WELCOME

Regional Science Consortium
16th Annual Research Symposium
November 4—6, 2020
Virtual Event – www.RegSciTV.com

Welcome… to the celebration of our 16th Annual Regional Science Consortium Research Symposium! It is hard to believe it has been 16 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 35 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 and Ohio, and even in South Africa. 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. Although an in-person Symposium was not possible, we are excited to offer our first VIRTUAL Symposium! Through a virtual platform we were able to have more presenters join us from a greater distance, increase our audience participation, and foster a greater awareness of the impressive research that is being conducted in this region. I am excited to report that the next three days will include a live-stream of 55 Oral Presentations, 24 Poster Presentations, and 2 evening presentations by our Guest Presenters. The purpose of the RSC Symposium is to provide a venue to present scientific research and awareness by our RSC researchers and partners. 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. Although we cannot be together in person this year, please take the time to tune in to the RSC YouTube Channel to listen to our presenters, ask questions, and share what you have learned with your colleagues.

Please visit www.RegSciTV.com to view presentation live according the schedule outlined in the proceedings. We encourage everyone to attend our Poster Session on Wednesday evening from 4:30 – 6:00, providing the opportunity to discuss the projects with the poster presenters. The Poster Session will take place on the platform Discord (www.discord.com) for a truly virtual and engaging experience. Please visit our website at www.regsciconsort.com/events/symposium for instructions to join the poster session.

I would like to thank all of 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 also like to thank our guest speakers, Jerry Skrypzak, David Frew, Brian Gula, and John Laskos, who will be discussing the unknown history and natural resources at Presque Isle State Park. A special *Thank You* to our Sponsors this year that value and supported this event. I would especially like to thank ETD Photography for making this event possible and the amazing RSC Team: Amber Stilwell, Jen Salem, Sean Dalton, and Sarah Magyan, for their hard work in making this event a great success... ***Thank you***!

I hope you all enjoy Symposium 2020!
Please mark your calendar for next year's Regional Science Consortium Research Symposium on November 3 – 5, 2021. Virtual or not, we'll come together in the interest of collaborative and innovative science.

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

PRESENTATIONS

Regional Science Consortium
16th Annual Research Symposium
November 4-6, 2020
Virtual Event – www.RegSciTV.com

This year we are excited to offer the RSC Research Symposium as a virtual event. Audience members can join from anywhere at any time to view live presentations, or visit the RSC YouTube Channel (www.RegSciTV.com) next week to view any presentations you might have missed.

Oral Presentations and Speed Talks

- Join at www.RegSciTV.com
- Audience members can ask the Presenter questions during live talks using the chat box

Poster Presentations

- Join using Discord
- Audience members can have live discussions about research projects with Poster Presenters
- See www.RegSciConsort.com/events/symposium for more details to join

Evening Guest Presentations

- Join at www.RegSciTV.com
- Audience members can ask the Presenter questions during live talks using the chat box

Presenters

- Join Zoom in the link provided in the acceptance email
- Audience members can ask questions during live talks using the chat box on YouTube
- The Session Chair will relay questions to Presenters

JERRY COVERT STUDENT RESEARCH AWARDS

Regional Science Consortium
16th Annual Research Symposium
November 6th, 2020, 1:00-1:30pm
Virtual Event – www.RegSciTV.com

Presented to those students demonstrating excellence in scientific research and presentation.

Chosen by the RSC Annual Research Symposium Faculty 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 live at www.RegSciTv.com

Award recipients will be asked to join via Zoom prior to the event.

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16th Annual Research Symposium
November 4-6, 2020
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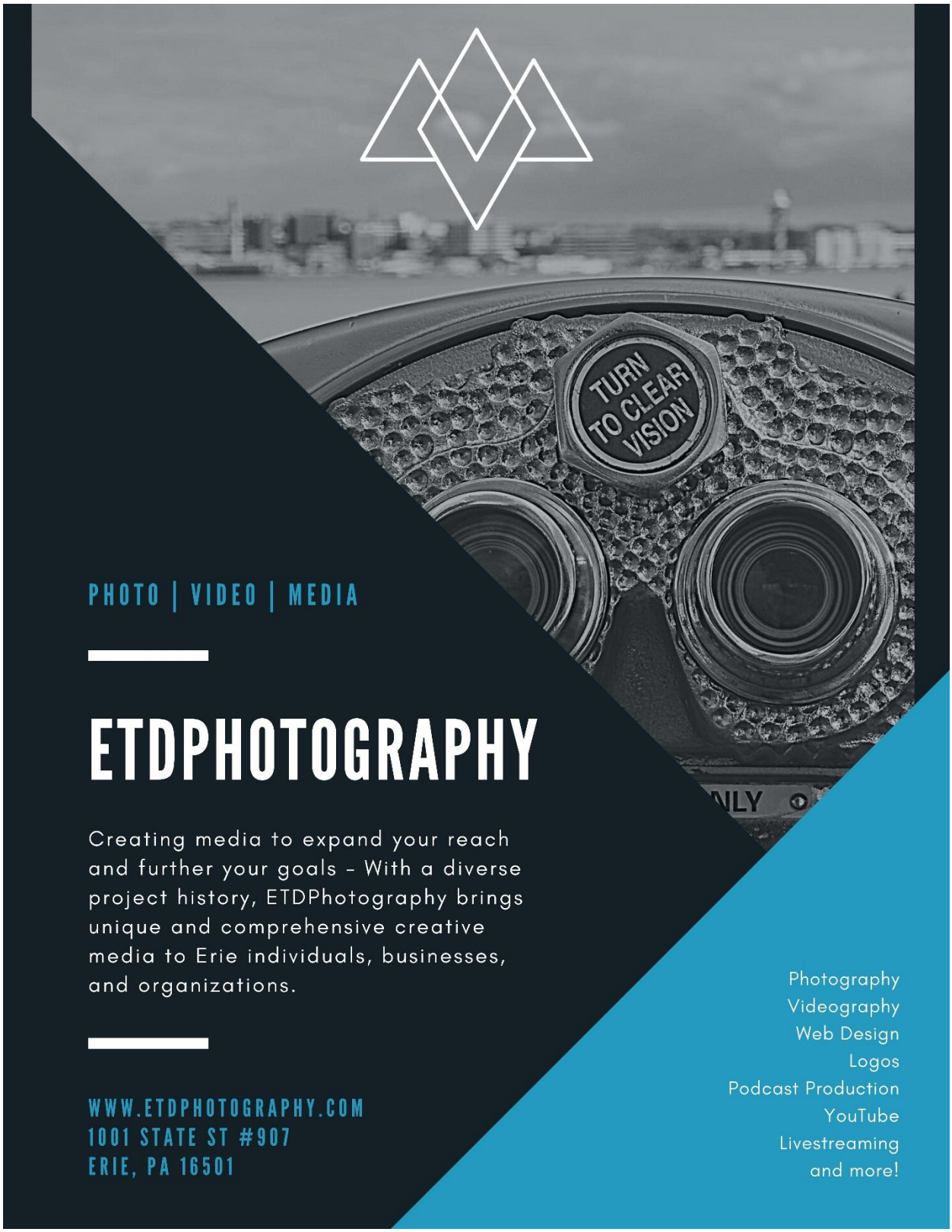
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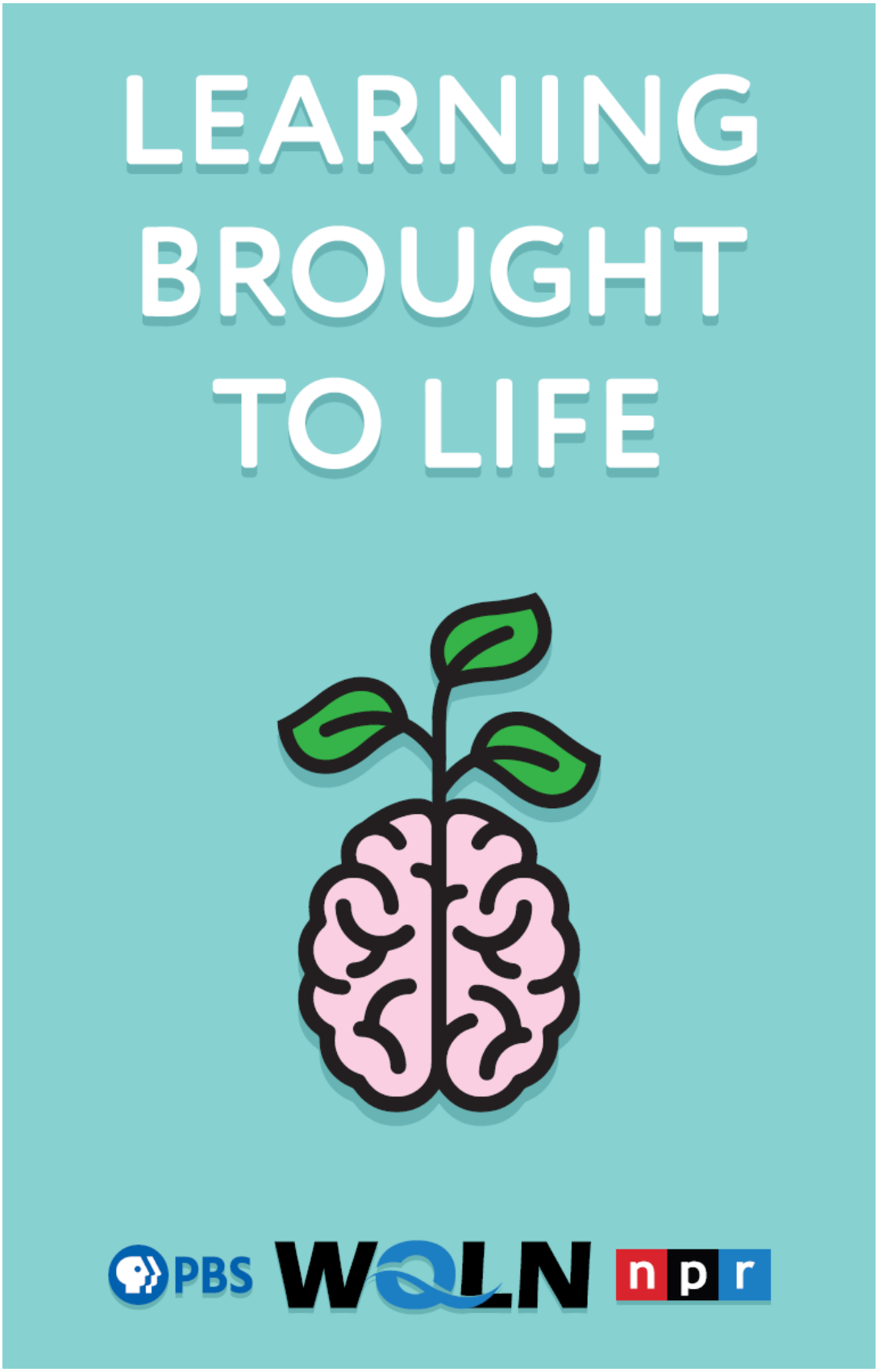
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SCHEDULE OF TALKS

Regional Science Consortium
16th Annual Research Symposium
November 4-6, 2020
Virtual Event – www.RegSciTV.com

WEDNESDAY, NOVEMBER 4, 2020

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

Presentations

Session Chair: RSC Staff

10:10 – 10:30 **Unsolved mysterysnails**
Lynne Beaty*, Adam Simpson, and Sam Nutile
Penn State Erie – The Behrend College

10:30 – 10:50 **The Effect of Coverboard Array Design on the Probability of Amphibian Detection**
Joey Forish*+, Brianna Peyton*+, and Lynne Beaty, Penn State Behrend

10:50 – 11:10 **America's Next Top Models: Using Integral Projection Models to Evaluate Data Availability and Sensitivity of Two Invasive Snail Species**
Cassidy Ulanowicz*+ and Lynne Beaty
Biology Department, Penn State Erie – The Behrend College, Erie, PA 16563

