculty/staff was conducted. Each participant was administered a questionnaire that included questions about their occupation and cell phone cleaning habits. Each phone was swabbed and cultured for *Staphylococcus aureus*, *Escherichia coli*, and *Clostridioides difficile* using species-specific growth media. The presence of pathogenic colonies was compared between locations, within different occupations, frequency of phone cleaning, and perceived phone cleanliness. Data were compared using a Fisher's Exact or Freeman Halton test and $p < 0.05$ was considered significant.

Results: The comparison of pathogenic growth between OR staff and community cell phones was not significant. There was no significant difference in growth of pathogenic colonies between different occupations, cleaning frequency, or different attitudes regarding perceived phone contamination/cleanliness in both community and OR staff cell phones.

Conclusion: The results of the current study are not significant; of the pathogenic bacteria tested, OR staff phones are not more colonized as compared to community phones. Thus, indicating patients are not at an increased risk of contracting an infection in the OR as compared to the public regarding phone contamination.

25. Efficacy of SURYA, a low-cost UV-sterilization chamber

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The concept of ultraviolet (UV) irradiation as a disease control method is nearly a century old. As early as 1937, UV lamps were installed in a K-12 elementary school (Swarthmore Public Schools, PA) and the effect of UV irradiation on various childhood disease metrics including measles was tracked in a longitudinal study (6-year duration). Although the viral agent would not be isolated until 1954 by Dr. Thomas Peebles, measles as a disease was extensively tracked by the CDC in the USA starting as early as 1912. Thus decades prior to viral identification, the 1937 study revealed a most remarkable finding: UV irradiation was effective at reducing the weekly measles incidence in attending Swarthmore elementary school students. Today, commercial UV-sterilization chambers are abundant. Here we examine the antibacterial efficacy of the commercially available PRIMACE design that utilizes 24 high-intensity UV-light emitting diodes (UV-LEDs) in a portable form factor. We also test our own portable design (SURYA, or Speedy Ultraviolet Radiation Yielding Antimicrobial effects) that harnesses a single UV-emitting CF-bulb. In our chamber comparisons, we employ the well-studied *Escherichia coli*, a gram-negative coccobacillus commonly found in the human colon. In each sterilization chamber (PRIMACE vs. SURYA), we tested three different durations of UV-exposure: 5, 10 and 30 minutes. To prevent contamination, we employed ampicillin as selective pressure, as our strain of *E. coli* is naturally

ampicillin-resistant (at 100 ug / mL ampicillin). Each plate for each timepoint was performed in triplicate to provide statistical robustness to our Quebec colony plate counts.

26. UV-C Light Sterilization: A Regulatory Overview

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On March 29, 2020, the U.S. Food and Drug Administration (FDA) issued the first Emergency Use Authorization (EUA) for a decontamination process of personal protective equipment (PPE), such as face masks, and filtering facepiece respirators (FFRs) [1]. In the absence of manufacturer's recommendations, third parties may provide guidance or procedures on how to decontaminate respirators without impacting respirator performance. Ultraviolet germicidal irradiation (UVGI) has been used successfully for sterilization of tools and whole environments. The advantages of this method are numerous. There not need to be any physical contact with the artifact to be sterilized; the procedure is quite fast and allows for covering large areas. As a drawback, the cost of these systems is often still prohibitive, and the necessity of the light to hit the surface to be effective might leave residual contamination in the shadowed areas within lumens. We provide an analysis of the regulatory aspect related to the use of UVC Devices. UV devices are typically Class II (“General Hospital and Personal Use Devices”) and therefore would need 510K clearance. However devices that are self contained, open chamber, UV radiation disinfection device intended for the purification of air in a room are excluded for FDA coverage and only EPA rules applies. UVC can be also responsible for the production of Ozone Gas in the environment. In 2015, the federal 8-hour ozone standard was set to 0.07 ppm, reducing the previous limit set in 2008, where the federal 8-hour ozone standard was 0.075 ppm.