11:10 – 11:30 **Evaluating the detection of predators at river otter (*Lontra canadensis*) latrines in Northwestern Pennsylvania**
Isabela Petronka*+, Allegheny College student
Kelly Pearce, Allegheny College professor

11:30 – 11:40 **The use of Erie Marsh Dominant areas in Erie County, PA by Waterfowl during breeding and migrating seasons**
Bailey Crable*+, Mercyhurst University
Speed Talk

11:40 – 11:50 **Wild Bee Species Diversity Supported in a Conventional Soybean Field Located in Crawford County, Pennsylvania**
Isabella Petitta*+, Allegheny College Student
Advised by Beth Choate, Allegheny College, Environmental Science and Sustainability Department
Speed Talk

11:50 – 12:00 **Predicters of Success in MCGA Community Gardens**
Julie Webster*+
Speed Talk

12:00 – 12:30 **LUNCH**

Session Chair: RSC Staff

12:30 – 12:50 **How does the non-native invasive periwinkle *(Vinca minor)* outcompete native species**
SudiWang*+ and Jonathan Titus, Biology Dept., SUNY-Fredonia, Fredonia, NY 14063

12:50 – 1:10 **Investigating the Role of Invasive Species in the Introduction of Heavy Metal Toxicants**
Sage Grenz*+, Samuel Nutile
Penn State Erie, The Behrend College, Erie, PA, USA 16563

1:10 – 1:20 **Natural history of the *Syringa reticulata*, Japanese tree lilac, and the costs and benefits of its use in landscaping**
Meaghan Adams*+, student, University of Pittsburgh at Bradford
Nicholas Thompson*+, student, University of Pittsburgh at Bradford
Mary Mulcahy, associate professor of biology, University of Pittsburgh at Bradford
Denise Piechnik, associate professor of biology, University of Pittsburgh at Bradford
Ovidiu Frantescu, director and assistant professor of petroleum technology, University of Pittsburgh at Bradford
Speed Talk

1:20 – 1:30 **Testing Hypotheses about the Invasiveness of *Syringa reticulata*, Japanese tree lilac, on the University of Pittsburgh at Bradford Campus**
Samantha Kircher*+, student, University of Pittsburgh at Bradford
Errion Holness*+, student, University of Pittsburgh at Bradford
Mary Mulcahy, associate professor of biology, University of Pittsburgh at Bradford
Denise Piechnik, associate professor of biology, University of Pittsburgh at Bradford
Ovidiu Frantescu, director and assistant professor of petroleum technology, University of Pittsburgh at Bradford
Speed Talk

1:30 – 1:40 **Designing a study to address how popular and common *Syringa reticulata*, Japanese tree lilac, is as a consumer product at Pennsylvania nursery, landscape, and retail garden businesses**
Amaya Lovoz*+, student, University of Pittsburgh at Bradford
Mary Mulcahy, associate professor of biology, University of Pittsburgh at Bradford
Denise Piechnik, associate professor of biology, University of Pittsburgh at Bradford

Ovidiu Frantescu, director and assistant professor of petroleum technology, University of Pittsburgh at Bradford
Speed Talk

1:40 – 1:50 **BREAK**

Session Chair: RSC Staff

1:50 – 2:10 **RSC Online Education Initiative: Addressing COVID-19**
Sarah Magyan, B.S.*, Jeanette Schnars, Ph.D.
Regional Science Consortium, Erie PA, 16505

2:10 – 2:30 **Impacts of COVID-19 to Education**
Drew Mortensen*, Assistant Principal – Harbor Creek Senior High School

2:30 – 2:50 **How to Connect with the Community Without Large Group Activities**
Kristen Currier*, Erie County Conservation District

2:50 – 3:10 **Presque Isle State Park COVID-19 Teaching Strategies**
Anne Desarro*, Environmental Education Specialist Supervisor
Ray Bierbower*, Environmental Education Specialist, PA DCNR

3:10 – 3:30 **STEM/Science during Hybrid Learning**
Ryan Bookhamer*, Fairview School District

3:30 – 3:50 **Lessons Learned, Remote Instruction for Students with Special Needs**
Jeff Zibelman*, Barber National Institute

3:50 – 4:10 **Engaging Elementary School Students During a Pandemic**
Connor MacKelvey*, Iroquois Elementary School

4:10 – 4:20 **Classroom Instruction in a Corona Climate**
Ben Tost*, Fort LeBeouf School District
Speed Talk

4:20 – 4:30 **BREAK**

4:30 – 6:00 **POSTER SESSION**
Join virtually on Discord!
Go to www.discord.com, create an account, and join using the link: https://discord.gg/XUM9GuS
More detailed instructions can be found at www.regsciconsort.com/events/symposium

6:00 – 6:30 **BREAK**

6:30 – 7:30 **GUEST SPEAKERS**

Accidental Paradise: *A Natural, Political and Social History of Presque Isle*
David Frew & Jerry Skrypzak

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

Presentations

Session Chair: RSC Staff

10:10 – 10:30 **Selection preference in *Hyalella azteca*: Development of a behavioral assay for ecotoxicology**
Pooja Metha*+, Kyle Deloe, Adam Simpson, Samuel Nutile
Penn State Erie, The Behrend College, Erie, PA, USA 16563

10:30 – 10:50 **Environmental DNA for Early Detection of Ballast-Mediated Invaders in the Great Lakes**
Ivor Knight*, Allegra Cangelosi, Noel Moore, Emily Dobry, Kyle Deloe, Matthew Gruwell. Penn State Erie, The Behrend College

10:50 – 11:10 **Environmental contextualization of urea toxicity in aquatic environments**
Sydnee White*+, Kristen Honhart, Samuel Nutile
Penn State Erie, The Behrend College, Erie, PA, USA, 16563

11:10 – 11:20 **Developing Artificial Manganese Porphyrin Proteins Encased in a Silica Sol-Gel for Sulfoxidation Reactions**
Mary Grace I. Galinato*, Aaron Trail (Student), and Ashley Lombardo (Student)
School of Science – Chemistry, Penn State Behrend, Erie, PA 16563
Speed Talk

11:20 – 11:50 **LUNCH**

Session Chair: RSC Staff

11:50 – 12:10 **Growth Rates and Catch Per Unit Effort of Yellow Perch (*Perca flavescens*) and White Perch (*Morone americana*) in Presque Isle Bay, 2016-2019**
Greg Andraso*, Chris Dempsey, Michelle Kuns, Nolan Pyle
Biology Department, Gannon University

12:10 – 12:30 **The effect of tail and body area on swimming kinematics in fish**
Truman[1], A. C., Gehman[2], A. J., Warren[3], M. J. and Anderson[4,5], E. J.*
[1]Department of Mathematics, Youngstown State University
[2]Department of Biomedical Engineering, Carnegie Mellon University
[3]Department of Biology, Grove City College
[4]Department of Mechanical Engineering, Grove City College
[5]Department of Applied Ocean Physics and Engineering (guest investigator), Woods Hole Oceanographic Institution

12:30 – 12:50 **Potential impact of toxicants on White Perch, *Morone americana*, a key species of New Jersey estuaries**
Jessica Briggs*+
Pennsylvania State University – University Park
Research Institution: National Marine Fisheries Service, Northeast Fisheries Science Center at Sandy Hook
National Oceanic and Atmospheric Administration (NOAA)

12:50 – 1:10 **A Harmful Algal Bloom Update from the Regional Science Consortium**
Amber R. Stilwell, M.S.*, S. Dalton, S. Magyan, J. Schnars, Ph.D.
Regional Science Consortium

1:10 – 1:20 **Predation response to chemosensory and visual cues in wild vs. cultured Chesapeake Logperch (*Percina bimaculata*)**
Madison Betts*+, Jay Stauffer Jr, Sara Mueller, Casey Bradshaw-Wilson
Speed Talk

1:20 – 1:30 **The economic effects of Zebra Mussels (*Dreissena polymorpha*) on businesses in the City of Erie, Pennsylvania**
Steven M. Spotts*+ and Kelly Pearce
Speed Talk

1:30 – 1:40 **Using historic records and habitat suitability analysis for the reintroduction of Lake Sturgeon (*Acipenser fulvescens*) in Lake Erie tributaries: Preliminary findings**
Kylie Wirebach*+, Allegheny College
Speed Talk

1:40 – 1:50 **BREAK**

Session Chair: RSC Staff

1:50 – 2:10 **Ducks Unlimited Pennsylvania Conservation Overview**
Jim Feaga*, Regional Biologist, Ducks Unlimited, Inc.

2:10 – 2:30 **A Resource Management Overview – 2020 Season at Presque Isle State Park**
Holly Best, M.A.*, Park Manager 3
Presque Isle State Park, Tom Ridge Environmental Center
301 Peninsula Drive, Suite 1, Erie, PA 16505

2:30 – 2:50 **Plant Propagation for Wetland Restoration on Presque Isle State Park**
Jen Salem*, Program Director, Go Native Erie!
Regional Science Consortium, Tom Ridge Environmental Center
301 Peninsula Drive, Suite 9, Erie, Pa 16505

2:50 – 3:10 **Monitoring Surveys in Priority Wetland Restoration Areas on Presque Isle State Park**
Amber R. Stilwell, M.S.*, S. Dalton, S. Magyan, J. Schnars, Ph.D.
Regional Science Consortium

3:10 – 3:30 **Waterbird Monitoring at Presque Isle State Park**
Sarah Sargent*, PhD. Erie Bird Observatory
Connor Vara, Erie Bird Observatory

3:30 – 3:50 **Summer bat communities in Presque Isle State Park**
K.J. Pearce*, Allegheny College, Department of Environmental Science and Sustainability
Sarah Till, Gannon University, Department of Biology
Katherine Brozell, Allegheny College, Department of Environmental Science and Sustainability
Bailey Kozalla, Allegheny College, Department of Environmental Science and Sustainability
Matthew Lazusky, Allegheny College, Department of Biology

3:50 – 4:10 **Aerial Drone Surveys of Shoreline Change and Primary Wetland Habitats on Presque Isle State Park, Erie, PA**
Sean Dalton*, A. Stilwell, S. Magyan, J. Schnars, Ph.D.
Regional Science Consortium

4:10 – 4:20 **BREAK**

Session Chair: RSC Staff

4:20 – 4:40 **Excitotoxic effects on development of auditory brainstem neuron morphology and function**
Hasan Alhelo*+, Weam Altaher, Devon Chosky, Randy Kulesza PhD
Lake Erie College of Osteopathic Medicine

4:40 – 5:00 **Investigation of a Long-Range Glycinergic Projection from Brainstem Interneurons to the Thalamus**
Alyson Burchell*+, Yusra Mansour, Randy Kulesza PhD
Auditory Research Center, Lake Erie College of Osteopathic Medicine (LECOM)

5:00 – 5:10 **The Effect of Drawing Microbiology Concepts on Short-term Retention Before and After Interrupted Learning**
Robert Waters MS*+, Mark A.W. Andrews Ph.D. FNAOME, Jennifer McBride Ph.D., Delbert Abi Abdallah Ph.D., Nancy Carty Ph.D., Christopher C. Keller Ph.D. FNAOME
Speed Talk

5:10 – 5:20 **Potential Discovery of New Antibiotics in Soil**
Lauryn Avery*+, Rylee Jackson, and Michelle M. Valkanas
Speed Talk

5:20 – 5:30 **Antibiotic Resistance in Environmental Bacteria**
McKayla Kling*+, Abigale King, and Michelle M. Valkanas
Speed Talk

5:30 – 5:40 **Uncovering innovative antibiotic-producing bacteria from soil samples**
Heaven Cole*+, Hunter Patterson, and Michelle M. Valkanas
Speed Talk

5:40 – 5:50 **The Contribution towards Antibiotic Discovery through Bacteria in Soil collected in Western Pennsylvania**
Abbie Reichelderfer*+, Raelynne Grabill*+, and Michelle M. Valkanas
Speed Talk

5:50 – 6:00 **Undergraduate Research of the Antibiotic Crisis**
Kendall Leake*+, Alex Lere, and Michelle M. Valkanas
Speed Talk

6:00 – 6:30 **BREAK**

6:30 – 7:30 **GUEST SPEAKERS**
Resource Management at Presque Isle State Park
Brian Gula & John Laskos
Pennsylvania DCNR Environmental Education Specialists

FRIDAY, NOVEMBER 6, 2020

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

Presentations

Session Chair: RSC Staff

9:10 – 9:30 **Application of stable oxygen isotopes to aid in refinement of origin for an unidentified individual**
Leslie Fitzpatrick*, Mercyhurst university

9:30 – 9:50 **A Geomorphometric Study on Sex Estimation of the Pelvis on Skeletal Remains: A Pilot Study**
Emily Brooks*+, Theresa De Cree*+, Nora Butterfield, and Luis Cabo-Perez

9:50 – 10:00 **A Pilot Study on 2D and 3D Image Distortion: A Forensic Anthropological Approach**
By Emily Brooks, Theresa De Cree, Victoria Lamond*+, Samantha LaFrance*+, Colleen Peters, Luis Cabo-Perez
Speed Talk

10:00 – 10:10 **The Importance of Recognizing the Indicators of Vulture Scavenging in Forensic Anthropology: A Case Study from Central Pennsylvania**
Kristine A. Kortonick, B.S.*+, Anthony V. Lanfranchi, B.S.*+, Luis L. Cabo, M.S.
Department of Applied Forensic Sciences, Mercyhurst University
Speed Talk

10:10 – 10:20 **BREAK**

Session Chair: RSC Staff

10:20 – 10:40 **Sand Provenance Across the White River Badlands Toward the Nebraska Sand Hills**
Colton Byers[1]*+, BURKHART, Patrick A.[1], BALDAUF, Paul[2], LIVINGSTON, Jack [1], PEET, Ellis[1], MCCLINTON, Brett[1], (1)Geography, Geology, and the Environment, Slippery Rock University, 1 Morrow Way, Slippery Rock, PA 16057, (2) Halmos College of Natural Sciences, Nova Southeastern University, 3301 College Avenue, Fort Lauderdale, FL 33314, (3)Dept. of Physical & Environmental Sciences, Colorado Mesa University, 1100 North Avenue, Grand Junction, CO 51801-3122

10:40 – 11:00 **Deglaciation of the southeast margin of the Laurentide Ice Sheet in northeast Pennsylvania**

[1]FINKENBINDER, Matthew S.*, [2]ADAMSON, Kathryn, R., [3]LANE, Timothy, P., [1]FORTUNE, Angus F., [1]DELPAIS, Michael J., [1]PAPP, Casandra, [1]BARATTA, Daniel D, [4]MONTEATH, Alistair, J.
[1] Environmental Engineering and Earth Sciences, Wilkes University, USA
[2] Natural Sciences, Manchester Metropolitan University, UK
[3] School of Biological and Environmental Sciences, Liverpool John Moores University, UK
[4] Geography and Environmental Science, University of Southampton, UK

11:00 – 11:20 **Insect Diversity on Two Urban Green Roofs on the Campus of Gannon University**

Nathan Maietta*+, Gannon University
Skyler Sevacko*+, Gannon University
Dr. Steven J. Ropski, Gannon University

11:20 – 11:30 **The Impact of Simulated Acid Rain on Soil-Dwelling Invertebrate Communities**

Ray Marszalek*+
Speed Talk

11:30 – 11:40 **Summer 2020 survey of owls of Erie County**

J. Michael Campbell*, Mercyhurst University
Speed Talk

11:40 – 12:00 **Forest change in four swamps and the College Lodge and Campus Woodlot in Chautauqua County**

Jonathan Titus*, Biology Dept., SUNY-Fredonia, Fredonia, NY 14063

12:00 – 1:00 **LUNCH**

1:00 – 1:30 **JERRY COVERT STUDENT AWARDS**

Jeanette Schnars, Ph.D., Executive Director, RSC
Student Award Presentations
Closing Remarks

ABSTRACTS

Regional Science Consortium
16th Annual Research Symposium
November 4-6, 2020
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ORAL PRESENTATIONS

Wednesday, November 4, 2020

Unsolved mysterysnails

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. Presque Isle State Park, located along the shore of Lake Erie, is an important waypoint for migrating birds and currently home to three invasive, nonindigenous freshwater snail species: New Zealand mud snails (*Potamopyrgus antipodarum*), faucet snails (*Bithynia tentaculata*) and Chinese mysterysnails (*Cipangopaludina chinensis*), all of which have the potential to negatively impact the coastal ecosystems of Lake Erie. In addition, another invasive snail species that is morphologically indistinguishable from the Chinese mysterysnail – the Japanese mysterysnail (*Cipangopaludina japonica*) - has also been detected in other areas of Lake Erie and Western PA. To date, basic information about these invasive populations is unknown, which makes it difficult to assess the threat of invasive snails to Presque Isle State Park, Lake Erie, and Western PA. Here we present the results of two years (2019-2020) of field sampling for these invasive snail species and speculate as to potential drivers of variation in distribution and abundance. We also discuss additional future and on-going projects involving these species.

The Effect of Coverboard Array Design on the Probability of Amphibian Detection

Joey Forish*+, Brianna Peyton*+, and Lynne Beaty, Penn State Behrend

Coverboards attract amphibians and other animals to seek refuge underneath them, where they can then be captured or observed without disturbing the natural cover and vegetation. This method offers several potential advantages as a sampling technique. For example, coverboards require less maintenance and sampling effort compared to other trapping mechanisms. It is unknown, however, how the design of coverboard arrays influences which species choose to live under the boards and how often researchers can find different species. In this study, we aimed to determine if the detection probability and occupancy of different amphibian species are affected by the spatial organization of coverboard arrays, including how close the boards are together and the density of boards, at three sites across Behrend's campus. We also observed how abiotic factors, including soil temperature, pH, and moisture, influenced amphibian detection probability and occupancy. We will discuss our results during the presentation. We hope our research results will fulfill the gap between the distribution of coverboards and the detection of amphibian species. Additionally, our findings can provide valuable information on how some amphibian species spatially organize themselves and have implications for how their spatial organization may impact the effect of disease, human habitat alteration, or predator stress.

America's Next Top Models: Using Integral Projection Models to Evaluate Data Availability and Sensitivity of Two Invasive Snail Species

Cassidy Ulanowicz*+ and Lynne Beaty
Biology Department, Penn State Erie – The Behrend College, Erie, PA 16563

Two invasive snail species, the Chinese mysterysnail (*Cipangopaludina chinensis*) and the Japanese mysterysnail (*Cipangopaludina japonica*), are nearly identical. While they may look alike, their life histories are dissimilar, which could cause them to have different impacts on invaded ecosystems as their populations grow and expand in range. What is more, it is unknown how much data exists to estimate the life history parameters of each species and what methods might be employed to most efficiently and effectively control their invasive populations. To address these gaps, we created an integral projection model for each species and conducted a sensitivity analysis to determine the most influential parameters. To create the population models, we reviewed the literature to find demographic parameter estimates for both species. We then used the estimated parameters to construct our integral projection models. We conducted a sensitivity analysis to determine which life stages have the most substantial effect on population size for each species by increasing and decreasing each parameter by 50%, 20%, and 10% and quantifying their relative impacts on estimated population size. We found that the most important parameter for both the Chinese and Japanese mysterysnail was adult survival, particularly during winter months. Data on survival rates of adult and juvenile Chinese and Japanese mysterysnails, however, is generally lacking and should be the focus of future studies. Our study provides insight to help guide future studies on these species and help target control efforts.

Evaluating the detection of predators at river otter (*Lontra canadensis*) latrines in Northwestern Pennsylvania

Isabela Petronka*+, Allegheny College student,
Kelly Pearce, Allegheny College professor

River otters (*Lontra canadensis*) are semi-aquatic mammals that can be found throughout most of North America. Otters scent mark in areas along shorelines where they deposit feces, urine, and glandular secretions. These areas, called latrines, have a strong and persistent odor. It is speculated that this may serve as an olfactory cue that attracts predators and other carnivores. This study was conducted at the Erie National Wildlife Refuge between January and March 2020 for a total of 57 trap days. Two Cuddeback Attack and Cuddeback C-Series (white flash, black flash, and infrared models) 20.0-megapixel camera traps were placed at latrines to determine the latency of detectability of predators after river otter activity. In addition to river otters, the red fox (*Vulpes vulpes*), coyote (*Canis latrans*), and fisher (*Martes pennanti*) were also detected. We found that the average latency of detection of a predator species after an otter detection was 25.52 hours. When the detections were within 24 hours of each other, the average length between otter and predator detection was 14.55 hours. This evidence suggests that predators may be attracted to the scent of river otter latrines. Predators are often elusive and difficult to detect. Since they are attracted to river otter latrines, latrines could be targeted as attractants for predator studies.

The use of Erie Marsh Dominant areas in Erie County, PA by Waterfowl during breeding and migrating seasons

Baily Crable*+, Mercyhurst University

Three marsh areas of central Erie County were visited during the waterfowl breeding season, between June 1st and August 31st 2020, including one trip to State Game Land 218, six visits to the West Branch of French Creek Conservation Area, and 13 visits to the Lake Pleasant Conservation area. On those visits, the only waterfowl species spotted included Canada goose (*Branta Canadensis*), Mallard duck (*Anas platyrhynchos*), Wood duck (*Aix sponsa*), and Common loon (*Gavia immer*). Reports of Common loon by myself and others on lake Pleasant near the end of the spring migration period ended during the first week of June, so this species did not breed there. With continued observations in the coming months, I expect to find more abundant and diverse waterfowl at these three locations during the migration

seasons. On my 11 visits to Lake Pleasant Conservation Area during September 2020, I documented repeated presence of Wood duck, Double-crested cormorant (*Phalocrocorax auritus*) and Bald eagle (*Haliaeetus leuococephalus*).

Wild Bee Species Diversity Supported in a Conventional Soybean Field Located in Crawford County, Pennsylvania

Isabella Petitta*+, Allegheny College Student
Advised by Beth Choate, Allegheny College, Environmental Science and Sustainability Department

Conventional agriculture and crop intensification can be detrimental to wild bee populations as their populations have declined due to synthetic pesticide use and habitat destruction; however, there is a lack of research that identifies wild bee abundance, richness, and diversity in conventional, no-till agricultural fields. This study will investigate the abundance, richness, and diversity of wild bees in a conventional, no-till soybean field in Meadville, PA and provide a framework of bee species present. Wild bee populations will be assessed by examining samples that were collected by a former Allegheny College student in her uncompleted project, Evaluating Wild Bee Populations in Soybean Agriculture. Bees will be identified to species with the use of taxonomic keys to allow for statistical analysis. Wild bee abundance, richness, and diversity will be determined with the use of ANOVA testing and a diversity index. It is hypothesized that the greatest mean species richness and diversity will be found at exterior field sites due to the proximity of alternate plant resources. A lack of wild bee abundance, richness, and diversity in a conventional, no-till soybean field can demonstrate the possible impact of domesticated agricultural areas on wild bee communities and determine the urgency to conserve wild pollinators.

Predicters of Success in MCGA Community Gardens

Julie Webster*+

Food deserts are residential areas with limited access to fresh and healthy food options and are often correlated with the income and racial demographics of particular neighborhoods. There are a number of different ways to determine whether a particular area is a food desert, but the basic idea is limited access which is related to a number of health disparities including diabetes and heart disease. And even though discount stores like Dollar General have recognized this disparity in access to food, their presence in food deserts only worsens the problem because prepackaged and junk food further contributes to malnutrition and obesity.