27. Performance of SURYA, a low-cost UV-sterilization chamber

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Frontline workers are still struggling to procure personal protective equipment (PPE), such as face masks, and filtering facepiece respirators (FFRs), and have been using several disinfectant solutions to sterilize and reuse them. In the absence of manufacturer's recommendations, third parties may provide guidance or procedures on how to decontaminate respirators without impacting respirator performance. The filtration properties of the FFRs rapidly degrade as disinfectant polar liquids compromise the electrostatic effect within the mask fibers, thus decreasing or nullifying the protection for the user. We designed a cost-efficient sterilization chamber that uses UVC for decontamination (SURYA, or Speedy Ultraviolet Radiation Yielding Antimicrobial effects). The design focuses on a decontamination chamber easy to manufactured for rapid deployment. The device can also be used by the general public for sanitizing non washable materials. The coronavirus is very UV sensitive, especially in the UVC spectrum with a peak wavelength around 254 nm. A literature review of controlled laboratory experiments indicated that a reduction of 1 log₁₀ (i.e. 90%) of the viral load was achieved with a dose of 10-20 mJ/cm² (H Kariwa et al., 2006). Reduction of the viral load of 6 log₁₀ (i.e. 99.9999%) can be reached with a dose of a few hundred mJ/cm². The spectrum produced by our chamber is of 800 mJ/ cm² at the 254 nm wavelength

and overall 19J/ cm² for the whole UVC spectrum for a 300s exposure, indicating an extremely quick time for the reduction of viral load compared to other commercially available product (e.g. PRIMACE).

28. Feasibility Study to Implement Solar Panels at Gannon University

Luke Moon* and Nikolas Kaliszuk*

Gannon University Environmental Science and Engineering Department

The overall goal of this project is to evaluate the feasibility of implementing a solar energy system to the Gannon campus. Our plan is to survey university buildings across Gannon's campus and determine which of those would be optimal in implementing solar panels. This evaluation will include an aerial imaging survey of university roof tops, an estimate of solar radiation on campus, and the amount of electricity produced per climate conditions in Erie, PA. Through our research and data analysis we plan to determine the feasibility of utilizing solar radiation to supply electricity to devices within a specific building on campus. The results of this feasibility study will include: estimates of solar radiation, energy produced, costs, funding sources, and how to display information for educational purposes on Gannon campus. This project aligns with the goals of the Erie 2030 District, of which Gannon University is a participating member.

29. The Role of *trans*-Golgi network and Endosomal Adaptors in Nitrogen-Regulated Growth of *Saccharomyces cerevisiae*

Ellen Madden and Mia Krevh, Gannon University

Nitrogen is necessary for cell growth and the synthesis of amino acids and nucleic acids, two of the basic building blocks of all life, and is taken in from the environment by nitrogen permeases. Cells have many different types of nitrogen permeases, depending on the nitrogen available. In the yeast *Saccharomyces cerevisiae*, ensuring that cells use the correct permease to take a specific nitrogen source likely involves proteins, called clathrin adaptors that help traffic the permease in the cell. Yeast have many clathrin adaptors and it is unclear which adaptors are important for this regulation. To discern the role of these adaptors, we constructed genetic mutants with various combinations of clathrin adaptors deleted. Growth assays are used to determine the effects of adaptor protein deletions on cell growth in varying nitrogen media by comparing growth curves of mutant and wild-type cells. We hypothesize that there will be minimal impact in mutants containing single adaptor deletions, growth defects will be seen in mutants containing multiple adaptor deletions. This would suggest that clathrin adaptors work together in specific combinations to differentially regulate the localization of nitrogen permeases. Through this work, we hope to establish how these clathrin adaptors interact as a network to regulate the transport of nitrogen permeases in preferred and non-preferred nitrogen sources.