Community gardens provide fresh, safe, and affordable produce which promotes an increased sense of health and wellbeing. These gardens are especially helpful in food deserts and provide the added bonuses of community belonging and investment in the neighborhood. One such food desert – downtown Marion, IN – decided to combat its regional food poverty by establishing the Marion Community Gardens Association (MCGA) which organized its first plot in 2010 in partnership with the Marion Public Library. The MCGA peaked with 8 plots in 2010, but only had 2 operational sites by 2019. This study is a collaboration between the Marion Community Gardens Association, the Community Foundation of Grant County, the John Wesley Honors College, and the Departments of Natural Science and Design at Indiana Wesleyan University with the goal of comparing successful and failed gardens and helping the MCGA better target sites for future gardens and promote success of current ones.

How does the non-native invasive periwinkle *(Vinca minor)* outcompete native species

SudiWang*+ and Jonathan Titus, Biology Dept., SUNY-Fredonia, Fredonia, NY 14063

Periwinkle *(Vinca minor)* is a decumbent evergreen invasive plant species. The purpose of this research is to understand the impact of periwinkle on our native forest understory species and the mechanisms it uses to outcompete these species. In 16 4m 2 plots in dense periwinkle and 16 non-periwinkle plots richness, diversity, cover, canopy cover, slope and aspect were assessed in the spring and summer. In the lab soil moisture, nitrogen, pH, organic matter and mycorrhizal inoculum potential (MIP) were measured

in each plot. MIP is determined by planting corn in soil and examining the corn roots for % mycorrhizal colonization. This indicates the amount of mycorrhizal fungi in the soil. Seeds of zigzag goldenrod *(Solidago flexicaulis)* and yellow giant hyssop *(Agastache nepetoides)* were planted in the plots and in soil from the plots to compare germination, however germination was zero in all cases but will continue to be tracked. Soil from half the plots was spread out in flats in the greenhouse and observed for >3 months to compare the seedbank between periwinkle and non-periwinkle plots. Periwinkle leaf extracts were made to assess allelopathic effects on corn seedlings. Comparison of periwinkle and non-periwinkle plots will yield information about the effects of this invasive and possible mechanisms for its competitiveness.

Investigating the Role of Invasive Species in the Introduction of Heavy Metal Toxicants

Sage Grenz*+, Samuel Nutile
Penn State Erie, The Behrend College, Erie, PA, USA 16563

Presque Isle State Park located in Erie, PA is both a large tourist attraction and home to a diverse community of organisms that are interdependent upon one another in order to survive. Given Presque Isle's location along Lake Erie, it is susceptible to the introduction of invasive species, one being *Cipangopaludina chinensis*. Invasive species are known to degrade the overall quality of an ecosystem by outcompeting native species for resources, leading to their endangerment or extinction, in turn reducing the biodiversity of the ecosystem. It is not entirely known, however, the role invasive species play in the spread of pollutants, such as metals, within an ecosystem. The objective of this study is to gain insight on how invasive species contribute to the bioaccumulation of metal toxicants within an ecosystem by analyzing metal concentrations in *C. chinensis*, sediment, and water samples from Presque Isle via microwave digestion and ICP-MS. Lead has already been detected in sediment samples at concentrations of over 47 parts per billion. Tissue samples from snails collected in these areas are currently being processed to determine how these metals are being transferred to invasive snails. Pollution of Presque Isle with metal toxicants could not only be degradative to the ecosystem but reduce the recreational value of the State Park. Understanding the role of invasive species in the introduction of metal toxicants is imperative in combating the spread of these toxicants and minimizing harm to the surrounding ecosystem.

Natural history of the *Syringa reticulata,* Japanese tree lilac, and the costs and benefits of its use in landscaping

Meaghan Adams*+, student, University of Pittsburgh at Bradford
Nicholas Thompson*+, student, University of Pittsburgh at Bradford
Mary Mulcahy, associate professor of biology, University of Pittsburgh at Bradford
Denise Piechnik, associate professor of biology, University of Pittsburgh at Bradford
Ovidiu Frantescu, director and assistant professor of petroleum technology, University of Pittsburgh at Bradford

Syringa reticulata, Japanese tree lilac, is being used and sold as a landscaping species in the United States. The tree has showy and fragrant inflorescences that bloom in mid to late summer. The species is regarded as easy to grow and maintain. At the University of Pittsburgh at Bradford, Japanese tree lilac has escaped cultivation and naturalized along the Tunungwant stream that borders the campus property, with some individuals being quite large with ample seed production. This presentation will describe the natural history of this species, with special attention to the value and costs of this species as a municipal landscaping choice.

Testing Hypotheses about the Invasiveness of *Syringa reticulata,* Japanese tree lilac, on the University of Pittsburgh at Bradford Campus

Samantha Kircher*+, student, University of Pittsburgh at Bradford
Errion Holness*+, student, University of Pittsburgh at Bradford
Mary Mulcahy, associate professor of biology, University of Pittsburgh at Bradford
Denise Piechnik, associate professor of biology, University of Pittsburgh at Bradford

Ovidiu Frantescu, director and assistant professor of petroleum technology, University of Pittsburgh at Bradford

One of the most challenging threats to an ecosystem are invasive plants. *Syringa reticulata*, Japanese tree lilac, is a popular landscaping plant because of its showy flowers, availability, cheap price, and easy propagation. The Japanese tree lilac may have invasive potential, especially in riparian habitats. Students and professors from the University of Pittsburgh at Bradford have made over 40 observations in iMapInvasives of escaped and naturalized individuals of this species, mostly along the Tunungwant stream (also called "Tuna Creek"). In this presentation, we will explore ways to test hypotheses about whether the seeds of this tree are dispersing via the stream and whether the tree is more problematic in riparian than other types of habitats.

Designing a study to address how popular and common *Syringa reticulata*, Japanese tree lilac, is as a consumer product at Pennsylvania nursery, landscape, and retail garden businesses

Amaya Lovoz*+, student, University of Pittsburgh at Bradford
Mary Mulcahy, associate professor of biology, University of Pittsburgh at Bradford
Denise Piechnik, associate professor of biology, University of Pittsburgh at Bradford
Ovidiu Frantescu, director and assistant professor of petroleum technology, University of Pittsburgh at Bradford

Naturalized populations of the exotic plant *Syringa reticulata*, Japanese tree lilac, have recently been documented on the Pitt-Bradford campus along the Tunungwant stream. Japanese tree lilac may be invasive, and yet, like other exotic invasive plants such as burning bush, *Euonymus alatus*, the Japanese lilac tree is likely widely sold to landscapers and the pubic at many garden centers and plant nursery businesses in Pennsylvania. How might students design research projects to gather and compare the popularity and frequency of the sale of this and other invasive exotic plants? How could student research be combined with approaches to educate and change patterns of the sale and use of invasive plants locally?

RSC Online Education Initiative: Addressing COVID-19

Sarah Magyan, B.S.*, Jeanette Schnars, Ph.D.
Regional Science Consortium, Erie PA, 16505

The Regional Science Consortium has developed and implemented an entirely new online education initiative to address challenges and limitations posed by the COVID-19 pandemic. This initiative provides both hands-on and descriptive lessons in a wide range of scientific topics including but not limited to bacteria, harmful algal blooms, herpetology, pollinators, stormwater runoff and weather. Each lesson includes a narrated presentation, video, introduction, activity instructions, student worksheet, teacher guide, and Skype with a Scientist session. These lessons allow the RSC to continue to provide high quality educational experiences to our members, broaden our reach to long-distance members, and feature local research while remaining within COVID-19 restrictions.

Impacts of COVID19 to Education

Drew Mortensen*, Assistant Principal – Harbor Creek Senior High School

Science, data, guidelines, risk management, and numerous other considerations have converged at the intersection of public education during the COVID-19 pandemic. Parents, educators, administrators, boards, and every other connected member of education have had to reevaluate historical methods and procedures to determine viability and efficacy in light of the personal and community needs. Furthermore, in a dynamic system where the variables are shifting on a weekly, and sometimes daily, basis, there is a significant need for an adaptable and highly mobile education.

The support structures necessary to create a high quality and portable education have been progressively developed over the past several decades, however those systems were never load tested at anywhere near the scale that has occurred since March 2020. Consequently, there is a significant need to analyze, reflect,

and adjust based on the progressively evolving data. This session will discuss some of the impacts and emerging trends in education as a result of COVID-19.

How to Connect with the Community Without Large Group Activities

Kristen Currier*, Erie County Conservation District

As the programming for the Erie County Conservation District hinges on outdoor and group experiences, the onset of a global pandemic immediately sent us to brainstorming sessions on how to continually reach out with education to the community. Through a balanced mix of digital media, social media, and COVID-safe, outdoor, socially distant activities, the District has found that we are able to connect with the community in a whole new variety of ways. While we miss spending time face-to-face with our educational groups for the time being, we have found multiple unique ways to reach out to patrons of all ages, technological abilities, and physical abilities. This presentation will explore both the diversity of our audience and the new outreach techniques we have employed within our programming and Headwaters Park.

Presque Isle State Park COVID-19 Teaching Strategies

Anne Desarro*, Environmental Education Specialist Supervisor

Ray Bierbower*, Environmental Education Specialist, PA DCNR

Presque Isle State Park normally hosts several thousand students a year doing school field trip lessons to fulfill our mission of encouraging environmental stewardship. In 2020 this was drastically changed due to COVID-19. This talk will explore the ventures in virtual field trip learning the park's environmental education staff has done. We will also examine how we planned a teaching strategy using the DCNR Outdoor Programming Services guidelines for programming in the age of COVID-19. We will identify the pros and cons of our teaching strategy and share some examples of our teaching methods.

STEM/Science during Hybrid Learning

Ryan Bookhamer*, Fairview School District

This session will focus on STEM / Science projects that can be implemented at home during a virtual or hybrid learning model. With limited time for instruction, educators need to find creative ways to implement and integrate Science, Technology, Engineering, and Math concepts into student's projects, and at-home learning activities. This session will focus on developing projects that are grade-level appropriate, meet grade-level standards, and engage students in hands-on learning that facilitates innovative problem solving research, and the engineering/design process. Educators will be given example projects and concepts to assist with their science curriculums during this challenging period of learning. STEM projects can be a vehicle for ELA, Math, and Science to thrive during at-home learning.

Lessons Learned, Remote Instruction for Students with Special Needs

Jeff Zibelman*, Barber National Institute

A review of educational practices for students that require individualized supports and how to provide instruction in a virtual manner.

Engaging Elementary School Students During a Pandemic

Connor MacKelvey*, Iroquois Elementary School

Through the impacts of COVID-19 in relation to education during the Spring of 2020, teachers were challenged to change their day-to-day operations to deliver the most appropriate free public education to their students. Mr. Connor MacKelvey, a fourth grade educator at Iroquois Elementary School in Erie, Pennsylvania, shares his innovative strategies and ideas to engage students through online learning. From Microsoft Teams, to Google Classroom, to Schoology, Mr. MacKelvey provides insight to various educational platforms along with the challenges and shortcomings faced during online instruction. Through inventive means of assessment, Mr. MacKelvey shares how programs such as Monster Quiz, Quizizz, and EdPuzzle permitted students to be engaged while also being assessed. Finally, Mr.

MacKelvey will share how create themes and guest speakers, such as Chef MacKelvey, Titanic BellBoy, Paco Taco, and Pirate Axis helped engage elementary-aged students during the COVID-19 pandemic.

Classroom Instruction in a Corona Climate

Ben Tost*, Fort LeBeouf School District

In this climate of the coronavirus, many schools have elected to provide instruction in a 100% virtual environment or a hybrid virtual and "brick and mortar environment." Other districts have however elected to continue to provide instruction 100% "brick and mortar." What are the challenges of instruction when the coronavirus may be present in your classroom? What measures does a district take to protect students and staff and prevent exposure and the spread of the coronavirus? What do the students think? What do they want? What do teachers think… what do they want? "Brick and mortar" instructor Ben Tost will attempt to address those questions and more, and provide a window into a day of instruction in the climate of the coronavirus.

ORAL PRESENTATIONS

Thursday, November 5, 2020

Selection preference in *Hyalella azteca*: Development of a behavioral assay for ecotoxicology

Pooja Metha*+, Kyle Deloe, Adam Simpson, Samuel Nutile
Penn State Erie, The Behrend College, Erie, PA, USA 16563

Sublethal effects associated with pollutants are often overlooked in ecotoxicology yet have significant environmental implications. In comparison to lethality, study of sublethal effects, such as behavioral changes, can provide insight into toxicological effects that occur below lethal concentrations but cause lethality through indirect means. Despite the importance of behavioral effects of toxicants, no reliable assays exist for evaluating behavioral endpoints, particularly in aquatic species. The objective of this study was to determine if *Hyalella azteca* exhibit preferential selection to substrates as an estimate of this species' behavioral response to contaminants. By designing a two-choice test chamber, preferential selection behaviors were tracked, observed, and measured. Individual *H. azteca* were given a choice between field-collected sediment and sand. They were then monitored for 10 minutes using EthoVision Software. Experiments with individuals were repeated three times to determine intraindividual variation. The results show that *H. azteca* significantly exhibit selection preference behavior of sediment substrate, but a bias for one side of the experimental chamber was observed during initial trials, which is being explored in current experimentation. Despite this side bias, *H. azteca* demonstrate a clear preference for field collected sediment over sand, suggesting this assay serves as a viable means to explore sublethal behavioral effects of toxicants. Establishing a viable behavioral assay lends opportunity to make determinations on *H. azteca* environmental preference and how contamination alters these preferences. Behavioral changes caused by substances ranging from pharmaceuticals to industrial contaminants can be studied, providing a more realistic view of pollution in aquatic environments.

Environmental DNA for Early Detection of Ballast-Mediated Invaders in the Great Lakes

Ivor Knight*, Allegra Cangelosi, Noel Moore, Emily Dobry, Kyle Deloe, Matthew Gruwell. Penn State Erie, The Behrend College

Reliable, timely and economical detection of aquatic invasive species (AIS) in harbors and ballast water is urgently needed to prevent harmful organisms from being spread, especially from the lower four Great Lakes to Lake Superior, by commercial ships. Current target organism detection in the region is expensive, difficult and time-consuming, and therefore largely after-the-fact of establishment and spread in the Great Lakes basin. We have been investigating the utility of Environmental DNA (eDNA) to for use as a genetic signature to identify the presence of target AIS in lake water. The advantages of eDNA methods over conventional methods include ease of sampling, the ability to simultaneously analyze hundreds of samples, high sensitivity and lower cost per sample. A key limitation of eDNA methodology is the uncertainty as to whether the target AIS genetic signature detected in water reflects the presence of

recent, living organisms. To understand this dimension of the method we developed eDNA methods for detecting the Bloody Red Shrimp (*Hemimysis anomala*), whose presence our group recently documented for the first time in the PA waters of Lake Erie, and tested the persistence of eDNA signal in controlled lake water mesocosm experiments. Our results show that eDNA declined rapidly over 4-5 days in mesocosms where dead *H. anomala* were present but was also detectable sporadically throughout the 14-day duration of the experiment. Further mesocosm experiments of longer duration and utilizing additional AIS are planned for the next summer season and will be discussed.

Environmental contextualization of urea toxicity in aquatic environments

Sydnee White*+, Kristen Honhart, Samuel Nutile
Penn State Erie, The Behrend College, Erie, PA, USA, 16563

Chloride deicers applied to roadways and sidewalks cause freshwater salinization. Urea-based deicers are made as eco-friendly alternatives, mitigating salinization. Spring runoff and rainfall following winter applications introduce urea into freshwater ecosystems; hydrolysis converts it into ammonium, a toxic chemical. Because of hydrolysis, urea-based deicers pose greater harm to aquatic invertebrates than chloride-based deicers. The toxicity of urea is dependent on how ammonium affects a given ecosystem. To better understand the specific effects of ammonium toxicity in aquatic environments, 10-d toxicity tests were performed on *Chironomus dilutus* at two temperatures (10°C and 23°C) in two substrates (sand and lake sediment) to determine the rate at which urea is hydrolyzed to ammonium and the relationship of this hydrolysis to toxicity. Testing of urea hydrolysis at different temperatures resulted in significantly higher peak ammonium concentrations in warm temperatures in comparison with cold temperatures. Similarly, substrate type influenced the rate of hydrolysis, with urea hydrolyzing to ammonium at a significantly increased rate in lake sediments compared to sand. Toxicity associated with urea-based deicers to *C. dilutus* was the same regardless of substrate type and temperature. This suggests the peak ammonium concentration reached during the toxicity test determines the toxic effects of urea. Despite significant variation in the urea hydrolysis rate related to substrate type and temperature, biotic factors, such as life stage and exposure duration play a larger role in governing toxic response to ammonium, suggesting simple toxicity benchmarks may be appropriate in the context of regulating urea contamination in aquatic ecosystems.

Developing Artificial Manganese Porphyrin Proteins Encased in a Silica Sol-Gel for Sulfoxidation Reactions

Mary Grace I. Galinato*, Aaron Trail (Student), and Ashley Lombardo (Student)
School of Science – Chemistry, Penn State Behrend, Erie, PA 16563

Oxidative desulfurization (ODS) reactions have been used as an alternative method to the more conventional hydrodesulfurization (HDS) technique of removing sulfur from hydrocarbon fuels because of the less adverse effects on public health and the environment. ODS can be employed in more moderate reaction conditions, does not require the use of expensive hydrogen, has high selectivity, and can efficiently treat S-containing aromatic compounds such as (di)benzothiophenes to achieve ultralow sulfur levels. Our work aims to develop catalysts for ODS inspired by nature, in particular, enzymatic hemoproteins. Here, we will utilize manganese (Mn) porphyrins in protein scaffolds (e.g. human serum albumin, or HSA) as they participate in crucial metal-oxo mediated reactions that are typically not accessible in other metal porphyrins. Importantly, binding of Mn with a nitrogen (N)-donor ligand, thus forming a Mn-N bonding interaction, enhances reaction stereoselectivity and rate. Encasing these artificial enzymes in a silica sol-gel further stabilizes the system without compromising its spectroscopic or catalytic properties. Initial optimization conditions using UV-vis spectroscopy show a few promising N-donor ligands that influence the absorption spectrum of manganese protoporphyrin IX (MnPPIX) in buffer solution. Fluorescence spectroscopy demonstrates a 1:1 binding interaction between the MnPPIX and HSA. Preliminary molecular docking studies of the N-donor ligand 1-methylimidazole on HSA-heme complex (heme refers to FePPIX) indicate a long-range interaction between the ligand and heme, instead

of a direct Fe-N bonding interaction. Further spectroscopic and molecular docking studies are currently being pursued to further understand the electronic structure of the artificial porphyrin enzyme complex.

Growth Rates and Catch Per Unit Effort of Yellow Perch (*Perca flavescens*) and White Perch (*Morone americana*) in Presque Isle Bay, 2016-2019

Greg Andraso*, Chris Dempsey, Michelle Kuns, Nolan Pyle
Biology Department, Gannon University

Gannon University began a long-term sampling program in 2016 to better understand the waters of Presque Isle Bay (PIB). One objective of this program is to monitor the fish assemblage of the open waters of the bay, including the commercially and recreationally valuable yellow perch (YP, *Perca flavescens*) and the white perch (WP, *Morone americana*), a non-native temperate bass. Monthly trawl data compiled between October 2016 and November 2019 were used to analyze growth rates and catch per unit effort (CPUE) of both species. Fish were captured by trawling the same open-water area of PIB. Individual YP and WP were counted and measured for total length (TL) before being released. Across sampling years, YP reached average TL of 69mm and 123mm by the end of their first and second growing seasons, respectively. In contrast, WP reached average lengths of 76mm and 160mm in their first two growing seasons. Young of year (yoy) of both species appeared in the open waters of PIB by mid-August. Young of year YP persisted throughout November, whereas yoy WP numbers declined sharply between September and October, and WP were essentially absent from the study site by mid-November. The presence of large YP early in the season and yoy YP throughout the late summer and fall suggest that PIB is an important spawning and nursery area for the species. In contrast, the near absence of adult WP throughout the season and short stay of yoy suggest that WP use the bay in a more limited manner.

The effect of tail and body area on swimming kinematics in fish

Truman[1], A. C., Gehman[2], A. J., Warren[3], M. J. and Anderson[4,5], E. J.*
[1]Department of Mathematics, Youngstown State University
[2]Department of Biomedical Engineering, Carnegie Mellon University
[3]Department of Biology, Grove City College
[4]Department of Mechanical Engineering, Grove City College
[5]Department of Applied Ocean Physics and Engineering (guest investigator), Woods Hole Oceanographic Institution

The relationship between swimming speed and tail beat amplitude in fish is well known, but not thoroughly understood. When tail beat amplitude is normalized by body length, plots of the speed vs. amplitude collapse to one curve within a species, but the relationship appears to be unique in each species. In this work, we hypothesized that tail area, normalized by body area, may impact tail beat amplitude. Fish with larger tails and smaller bodies may have to move their tails with greater relative amplitude than fish of the opposite proportions. We also examined whether tail area changes with swimming speed. High resolution stereo imaging was used to gather three-dimensional tail kinematics in swimming bluefish, mackerel, striped bass and scup. Tail and body areas were measured from side view images in 2D and 3D. Mean measured tail to body area ratios were 0.16 for bluefish and 0.09 for mackerel, and our preliminary work suggests that normalized tail beat amplitude is lower in bluefish than in mackerel, supporting our hypothesis, though more data is needed. We also observed little to no modulation of tail area with swimming speed. This work may inform the design of efficient biomimetic propulsion systems and deepen our understanding of tradeoffs in fish morphology, performance and ecology.

Potential impact of toxicants on White Perch, *Morone americana,* a key species of New Jersey estuaries

Jessica Briggs*+
Pennsylvania State University – University Park
Research Institution: National Marine Fisheries Service, Northeast Fisheries Science Center at Sandy Hook
National Oceanic and Atmospheric Administration (NOAA)

The Lower Passaic River in northern New Jersey has been polluted by industry and surrounding communities since the 1700s. As a result, the river sediments are contaminated with pollutants, such as PCBs, dioxins, PAHs, and heavy metals, and the area is designated as a Superfund site. This contamination is thought to impact organisms living in the river, including white perch, *Morone americana*, a key species in the estuary. This project plans to address how exposure to contaminated sediments may impact finfish health by examining external morphology, a quick and inexpensive index of fish health. The objective was to obtain qualitative and quantitative data regarding fish health using known morphological biomarkers for contaminant exposure. Any observed phenotypic changes would be compared to known effects of specific contaminants thought to be present in the Lower Passaic River. Fish were collected from the Lower Passaic River and Mullica River, a reference site in Southern New Jersey. Fish would then be photographed and analyzed using NIH's ImageJ software for a variety of features. Expected results include smaller length and weight at age, allometric loss of fin size, and higher frequency of lesions, parasites, exophthalmia, and discoloration in fish from the Lower Passaic when compared to those from the Mullica River. It is hoped the data will provide compelling evidence between changes of morphology in wild fish and known contaminants in order to provide a quick and inexpensive bioindicator for use in field and laboratory studies. Project funded by the NOAA Hollings Undergraduate Scholarship.

A Harmful Algal Bloom Update from the Regional Science Consortium

Amber R. Stilwell, M.S.*, S. Dalton, J. Schnars, Ph.D.
Regional Science Consortium

The Regional Science Consortium has been monitoring for Harmful Algal Bloom (HAB) toxins since 2013. These toxins can be harmful to humans, pets, wildlife, and livestock, and cause taste, odor, visual issues in recreational waters. In the last six years, the monitoring has grown into a large effort supported by many organizations and includes multiple projects that greatly benefit the Erie community and beyond. Monitoring efforts funded by the Great Lakes Restoration Initiative through the Department of Environmental Protection (DEP) and Canine Cyanotoxin Testing Program developed through Coastal Resource Management funding will be discussed. Listen in to this talk to hear an update from the 2020 monitoring season, a comparison of past data, 2020 projects, and plans for 2021.