30. Prescribed Browsing by Goats Controls Multiflora Rose in a Black Cherry-Red Maple Deciduous Forest at the Erie National Wildlife Refuge in Northwestern PA

Alton Caylor*, Robin Forsha, Grace Hemmelgarn, Julia M. Holder*, Bailey Kozalla*, Megan Kresse*, Alexandria Martin, Danielle Studer, Richard D. Bowden – Allegheny College

Multiflora rose (*Rosa multiflora* (MFR)), originally from Asia, has invaded many temperate forests across the eastern United States, often out-competing native plants for sunlight and other resources. Herbicides can control MFR, but they can also reduce non-target plant species and threaten aquatic ecosystems. In a black cherry-red maple forest in the Erie National Wildlife Refuge in Pennsylvania, the United States Fish and Wildlife Service introduced prescribed goat-browsing as an exploratory control method. In four treatments, browsed, browsed/herbicide, cut/herbicide, and an unmanaged reference, we evaluated preliminary effects of these treatments on MFR and non-MFR herbaceous vegetation. The browsed treatment had 56% lower leaf/stem mass ratios and 35% shorter stem lengths than the reference; the leaf/stem ratio in the cut/herbicide treatment was 55% lower than the reference. Stem density was not reduced because goats did not kill the MFR plants in this first year of treatment. The herbicide treatment had fewer non-MFR plants than the reference treatment. Light levels at ground level did not differ among the treatments. Overall, 33% of trees in the browsed treatment were affected by the goats, and 9% were

completely girdled; red maple and ironwood were the most commonly browsed species. Preliminary results suggest that goats can be an effective control for MFR, however long-term success will be best evaluated after consecutive treatment seasons. Goats may increase tree mortality and shift tree species composition in stands dominated by trees with high browsing rates, but effects on diverse stands may be less pronounced.

31. Comparing Species Richness between restored and unrestored farmland In Northwestern Pennsylvania

Hailey Stupay*, Hannah Heutsch, Katherine Mowry, Ashlynn Peachy, Julia Sonen, Michael Williams and Dr. Kelly Pearce - Allegheny College

Habitat restoration on private lands is important for supporting wildlife, plants and insects. Without a stable ecosystem the environment in Northwestern PA is threatened. This study compares a 20-year restoration site to an unrestored site within five miles in Mercer County. There were 13 camera traps at Coloneal farms, and 3 at Enterline. Additional cameras were added from April 17th, 2021 to May 24th, 2021. The dates of the Enterline study were from April 2021 to May 2021 and the Coloneal study was taken from April 2021 to July 2021. Various species were detected at both properties, the restored property data showed foxes, deer, racoons, white tailed deer, possums, turkeys, a woodchuck, coyotes, a domestic dog, cottontail rabbits, deer and fox squirrels. Compared to the Enterline data, the species discovered were racoons, possums, gray squirrels, deer, groundhogs, white tailed deer, and cottontail rabbits. A total of 229 independent detections on the Coloneal Hunter Property compared to 62 at Enterline. The properties have very similar animals but the only difference is that the Coloneal Hunter's site has more species richness due to the restoration of the property. A majority of the species at the Coloneal and Enterline site data were deer, whitetail deer and racoons. This study shows the importance of restoring refuges to increase the species richness in environments.

32. Weed Warriors of Presque Isle: Fighting Invasive Plants

Jennifer Salem, Regional Science Consortium

The Weed Warriors of Presque Isle consists of a group of organized volunteers that work in conjunction with the Wetland Restoration project on Presque Isle State Park. Weed Warriors identify, monitor and remove invasive plant species and assist Department of Conservation and Natural Resources staff and interns with these efforts.

33. Evaluation of common, acrylic chemical bonding agents as phytotoxins of gametophyte development in the fern, *Ceratopteris richardii*

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Chemical toxicity is one of perspective, driven by the eye of the beholder. What counts as toxic to a particular biological species may be entirely non-toxic to another. For instance, acrylic bonding agents (ABs) are commonly used in numerous industrial applications, and are typically comprised of a composite ratio of dichloromethane, methyl methacrylate, methylene chloride, and trichloroethylene. In liquid form, ABs have been shown to be exceptionally teratogenic and carcinogenic in many different animal studies, including in humans. ABs however have not been fully investigated in plants. A contrasting example is that of silicone, routinely used in clinical settings as bonding agents for medical devices. Silicone exhibits no known toxicity profile in humans, and is chemically composed of hexamethyldisilazane and trimethoxymethylsilane. Like ABs, silicone toxicity in plant organisms has also not been fully investigated. All plants execute a lifecycle of alternating generations. However, ferns are unique in that they possess free-living gametophyte and sporophyte stages. Fern gametophytes often resemble non-vascular plants such as mosses. But as a fern sporophyte, the organism begins to resemble angiosperms in many respects. Because of this, ferns allow us to not only test whether certain chemicals

are phytotoxic, but also if these chemicals are specifically toxic against gametophytes and/or sporophytes. Here we show data that evaluate the plant toxicity of ABs and silicone on developing gametophytes in the model fern organism, *Ceratopteris richardii*. Future work will examine toxicity of these substances on fern sporophytes.