Predation response to chemosensory and visual cues in wild vs. cultured Chesapeake Logperch (*Percina bimiculata)*

Madison Betts*+, Jay Stauffer Jr, Sara Mueller, Casey Bradshaw-Wilson

The Stauffer Lab at Penn State University has begun rearing and releasing Chesapeake logperch (*Percina bimaculata*) into tributaries of the lower Susquehanna River drainage to prevent further population decline. However, many studies have shown reared fish have lower survival rates than their wild relatives after release, with one possible explanation being predation. Fishes generally rely on visual and/or chemosensory cues to alert them to the presence of predators, but it is unknown whether the recognition of such cues is an innate or learned behavior in Chesapeake logperch. Smallmouth bass (*Micropterus dolomieu*) are a naturalized species within the Susquehanna watershed and feed primarily on small fish, making them a likely predator of Chesapeake logperch. This study will use smallmouth bass to determine whether predator recognition and avoidance strategies are innate or learned behaviors for Chesapeake logperch by conducting a series of experiments that expose both wild-caught and cultured fish to visual and chemosensory cues.

The economic effects of Zebra Mussels (*Dreissena polymorpha*) on the businesses in the City of Erie, Pennsylvania

Steven M. Spotts*+ and Kelly Pearce

Zebra mussels (*Dreissena polymorpha*) are an invasive species of freshwater mussel that are known to live in Lake Erie. Dating back to their first sighting within the lake in the 1980s, fish populations, native clam species, and local business have been impacted. Within the last forty years, these mussels have cost residents and the lake a considerable amount of money in damages such as boat repair and decline of certain fish species. Repairs range from hatcheries having to raise more fish to keep up with population decline and locals having to repair personal or commercial boats due to zebra mussels ruining motors and the hull. The goal of this study is to analyze the impact zebra mussels have on local business in the city of Erie, Pennsylvania, by assessing how much money is spent annually on correcting these issues. A short telephone survey will be conducted with local stakeholders including marinas and boat repair shops. Ultimately, these surveys will gather economic information on annual cost correlated to damages caused by the zebra mussel populations within Lake Erie.

Using historic effects records and habitat suitability analysis for the reintroduction of Lake Sturgeon (*Acipenser fulvescens*) in Lake Erie tributaries: Preliminary findings

Kylie Wirebach*+, Allegheny College

Reintroduction of species extirpated from their native range remains a primary focus of conservation biology. Lake sturgeon (*Acipenser fulvescens*) were abundant throughout Lake Erie until the mid-1800's when they were overfished and 'destroyed' as a nuisance, with remnant populations in the Detroit and Niagara Rivers. Investigations into whether spawning occurs -- or could occur -- between these two rivers has been sparse, particularly within tributaries. Reintroductions in potential spawning tributaries are of interest to the U.S. Fish and Wildlife Service since the existing populations at either end of the Lake seem to be stable. I will combine historic accounts of sturgeon habitat use and current stream conditions (e.g., depth, substrate, temperature, and velocity) in a geospatial information system (GIS) to map potential spawning locations and rank them as potential locations using habitat suitability analysis. Preliminary research has identified twenty-two tributaries that may provide spawning habitat for lake sturgeon, based on historic use. Of those, 13 are in Ohio, 3 in Pennsylvania, 3 in New York, and 3 in Michigan.

Ducks Unlimited Pennsylvania Conservation Overview

Jim Feaga*, Regional Biologist, Ducks Unlimited, Inc.

Four centuries of human population on the East Coast has eliminated or damaged nearly 7 million acres of wetlands from Maryland to Maine, with most states having lost at least 60% of their original wetlands. With hardened shorelines, nutrient loading from former wetlands converted to agricultural lands, reduced water quality in many of our coastal bays, and increasing treats of sea level rise resulting in habitat loss and conversion, the Atlantic Flyway has many treats to sustaining healthy wetlands and subsequent waterfowl populations. Since the 1980's, Ducks Unlimited's (DU) programs have been working to address these challenges to meet the needs of Atlantic waterfowl as well as cleaner water. To date, DU in collaboration with partners have invested >$15 Million to conserve >30,000 acres of habitat throughout Pennsylvania. Wetland conservation here has also benefited local residents by reducing flooding risk, improving water quality and boosting the economy. DU will provide an overview of the importance of wetlands to wildlife and people, as well as, their conservation efforts throughout Pennsylvania, in particular, their support towards efforts at Presque Isle State Park.

A Resource Management Overview – 2020 Season at Presque Isle State Park

Holly Best, M.A.*, Park Manager 3
Presque Isle State Park, Tom Ridge Environmental Center
301 Peninsula Drive, Suite 1, Erie, PA 16505

The park, in partnership with Ducks Unlimited, The Regional Science Consortium, Go Native Erie, California University of PA, Environment Erie, and Erie Bird Observatory received a large amount of Sustain our Great Lakes grant funding to be able to perform invasive species control. This presentation will be an overview of why this work is important and what we were able to accomplish during 2020, even with COVID-19.

Plant Propagation for Wetland Restoration on Presque Isle State Park

Jen Salem*, Program Director, Go Native Erie!
Regional Science Consortium, Tom Ridge Environmental Center
301 Peninsula Drive, Suite 9, Erie, Pa 16505

Despite ongoing efforts to eliminate invasive plant species from Presque Isle State Park, targeted areas are not being repopulated by native plants quickly. The absence of these beneficial plants is an invitation for invasives to move back in, creating a situation where extensive treatment is necessary. The goal of this wetland restoration project is to grow and re-populate native wetland plants in three selected areas of Presque Isle. This will include propagation directly from plants found on the Park, and continual monitoring on the selected areas. The results of this project will be used by the PA DCNR and will impact future wetland restoration projects on Presque Isle State Park.

Monitoring Surveys in Priority Wetland Restoration Areas on Presque Isle State Park

Amber R. Stilwell, M.S.*, S. Dalton, S. Magyan, J. Schnars, Ph.D.
Regional Science Consortium

Encroaching invasive plant species can have numerous negative effects if left unopposed in priority wetlands for the entire ecosystem, ultimately leading to the displacement of animals and insects. Using field observation methods, collection transects, as well as overnight recordings, surveys were conducted at 5 priority wetland habitat restoration areas distributed across Presque Isle State Park in Erie County PA where treatment for invasive plants has been applied. Surveyed populations included fish, amphibians, macroinvertebrates, and native unionid mussels to monitor the success of the restoration of these priority wetland areas on Presque Isle State Park.

Waterbird Monitoring at Presque Isle State Park

Sarah Sargent, PhD.*, Erie Bird Observatory
Connor Vara, Erie Bird Observatory

Presque Isle's wetlands and near-shore habitats are heavily used by migratory waterfowl and allies. Beginning in March 2019, Erie Bird Observatory began a routine monitoring program for 35 species of waterfowl and similar species during spring and fall migration with the intent of documenting species composition and abundance over the course of each season in different areas of the park. We selected 16 locations used by waterbirds and conduct frequent counts of birds at these sites through the 8-week spring season and 12-week fall season. Waterbird Use Days (WUDs) are calculated for each species and each location by summing the number of individuals of each species at a site each day of the season, estimating by interpolation for days without actual counts. For spring of 2019, we estimated a total of 175,240 WUDs (164,912 excluding gulls) and in fall we had 103,519 WUDs (69,529 excluding gulls). We will discuss comparisons among species and locations, and spring versus fall. This project is ongoing.

Summer bat communities in Presque Isle State Park

K.J. Pearce*, Allegheny College, Department of Environmental Science and Sustainability
Sarah Till, Gannon University, Department of Biology
Katherine Brozell, Allegheny College, Department of Environmental Science and Sustainability

Bailey Kozalla, Allegheny College, Department of Environmental Science and Sustainability
Matthew Lazusky, Allegheny College, Department of Biology

Several species of North American bats have been documented at Presque Isle State Park. However, previous studies on PISP on bats have focused on telemetry stations or acoustic technology. As part of a larger wetland monitoring project we conducted summer mist netting between 1 June and 15 August to monitor summer bat populations at 3 locations in PISP. Triple-high mist net surveys were conducted over potential flight corridors associated with streams, ponds, and trails. For each captured bat, time, species, sex, age, weight, forearm length, reproductive condition, wing score, and presence of Pd spores was recorded. A total of 24 bats were captured over 10 sample days, including Big brown bats (*Eptesicus fuscus*) and little brown bats (*Myotis lucifugus*).

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

Sean Dalton*, A. Stilwell, S. Magyan, J. Schnars, Ph.D.
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.

Excitotoxic effects on development of auditory brainstem neuron morphology and function

Hasan Alhelo*+, Weam Altaher, Devon Chosky, Randy Kulesza PhD
Lake Erie College of Osteopathic Medicine

Elevated levels of excitatory neurotransmitter glutamate during the neonatal period results in neuronal injury and cell death. Repeated neonatal monosodium glutamate (MSG) exposures result in lower body and brain weights, degeneration of cells, and lower density of neurons.

We hypothesize that MSG-exposure results in nonuniform loss of neurons throughout the auditory brainstem pathways, most severely in the cochlear nucleus and superior olivary complex. The functional impact of neuronal loss will be assessed with click-evoked auditory brainstem responses.

Repeated neonatal MSG exposure between postnatal days 4 and 10 result in fewer but larger spiral ganglion (SG) neurons. MSG-exposure also show fewer globular bushy cells (GBC) and medial nucleus of the trapezoid body (MNTB) neurons, as within the dorsal nucleus of the lateral lemniscus (DNLL), ventral nucleus of the lateral lemniscus (VNLL) and central nucleus of the inferior colliculus (CNIC). Neurons are smaller in the DNLL, VNLL and CNIC in the exposed group, with a difference in proportions of cell body shapes in the CNIC. Click-evoked auditory brainstem responses at postnatal days 50 and 150 show MSG-exposed animals have longer wave latencies, longer intervals between waves, lower wave I amplitudes and higher click thresholds.

We show that neonatal exposure to MSG impacts survival of neurons in the midbrain, several synapses away from where it was initially believed the insult was localized. Susceptibility of the auditory neurons to glutamate excitoxicity varies by location, with neurons cochlear nucleus and CNIC being severely impacted compared to the lateral superior olive, which were spared.

Investigation of a Long-Range Glycinergic Projection from Brainstem Interneurons to the Thalamus

Alyson Burchell*+, Yusra Mansour, Randy Kulesza PhD
Auditory Research Center, Lake Erie College of Osteopathic Medicine (LECOM)

The medial nucleus of the trapezoid body (MNTB), located within the superior olivary complex, plays essential roles in sound source localization and processing temporal features of complex sounds. Globular bushy cells in the posterior ventral cochlear nucleus have excitatory, glutaminergic projections to MNTB. MNTB neurons use glycine, acting as inhibitory interneurons in the ascending auditory pathway. Prior research concluded that MNTB does not project to MGB. However, preliminary studies revealed retrogradely labeled neurons in MNTB after injections in the thalamus. We therefore hypothesized a glycinergic, MNTB projection directly to the thalamus. To investigate this long range glycinergic projection from MNTB, we performed retrograde tract tracing injections into the thalamus using a rat model. Initially, 200 nL of Fluorogold (FG) was injected into MGB and central nucleus of the inferior colliculus (CNIC). Significantly more MNTB neurons labeled after an injection into MGB compared to CNIC. Then, smaller injections of FG determined the topography of projections to MGB. Quantitative immunohistochemistry showed that MNTB projects to the ventral medial geniculate body (vMG). Confocal microscopy was used analyze the distribution of glycine receptors. Neurons in MGB express glycine receptors, with significantly higher density in vMG and the region directly ventral to vMG. Together, these results suggest a novel pathway in the ascending auditory system where MNTB projects directly to vMG, bypassing the CNIC. These direct MNTB projections to the thalamus may be responsible for generating offset responses in the thalamus. Such responses are important for encoding temporal features of vocalizations.