34. Survey of Riparian Flora of Canadaway Creek, Chautauqua County

Justine Bloom*, Alyssa Fisher, Alyssa Graziano, Autumn Maedl, Sydney Schwartzott, and Dr. Jonathan Titus – State University of New York – Fredonia

The plant species of two ~1 km long reaches of Canadaway Creek, a stream in Chautauqua County, NY, which flows into Lake Erie, were collected and identified. The riparian zones are primarily floodplain forest with a canopy of *Populus deltoides*, *Platanus occidentalis*, *Robinia pseudoacacia* and *Acer saccharum* with non-forested areas adjacent to the stream in high disturbance areas. Invasive species, such as *Fallopia japonica*, *Frangula alnus*, *Lonicera morrowii* and *Phragmites australis* dominate large areas. Thus far, 203 plant species of plants have been identified. Sixty-nine of those species were found to be non-native with 15 of those qualifying as invasive. The two most prevalent families found were Asteraceae with 40 species and Rosaceae with 14 species. Asteraceae and Fabaceae were composed of the most non-native species. The species composition illustrates a typical riparian zone with the inclusion of disturbance-adapted species such as *Persicaria* and *Bidens* species, and several pond species such as *Utricularia vulgaris* and *Alisma subcordatum*. The only uncommon species observed was *Cakile edentula* (S3), a species found on sandy beaches occurring at the mouth of the Creek. The purpose of this inventory is to understand what species are inhabiting the riparian zones of Canadaway Creek and how many non-native species have invaded these habitats.

35. Design and implementation of a low-cost plant growth chamber that permits video-timelapse recordings of root systems

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Previous work on time-lapse imaging of plant roots have yielded amazing insights into the rapid kinetics of the secondary messengers involved in growing roots. Although such experiments provide exceptional resolution of the developing root, they can be costly. A typical time-lapse fluorescence microscopy (TLFM) setup can easily start at about \$7,000 per imaging system. Here we describe efforts in implementing an alternative, low-cost Raspberry PiCAM solution for imaging root growth in the fern model organism, *Ceratopteris richardii*. Although our imaging system lacks the cellular resolution typical of TLFM, we do provide anatomical recordings of developing roots in custom-built growth chambers. Our root growth chambers are constructed of laser-cut acrylic panels of dimensions dictated by on-site temperature-controlled plant-growth incubators. Spectral analysis reveals that the acrylic panels permit all wavelengths in the visible-light range, and thus permit photosynthesis. Laser-cut acrylic panels are assembled via bonding agents that were determined to be nontoxic to ferns. Our imaging system provides many benefits. Firstly, we can control all aspects of the root growth experiment, such as the precise nutritional composition of the growth media as well as the presence of bacterial and fungal species known to impact root growth in plants. Although we showcase here results in ferns, the imaging system is amenable to seed plants in future experiments. The entirety of our approach, from design to implementation of both the root growth chamber & the PiCAM imager, is estimated to cost ~100-fold less than existing TLFM approaches. This savings can also feed statistical replication.

36. Population Ecology of Tardigrades

Lucas Foster* and Dr. Matthew Venesky – Allegheny College

While the use of tardigrades as a model system for the study of extreme environments continues to increase, there is still much to be learned about the population ecology of these

resilient microscopic animals. Currently, there is no existing literature detailing the distribution and dynamics of tardigrade populations in Northwestern Pennsylvania. Environmental and ecological conditions have been demonstrated to have varying effects on moss-dwelling tardigrade populations, though no ubiquitous trends have been discovered. This project was conducted with the goal of addressing these gaps in scientific knowledge by investigating the effects of moss substrate type (rock or wood), substrate location (stream bank or in stream), and substrate temperature on tardigrade abundance over time. Moss samples and temperature data were collected from four sites in Bousson Environmental Research Forest. Tardigrades were collected from these samples and a mixed-effects model was used to analyze the impact of each condition on abundance. Substrate type, temperature, and sampling date had no effect on tardigrade abundance, while the difference between substrate locations approached significance (P -value = 0.052). Since the mean tardigrade abundance of substrates collected from the stream was over five times higher than that of the stream bank, the lack of statistical significance could be due to low sample size. Further inquiry into the effect of water proximity on tardigrade abundance is needed to fully substantiate these findings, while a future investigation into the species of these specimens could provide novel insight on the composition, distribution, and dynamics of Northwestern Pennsylvania tardigrade populations.

37. Spatial distribution of organic carbon in vegetated wetland soils, Presque Isle State Park, Pennsylvania

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In the Great Lakes region, freshwater wetland systems are important areas for carbon storage that are being threatened by climate change. Disturbance can lead to oxidation of the carbon held in these systems, potentially releasing significant greenhouse gas (GHG) emissions back into the atmosphere. Information on the spatial distribution of soil organic carbon (SOC) across a wide range of freshwater wetland ecosystems is needed to help better manage these wetlands to reduce GHG emissions. Triplicate soil cores were collected at nine locations on three 150 m long transects spanning hydrogeomorphic settings from lacustrine (open water)-depression-lacustrine (lagoon). Cores were sub-sampled into 5 cm sections for the determination of bulk density, organic matter and organic carbon content. Bulk density at depths greater than 30 cm was 1.3-2.4 times greater than bulk density at 0-30 cm. Organic carbon in the top 30 cm (2.08 ± 4.20 %) of soil was significantly greater ($P=0.003$, $\alpha=0.05$) than organic carbon at depths of 30-60 cm (0.01 ± 0.03 %). Similarly, estimated soil organic carbon stocks were significantly greater ($P=0.003$, $\alpha=0.05$) in the top 30 cm of soil (2.09 ± 2.49 Mg C ha⁻¹ in comparison to soil layers > 30 cm (0.04 ± 0.08 Mg C ha⁻¹). These type of data contribute to an increased understanding of soil carbon variability with depth—information that is needed to better model GHG emission from these ecosystems.

38. Assessing and Quantifying Changes in Rainfall and Temperature Patterns in Indiana Pennsylvania along with many other locations within the Appalachian Plateau

Joshua Merichko* and Dr. Katie Farnsworth – Dept of Geology, Indiana University of PA
Global climate change is having a detrimental effect on weather patterns of Pennsylvania, Ohio, and West Virginia. Changes in rainfall patterns, as well as the subsequent inconsistencies to stream flow patterns, have large effects on local industry, urban areas, and agriculture. Long-term climatic trends were assessed on a local (Indiana, PA) and regional scale (Appalachian Plateau). Climatic indicators were evaluated to see if changes can be observed on a regional scale. Historical weather station data from 20 National Weather Service (NWS) stations with a minimum of 30-years of data were evaluated. These stations covered a region including western Pennsylvania (PA), eastern Ohio (OH), and northern West Virginia (WV). The data was assessed for long-term changes in daily precipitation, temperature high and lows, and other calculated

variables for months and seasons. For precipitation and temperature, calculated variables included total precipitation, number of rain days, maximum of the high temperature, minimum of the low temperature and heating/cooling degree days. The data was processed, and Mann Kendall non-parametric statistics tests were calculated using the Sen Slope script written in Matlab by Burkey to evaluate all variables. A rise in seasonal minimum low temperatures were found in the summer, with few stations during the fall and winter. Several stations were found to be changing fastest during the last 20 years. This rapid change is leading to an increase in cooling degree days because overnight low temperatures are rising. For precipitation, regionally 7 out of 17 stations show a statistically significant increase in annual precipitation.