The Effect of Drawing Microbiology Concepts on Short-term Retention Before and After Interrupted Learning

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

Introduction: During preclinical education, medical students are required to learn numerous concepts that must be retained and added to over time even when not being actively used or when learning about new, unrelated concepts. Previous studies have shown that utilizing drawing as a learning tool leads to improved retention. However, limited studies have been conducted on the use of drawing activities at the medical school level. Therefore, the goal of this study was to utilize mechanism-based drawing aimed at presenting conceptual material, rather than strict memorization of facts before and after interrupted learning.

Methods: Participants were randomly assigned to a drawing or a text group and both groups received text #1 that covered a microbiology concept that they were instructed to read, but only the drawing group received a drawing prompt. The groups were given 15 minutes to read, take notes, or draw. The groups then completed post-test #1. During part two of the study the groups received text #2 with no drawing prompt. Both groups were instructed to read the text and take notes for 15 minutes. The two groups were then instructed to complete post-test #2 which covered topics from text #1 and #2. A t-test or Mann-Whitney U was performed and $p<0.05$ was considered significant.

Results: The drawing group performed significantly better on post-test #1 compared to the text group. There was no significant difference on overall performance on post-test #2. However, the drawing group performed significantly better on questions related to the material covered in the text #1 on post-test #2.

Conclusions: Results presented here show that students perform significantly better when immediately tested on microbiology text while drawing, even after the introduction of an unrelated concept. A future study will be conducted to investigate the effectiveness of an online drawing workshop that will supplement concepts taught during lecture.

Potential Discovery of New Antibiotics in Soil

Lauryn Avery*+, Rylee Jackson, and Michelle M. Valkanas

Antibiotic resistance has become a problem in today's society. Bacteria are becoming resistant to the effects of the most common antibiotics widely used, such as Penicillin and Vancomycin. Bacteria have become resistant to antibiotics in two main ways: mutations in their DNA sequence or they can encode antibiotic resistant genes and transfer them to other bacterial cells through horizontal gene transfer. In order to stop the progression of antibiotic resistance, new antibiotics need to be discovered. The Tiny Earth Project is a network of instructors and students that focuses on discovering new microbes that produce antibiotics from soil samples collected from all over the world. In this research paper, I will be sampling soil from California University of Pennsylvania and analyzing the sample to see if there are microorganisms that have antibiotic properties. I will test the hypothesis: master plate 3 will have bacteria from soil that produces novel antibiotics in four steps. Firstly, my soil sample will be serial diluted and a master plate of 10 colonies will be made. Secondly, I will test the colonies on my master plate for antibiotic production by screening if they inhibit growth of ESKAPE safe- relatives (bacteria closely related to known pathogens). Lastly, I will characterize the antibiotic-producing microorganisms. This work will lead to the potential discovery of new antibiotics that can replace the ones that bacteria are becoming resistant to.

Antibiotic Resistance in Environmental Bacteria

McKayla Kling*+, Abigale King, and Michelle M. Valkanas

Antibiotic resistance is growing rapidly worldwide, as viable options for antibiotics continue to decrease. This has led to an antibiotic crisis that will continue to affect human health. The main objective of the experiment was to isolate, recognize, and specify antibiotic-producing bacteria found in the environment. The bacteria were found in soil that was collected behind the California University of Pennsylvania's biology building. Serial dilutions were performed to isolate single colonies. Twelve isolates were selected and screened for metabolic and antibiotic production by growing them in the presence of other bacteria and screened for growth inhibition. Positive colonies were further characterized using selective and differential media. This work has the potential to identify novel antibiotics using soil bacteria.

Uncovering innovative antibiotic-producing bacteria from soil samples

Heaven Cole*+, Hunter Patterson, and Michelle M. Valkanas

As time passes, there is an increasing dependence on antibiotics as the production of new antibiotics decreases. This growing reliance on the same antiseptic medicines over decades has led to the creation of antibiotic-resistant bacteria. Because of this development, one of two pathways is necessary: increasing the dosage of antibiotics to possibly overpower resistant strains of bacteria, or to find new antibiotics. The purpose of this experiment was to find antibiotic-producing bacteria in soil samples taken from California University of Pennsylvania. In all, twelve colonies of bacteria were cultured and studied via antibiotic production screenings, including the patch-patch method, where isolates are grown in the presence of bacteria related known antibiotic-resistant pathogens and growth inhibition is observed. The isolates that showed potential for antibiotic-production were then grown on differential media to determine their metabolic potential. Discovery of these innovative antibiotics could be used to the benefit of human health and to discourage existing antibiotic-resistant strains of bacteria.

The Contribution towards Antibiotic Discovery through Bacteria in Soil collected in Western Pennsylvania

Abbie Reichelderfer*+, Raelynne Grabill*+, and Michelle M. Valkanas

Antibiotic Resistance is one of the biggest public health challenges that we face in today's world. The lack of antibiotic discovery has led us to research environmental bacteria and their beneficial resistant properties. We conducted research by examining collected soil samples. We cultured a soil sample in order to pick diverse colonies for antibiotic screening. We then isolated pure cultures of antibiotic producers and evaluated its potential to contribute towards antibiotic discovery. By conducting serial

dilutions, an examination of 12 isolates of bacterial colonies from our soil sample was performed. We then tested our bacteria for antibiotic production. We also were able to examine metabolic capabilities of potential positive bacteria for antibiotics, using differential and selective media. By contributing our data, we collected, to the Tiny Earth research database, it presents a potential solution towards averting the worldwide antibiotic crisis.

Undergraduate Research of the Antibiotic Crisis

Kendall Leake*+, Alex Lere, and Michelle M. Valkanas

Microbes have been the source of many diseases and as you may know, there is unfortunately an antibiotic shortage. The antibiotic crisis is due to low supply of new antibiotics produced by the pharmaceutical industry and of course to antibiotic resistance. Most of the antibiotics we use today have been obtained from microbes. So, for this experiment, I will be identifying and characterizing antibiotic producing organisms. I will be using a soil source from California University of Pennsylvania and will isolate 11 bacterial colonies. Those bacteria will be screened for antibiotic production by growing them in the presence of other bacteria to determine if growth is restricted. This research will help gain understanding of the major issues of the antibiotic shortage and provide an understanding of how undergraduate students are contributing to the world-wide database of antibiotic discoveries.

ORAL PRESENTATIONS

Friday, November 6, 2020

Application of stable oxygen isotopes to aid in refinement of origin for an unidentified individual

Leslie Fitzpatrick*, Mercyhurst University

Variations in the stable isotope values of oxygen (δ18O) for specific skeletal tissues provides information relevant to the development of a geographic mobility profile across an individual's lifespan. In modern forensic settings when presented with an individual of unknown origin, δ18O values obtained from the individual's tissues may be utilized in tandem with standard biological profile data to assist with isolating a possible region of origin. To demonstrate the practicality of stable isotope methodologies in the refinement of origin locality, a case study will be presented involving an unidentified adult male of probable Hispanic ancestry who died in a Pennsylvania hospital in 2017. The individual's remains were released to the coroner's office who subsequently released them to Mercyhurst University for further evaluation. Results from both the biological profile and δ18O will be explored indicating marked geographic mobility across the individual's lifespan with an origin outside of the stable oxygen isoscapes for Pennsylvania.

A Geomorphometric Study on Sex Estimation of the Pelvis on Skeletal Remains: A Pilot Study

Emily Brooks*+, Theresa De Cree*+, Nora Butterfield, and Luis Cabo-Perez

When estimating the sex of human skeletal remains, the os coxae have proven to be the most consistently reliable skeletal elements. However, most forensic and bioarchaeological sex estimation methods that utilize the pelvic girdle are qualitative and highly subjective. Quantitative measurements offer Daubert compliance, lower error rates, better statical backing, and reduced bias when compared to qualitative. Decker et al. (2011) proposed a quantitative method based on 20 measurements of the articulated pelvic girdle from Computed Tomography scans, reporting a 100% accuracy rate and low inter-observer error, using a four-variable formula. The study emphasizes the pelvic inlet, which is presumed to be sexually dimorphic due to the parturition demands of the female pelvis. In this study, the applicability of the Decker et al. method on dry bone is investigated, with the considerations of bone preservation, articulation, and the absence of soft tissue. Additionally, the authors of this study propose the addition of a rarely utilized measurement with Decker's variables: the distance between the superior pubic symphysis and apex of the auricular surface. Due to variability in preservation, when skeletal remains are recovered, it is common to recover only one innominate. Therefore, the features that this study proposes to add to the Decker et al. method show better preservation in comparison for sex estimation. For these purposes, the

correlation of the proposed variable with the Decker et al. measurements, as well as the effect of its addition on accuracy and precision is examined.

A Pilot Study on 2D and 3D Image Distortion: A Forensic Anthropological Approach

Emily Brooks, Theresa De Cree, Victoria Lamond*+, Samantha LaFrance*+, Colleen Peters, Luis Cabo-Perez

With the ever-advancing technologies in the world of imaging, it is important to evaluate the practicalities and capabilities of emergent programs. Over the past two academic semesters schools across the world have been incorporating online and hybrid classes into their curriculums to prevent the spread of the COVID-19 Pandemic. While some programs are suited to this style the loss of practical osteological experience can be a disadvantage to the budding forensic anthropologist. Thus, the need for assessing the implementation of digital tools in Forensic Anthropology is more pressing than ever. The authors' on-going research questions if there are distortions between measurements taken between dry bone, photographs, radiographs, and 3D scans; as well as the practicality of taking the needed measurements with those mediums. With a pilot sample size of 10 humeri, 5 standardized measurements were taken on the humeri in person, on radiographs, in photographs, and 3D scans. ImageJ software was utilized to measure 2D images, and Artec 3D Scan software was utilized to take measurements from the 3D images. Statistical analyses will be run to calculate error rates between measurements for all samples, as well as significant differences in measurements comparing all 4 mediums. From these analyses, a determination of the limitations of each imaging type can be made.

The Importance of Recognizing the Indicators of Vulture Scavenging in Forensic Anthropology: A Case Study from Central Pennsylvania.

Kristine A. Kortonick, B.S.*+, Anthony V. Lanfranchi, B.S.*+, Luis L. Cabo, M.S.
Department of Applied Forensic Sciences, Mercyhurst University

Animal scavenging activity has the potential to alter significantly the final deposition of human remains, and the surrounding environment. Thus, understanding the behavior of different scavenger species becomes crucial to detect and interpret their effects as taphonomic agents in forensic settings. Indeed, scavenging activity has been reported to affect post-mortem interval (PMI) markers, the spatial patterning of surface-scattered remains, and post-mortem bone preservation and alteration. Thus affecting PMI inferences, trauma interpretation, and scene reconstruction. Vultures in particular are known to alter human remains and the site of deposition due to rapid consumption of soft tissue, dispersion and damage to the remains, and alteration of the contextual environment. Therefore, recognizing the indications of animal scavenging associated with different types of scavengers, can improve the interpretation of the scene.

The first comprehensively documented example of vulture scavenging activity on human remains in Western and Central Pennsylvania was observed in Clearfield County. Despite the nearly skeletonized state of the remains, the individual had only been missing for less than 4 months. It has been suggested that approximately two years are required for the removal of all soft tissue by natural processes in Pennsylvania (Dirkmaat et al., 2012). Thus, if the evidence of vulture scavenging had not been considered, the PMI would have been likely overestimated by around two years. The evidence of scavenger activity present at the scene provided the necessary information to detect and correct the bias introduced by vulture activity, resulting in a more accurate, scientifically backed taphonomic interpretation.