39. Marsh Run Watershed

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This research study is focused on the water budget of Marsh Run watershed, in Indiana Pennsylvania. Determining the water budget, or the total volumes of water entering the watershed through precipitation and exiting through groundwater and runoff, allows for a better understanding of important impacts on the watershed, for example, changes in land use that can lead to flooding. Through data collection over the years of 2018 and 2019, 120 rainfall events were able to be identified. Total rainfall volumes were estimated for each event, by distributing that rainfall over the entire watershed evenly. These results showed over millions of gallons of water moving in and out of Marsh Run in only a quarter inch of rain, and more in larger rainfall events. Work is continuing to match stream gauge data to each of those rainfall events. Total volumes will be calculated for stream runoff during these rainfall events. Determination of total volumes of water being input and output through the watershed will allow us to calculate components of the water budget of Marsh Run and infer others. This research study will continue into the following academic year (2021-22).

40. Creating species specific eDNA probes for the aquatic invasive species (AIS) *Daphnia lumholtzi*

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Small AIS such as the African spiny waterflea (*D. lumholtzi*) can be unknowingly spread throughout the Great Lakes by ballast water of cargo ships. Invasive species have the potential to disrupt ecosystems, causing potentially serious economic and ecological issues. Developing a PCR or qPCR protocol to monitor the presence of AIS using eDNA can be a useful tool for rapid detection, tracking and preventing AIS spread. Before a protocol can be developed, reliable, species specific primers, must be designed. The focus of this project was to design a set of oligonucleotide primers with sufficient specificity to differentiate *D. lumholtzi* from all other species of *Daphnia*. Multiple primer set candidates were created for *D. lumholtzi* utilizing the rapid evolving, DNA barcoding gene Cytochrome Oxidase 1 (CO1). For species specificity, we created primers in highly variable regions which were found by comparing *D. lumholtzi* sequence to *Daphnia magna*, a very closely related species. Primer sets were tested for specificity with gDNA from *D. lumholtzi* and *D. magna* in PCR and qPCR assays. Results show that three of the four primer sets would consistently amplify *D. lumholtzi* but not *D. magna* using PCR but only one primer set would consistently amplify using qPCR. This primer set candidate is a strong option for the detection of *D. lumholtzi* in eDNA samples whether using PCR or qPCR. Primer sequences and working PCR / qPCR protocols are provided.

41. Evaluating environmental DNA as a Tool for Monitoring the Great Lakes and Ship's Ballast Water for the Invasive Species *Hemimysis anomala*

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Hemimysis anomala is an invasive species to the lower Great Lakes region that originated from the Black Sea and the Ponto-Caspian Sea and entered the Great Lakes region through the uptake and release of

ballast water from commercial ships. To prevent transport of this species to the upper lake region, environmental DNA (eDNA) has been proposed as a tool for monitoring harbor and ballast water. The objective of this experiment was to determine the length of time an eDNA signal from *H.anomala* is present within its environment after the organism dies or is removed. Six tanks with air bubblers were filled with 20 liters of lake water. Four of these tanks were test tanks exposed to dead organisms, and two tanks were control tanks that received no organisms. Triplicate samples were taken from each tank using a 0.45 µm filter periodically over 3 months. A DNA extraction kit with a modified protocol was used to extract DNA from the filters and a PCR protocol was followed to determine if eDNA from *H.anomala* was present at that timepoint. Results indicate that the eDNA was present at T0 (first time point after treatments were received) and T1, and it was not present at T2 and the succeeding timepoints. Overall, the eDNA signal from *H.anomala* was present for 24-48 hours after receiving the treatments. The knowledge that eDNA from *H.anomala* degrades rapidly is vital to confirming the species' presence as well as monitoring populations across the Great Lakes region.

42. Prevalence of *Rickettsia rickettsii* and *Borrelia Burgdorferi* in *D. variabilis* at Presque Isle State Park.

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Objectives: Rocky Mountain Spotted Fever (RMSF) is caused by *Rickettsia rickettsii*, transmitted by *Dermacentor variabilis*. While RMSF has historically been rare in Erie, County (EC) PA, recently there has been an increase in *D. variabilis* ticks found at Presque Isle State Park (PISP) in EC. Lyme Disease is caused by *Borrelia burgdorferi*. *B. burgdorferi* is transmitted by *Ixodes scapularis* ticks, but the increase in *D. variabilis* on PISP could allow this tick species to transmit *B. burgdorferi*. This study examines the prevalence of *R. rickettsii* and *B. burgdorferi* in *D. variabilis* ticks collected from PISP.

Methods: Questing *D. variabilis* ticks were collected by flagging throughout PI in May and June of 2021. After separation by morphology, ticks were individually crushed using a pestle followed by DNA extraction using chloroform/phenol. Presence of *D. variabilis* Internal Transcribed Spacer-2 gene (ITS-2) was confirmed by PCR. Positive samples were then tested for the *R. rickettsii* Outer Membrane Protein A (OmpA) and *B. burgdorferi* 16S ribosomal DNA.

Results: 26 adult *D. variabilis* ticks were tested from PISP. All were positive for ITS-2 DNA. However, all samples were negative for the *R. rickettsii* OmpA and *B. burgdorferi* 16S ribosomal DNA.

Conclusion: These results indicate the prevalence of *R. rickettsii* and *B. burgdorferi* in *D. variabilis* ticks from PISP is low to absent, therefore the risk of contracting RMSF or Lyme Disease from *D. variabilis* in this high tick prevalence area is low. Our future studies plan to examine larger number of ticks collected from PISP.

43. Comparison of *Borrelia burgdorferi* Carriage Rate in *Ixodes scapularis* Ticks Collected in a High and Low Tick Density Area

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Introduction: *Ixodes scapularis* ticks are the vector for transmission of *Borrelia burgdorferi*, the causative agent of Lyme disease. The carriage rate of *B. burgdorferi* in ticks found in Erie County, PA (EC) is higher than national averages, making EC an epidemic area for *B. burgdorferi*. Both the number of *I. scapularis* ticks and cases of Lyme disease are lower in Chautauqua County, NY (CC) as compared to EC. In this study we compared the prevalence of *B. burgdorferi* in *I. scapularis* ticks collected from EC and CC.

Methods: Ticks were collected from EC and CC between May 2021 and July 2021. DNA was extracted by crushing individual ticks followed by chloroform/phenol precipitation. For each tick tested, the

presence of tick and *B. burgdorferi* DNA was determined with specific PCR reactions followed by gel electrophoresis.

Results: A significantly higher number of ticks per hour were collected in EC (13.1 ticks/hr) compared to CC (0.63 ticks/hr, $p=0.00001$). *B. burgdorferi* DNA was detected in 45.7% (21 of 46) of ticks tested from EC and in 15.8% (3 of 19) of ticks collected from CC; this was statically different ($p=0.0267$).

Conclusion: These findings confirm the possibility of contracting Lyme Disease in both locations if proper protections and precautions are not taken to avoid tick exposure. The risk in EC remains higher than in CC based on the significantly higher carriage rate and number of ticks in the area.

44. Evaluating the interaction between oxidative stress management and insecticide susceptibility in *Chironomus dilutus*

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In the environment, organisms encounter both natural and synthetic stressors. Exposure to these stressors may or may not cause acute toxicity; regardless, the metabolism of toxins/toxicants often creates reactive oxygen species, which can induce oxidative stress. Oxidative stress alters a variety of physiological processes, which in turn may impact an organism's susceptibility to other environmental stressors. Although oxidative stress is known to induce the activity of enzymes that are involved in xenobiotic metabolism, the direct influence of this process on insecticide susceptibility is unknown. This study explores the relationship between oxidative stress and susceptibility to a common-use neonicotinoid insecticide, imidacloprid. Using lab cultures of *Chironomus dilutus*, the *in vitro* activity of glutathione-S-transferase (GST) was quantified before and after the induction of oxidative stress via paraquat exposure. Following these assays, acute toxicity tests were performed on second and fourth-instar *C. dilutus* larvae to determine the relationship between GST specific activity and insecticide sensitivity. The information gathered from this study will improve our understanding of the interplay between exogenous and endogenous stressors in the context of insecticide resistance.

45. Are you sure you want to eat that? Investigating Polychlorinated Biphenyl Concentrations in Lake Erie Fishes

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Lake Erie serves as an important commercial and recreational fishery for residents of Pennsylvania, yet consumption advisories for polychlorinated biphenyls (PCBs) exist for many commonly caught and consumed game species. With consumption limits set at one meal per month due to excessive PCB contamination, there exists large potential for dietary exposure of Pennsylvania anglers to PCBs. The risk associated with consumption of Lake Erie fishes, however, is unclear as little research exists regarding the effects of PCBs on human health when dietary exposures are considered. Therefore, the objective of the current research is to document PCB contamination within filets of common game species targeted by recreational anglers within Lake Erie. Extractions of PCBs from filets of walleye, freshwater drum, yellow perch, bluegill, and steelhead reveal concentrations of select PCBs ranging from 65.4 to 466.3 ng/g tissue. With tentative links to oncogenesis in humans, the PCB concentrations documented within fish filets will be used in cellular assays to better understand the role of dietary exposure of PCBs in effects on human health. The PCB concentrations determined to be present within filets of common recreational fish species will provided a clearer understanding of the exposure risk of Pennsylvania anglers to legacy contaminants, as well as document the potential human health effects resulting for such exposure.

46. Differences in Infections of Pennsylvania and West Virginia Ruffed Grouse (*Bonasa umbellus*) With *Ascarida* and *Heterakis* Nematodes, by Year, Age, and Sex

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Ruffed grouse (*Bonasa umbellus*) were collected from 21 counties in Pennsylvania, and from three counties in West Virginia during the last seven hunting seasons. Necropsies were performed and two species of nematodes were identified (not all specimens were identified to species), *Ascarida bonasae* from the intestines and *Heterakis isolonche* from the cecum. Overall infection rates with *Ascarida* have varied annually with a high of 64.7% in 2014 and a low of 29.6% in 2019. Individual mean infection with *Ascarida* were significantly lower during the 2016 and 2019 seasons than during the other 5 seasons. The infection rates of *Heterakis* have remained relatively constant throughout all seven seasons. Juvenile grouse had significantly greater mean infections of both *Ascarida* and *Heterakis* than did adult grouse. There was no significant difference in infection rates between the sexes. There was no significant difference in infections rate for either nematode between grouse collected in Pennsylvania and West Virginia.

47. Secretory carrier membrane protein 3's (SCAMP3) role in beta-Amyloid production and secretion

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Alzheimer's disease is a neurodegenerative disease associated with loss of memory and cognitive function. The aggregation of extracellular plaques containing β -amyloid is related to the processing of the amyloid precursor protein (APP). When endocytosed to the early endosome, APP will either be degraded by the lysosome or sent back to the *trans*-Golgi network. Degradation of APP is regulated by endosomal sorting complexes required for transport (ESCRTs). Disruption of ESCRT function leads to accumulation of β -amyloid. The secretory carrier membrane protein 3 (SCAMP3) interacts and opposes the function of the ESCRT proteins. We hypothesize then that SCAMP3 may regulate APP trafficking by promoting or inhibiting trafficking of APP to the lysosome. We will test this hypothesis using H4 neuroglioma cells stably transfected with APP-EGFP and examine the effects of RNA interference on SCAMP3 using two assays: (1) an immunofluorescence colocalization assay and (2) and ELISA assays. In the immunofluorescence assay, the cells will be fluorescently labeled with antibodies to the lysosomal proteins LAMP1/2 or the early endosomal protein EEA1. Colocalization of EGFP-APP with EEA1 and LAMP1/2 will be observed and quantitatively analyzed to determine the degree of colocalization. We then will use an ELISA assay to measure β -amyloid levels. We predict that if SCAMP3 promotes APP trafficking to the lysosome, then a knockdown of SCAMP3 will result in decreased colocalization of APP with lysosomal markers and increased intracellular accumulation of β -amyloid. If SCAMP3 inhibits APP trafficking to the lysosome, there will be increased colocalization on the lysosome and decreased β -amyloid accumulation.