Sand Provenance Across the White River Badlands Toward the Nebraska Sand Hills

Colton Byers[1]*+, BURKHART, Patrick A.[1], BALDAUF, Paul[2], LIVINGSTON, Jack [1], PEET, Ellis[1], MCCLINTON, Brett[1], (1)Geography, Geology, and the Environment, Slippery Rock University, 1 Morrow Way, Slippery Rock, PA 16057, (2) Halmos College of Natural Sciences, Nova Southeastern University, 3301 College Avenue, Fort Lauderdale, FL 33314, (3)Dept. of

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This study was conducted to test whether White River Badlands sediment is a significant component of the sand in the Nebraska Sand Hills (NSH). This investigation advances our previous work with a new statistical approach while also improving the accuracy of our data. It is predicted that dunes located in the White River Badlands (WRB) downwind of the White River Group (WRG) source rock contain sediment with a maturation signal intermediate between the source rocks and the NSH sand. Previous investigators found systematic changes in mineralogical and textural maturity in the NSH, suggesting dominant continuous downwind transport from NW to SE. In addition, these investigators suggested that Eocene and Oligocene age strata of the WRG in the WRB are a possible source of sand in the NSH. Because the WRG outcrops and WRB dune fields are to the NW of the western section of the NSH, it is possible that sand from this area may have reached the NSH. To test this hypothesis, we collected samples from terraces and floodplains of the Cheyenne and White Rivers, and their tributaries, together with sand samples from NSH and WRB dunes. We analyzed these samples using laser-induced breakdown spectroscopy (LIBS) to identify major element compositions. Our newest interpretation aims to spatially compare our newly refined data by creating an Inverse distance weighted (IDW) interpolation map. The hypothesis to be tested is that if White River Group sediment a source for the western NSH, then major element composition should reflect sand maturation with distance from the proposed source.

Deglaciation of the southeast margin of the Laurentide Ice Sheet in northeast Pennsylvania

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Northeast Pennsylvania lakes contain continuous archives of Laurentide Ice Sheet (LIS) deglaciation and postglacial environmental conditions. Here, we present multiproxy glacier and paleoenvironmental records from two lakes in Luzerne County that document retreat from the LIS southeast margin. Nuangola Lake and Cranberry Pond are relatively small, shallow (depth < 10 m) glacial lakes located approximately 10 kilometers north of the Last Glacial Maximum terminal moraine. We collected overlapping sediment cores from both lakes and characterized the sediments using a multi-proxy sedimentology and geochemical approach. Age control for the sediment sequences is developed using a combination of radiocarbon dates on terrestrial macrofossils and geochemical analysis of cryptotephra deposits.

Sediment cores from both lakes are divided into three distinct lithofacies consisting of basal glaciolacustrine sediments, overlain by transitional minerogenic sediments, and capped by organic rich post glacial sediments. A basal radiocarbon age above the varve transition indicates deglaciation of the Nuangola Lake basin occurred prior to ~ 19,200 cal yr BP and the subsequent transition to organic rich post glacial sediments occurred ~ 15,000 cal yr BP. Macrofossil materials from the Cranberry Pond cores were much less abundant, but our bracketing dates confirm the approximate timing of the post glacial sediment transition. The inferred timing of deglaciation is substantially younger than estimates developed from cosmogenic exposure dates on terminal moraine boulders from adjacent states. We explore our results in the context of other regional glacial-geologic and lacustrine sediment records to better understand the dynamics of LIS deglaciation for the region.

Insect Diversity on Two Urban Green Roofs on the Campus of Gannon University

Nathan Maietta*+, Gannon University

Skyler Sevacko*+, Gannon University

Dr. Steven J. Ropski, Gannon University

This research compared two urban green roofs on the campus of Gannon University and the quantity and diversity of different species of insects. One roof is only three years old while the other is 25 years old. Sticky fly ribbons were used both aerial as well as ground, to gain a census of the insect populations. These tests were conducted for two 3-day periods in the spring of 2019 and fall 2020. The newer roof had a greater quantity and quality of insects.

The Impact of Simulated Acid Rain on Soil-Dwelling Invertebrate Communities

Ray Marszalek*+

Acid rain, primarily composed of nitrogen and sulfur oxides, lowers the pH of ecosystems, leading to the removal of important nutrients from the soil. While there have been a multitude of studies done on increased nitrogen in forest ecosystems impact aspects such as soil nutrients and forest growth, there have been very few that have studied the impacts that nitrogen has on invertebrates. Soil-dwelling invertebrates play a key role in forest ecosystems, serving as important links in the food web as well as the cycling of nutrients. The goal of this study was to examine to what extent, if any, that populations and communities of invertebrates are impacted by increased levels of nitrogen. By comparing samples collected within control plots and plots with simulated acid rain from Bousson Forest, invertebrates were counted, identified to order, and were entered into a spreadsheet for further data assessment. By examining the data, patterns among different populations can be interpreted, and add new insight into how acid rain impacts these animals.

Summer 2020 survey of owls of Erie County

J. Michael Campbell*, Mercyhurst University

From July 26-August 26 2020, I visited 48 sites throughout Erie County to conduct nocturnal listening surveys for owls. Most of the 10-15-minute surveys began after 4 AM, and all concluded before 6 AM. They were conducted at parking areas or trails within or adjacent to forests at publicly accessible sites -- approximately half each in urban/suburban and rural locations. Owls were detected at less than half of the sites. Among three species detected, Eastern screech owl (*Megascops asio*) was most frequent, followed by Barred owl (*Strix varia*); Great horned owl (*Bubo virginianus*) was detected at one location (SGL 218). I was surprised to detect Eastern screech owl at several locations within and immediately adjacent to the City of Erie. All of my observations of Barred owl during this nocturnal survey (including pairs at two locations in Erie) were at locations having mature stands of Eastern hemlock trees.

Forest change in four swamps and the College Lodge and Campus Woodlot in Chautauqua County

Jonathan Titus*, Biology Dept., SUNY-Fredonia, Fredonia, NY 14063

Tree census and understory species cover data are being used to assess forest change due to emerald ash borer, beech bark disease, hemlock woolly adelgid, non-native species invasions and climate change. Tree diameters in 26 900m2 plots at four wetland sites (Elm Flats, Bonita Swamp, Frog Valley and Bentley) have been measured for ~10 years. At Elm Flats trees exhibited a hump-shaped basal area distribution with a high proportion of shade tolerant trees in the larger size classes. This is indicative of a forest that has been subjected to limited anthropomorphic disturbance and possibly retains some old growth characteristics. Trees at the other three wetland sites exhibited characteristics indicative of successional forests. The College Lodge and Campus Woodlot sites range from having old growth characteristics to successional. Canopy cover is decreasing rapidly in *Fraxinus* dominated plots. *Fagus* and *Tsuga* diseases are killing trees much more slowly. Thus far annual changes in the understory

vegetation due to local weather conditions have obscured signals from tree death and climate change. Non-native plant invasions have ben minor in most of the sites or controlled by invasive species pulls at the College Lodge and Campus Woodlot.

ABSTRACTS

Regional Science Consortium
16th Annual Research Symposium
November 4-6, 2020
Virtual Event – Join on Discord
Instructions at www.RegSciConsort.com/events/symposium

POSTER PRESENTATIONS

POSTER SESSION: Wednesday, November 4th, 2020, 4:30pm-6:00pm

1. Gram-positive bacteria affect rhizoid growth and sexual development of gametophytes of the fern *Ceratopteris richardii*

Erin Renwick*+, Gary Vanderlaan, and Mike Ganger
Department of Biology, Gannon University

Gametophytes of the fern *Ceratopteris richardii* may be either hermaphroditic or male. The hermaphrodite-secreted hormone antheridiogen influences undifferentiated gametophytes to develop as male. In its absence, gametophytes develop as hermaphrodite. The Gram-negative soil bacterium *Pseudomonas nitroreducens*, isolated from the roots of *Onoclea sensibilis*, a local fern, has been shown to alter sex determination by increasing the percentage of hermaphrodites in culture and also dramatically increase the length of rhizoids (nutrient-acquiring structures) in both males and hermaphrodites. Here we show that many Gram-negative soil bacteria, isolated from local fern roots, and many Gram-negative laboratory strains, including *Escherishia coli*, *Klebsiella pneumoniae*, and *Pseudomonas fluorescens*, induce the "rhizoid-lengthening" phenotype. In separate experiments, an unidentified soil bacterium and *E. coli* also increase the number of hermaphrodites in culture. The unidentified soil bacterium has a significant, but smaller effect on sex determination relative to *P. nitroreducens* and a significantly larger effect on rhizoid length relative to *P. nitroreducens*. It is possible that a molecule (or molecules) is being secreted that is common to Gram-negative bacteria (e.g., bacterial versions of phytohormones) or a structural feature common to Gram-negative bacteria (e.g., lipopolysaccharide) is perceived by the ferns that leads to changes in sexual development and rhizoid growth. These two mechanisms are different in that the induced changes in the fern gametophytes would either require proximity or direct contact. Furthermore, the variability in the effect on rhizoid lengths and sex determination by *P. nitroreducens* and the unidentified bacterium suggests a unique mechanism for each. Experiments are currently underway to these questions.

2. Identification of fern orthologous genes implicated in moss rhizoid and grass root hair development

John Vieira*+, Gary Vanderlaan, and Mike Ganger
Department of Biology, Gannon University

The evolution of terrestrial plants is an approximately 500-million-year story. Although all land plants execute an alternation of generations between a haploid gametophyte and a diploid sporophyte stage, the amount of time and space spent in each generation varies across clades. For instance, the bryophytes typified by *Physcomitrella patens*, are gametophyte-dominant and produce gametophyte structures known as rhizoids for anchoring to substrates as well as for nutrient absorption. Moss sporophytes are dependent on the moss gametophyte, and are diminutive in size, entirely lacking roots. In contrast, anthophytes like *Arabidopsis thaliana* are characterized by sporophyte-dominant stages with an exceptional spatiotemporal

reduction in gametophyte structures. Such is the reduction that flowering plants rely on sporophyte root systems for anchorage and nutrient absorption, forgoing any production of rhizoids. In the middle of this plant evolutionary saga lies *Ceratopteris richardii*, a fern capable of not only producing gametophyte rhizoids but also sporophyte root systems. Great strides have been made in the elucidation of the genes required in the specification and development of sporophyte root hairs in *Arabidopsis* as well as for the development of *Physcomitrella* gametophyte rhizoids, but little is known of the specific genes utilized in ferns for similar processes. Recent advances in genomics and transcriptomics for *Ceratopteris richardii* permits orthologous gene-function searches. Here we showcase novel fern genes that are expressed in gametophyte and sporophyte stages that share predicted-peptide conservation with known moss and cress genes that are key molecular players in rhizoid and root hair development, respectively.

3. Developmental Trajectory of the Auditory Brainstem Response of the Valproic Acid-Induced Rat Model of Autism

Arjun Malhotra*+, Lake Erie College of Osteopathic Medicine (LECOM)

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by abnormal social communication, behavioral patterns, and sensory, especially auditory, processing. Though the pathogenic mechanisms of ASD have not been fully elucidated, prenatal exposure to the antiepileptic drug valproic acid (VPA) has been shown to significantly increase risk of developing ASD. An animal model that takes advantage of this association has been developed, as rats exposed to VPA in utero develop characteristics consistent with ASD, including auditory brainstem dysmorphology. In the current study, this animal model will be used to investigate the developmental trajectory of the auditory systems of male rats exposed to VPA in utero. On postnatal days 28, 60, 120, 180, 240, 300, and 360, the auditory functioning of each rat will be measured by recording the auditory brainstem response (ABR) to acoustic stimuli. ABR uses surface electrodes to record synchronous neuronal activity in the auditory nerve, cochlear nucleus, superior olivary complex, and lateral lemniscus to determine hearing sensitivity, neural responsivity, and speed of neurotransmission. We hypothesize that rats exposed to VPA in utero will have deficits in their auditory processing, such as increased latency, hyposensitivity, and hyperresponsivity to the acoustic stimuli. Preliminary data is promising, as VPA-exposed juvenile rats have demonstrated higher hearing thresholds compared to control rats; like humans, these differences are expected to normalize by adulthood. Overall, this study serves to investigate the developmental trajectory of the auditory systems of the in utero VPA rat model of ASD using ABR.

4. In Utero Exposure to Valproic Acid Disrupts Neuronal Morphologies and Connections in the Dorsal Cochlear Nucleus

Shaelyn O'Connor*+ (presenting-LECOM student), Randy Kulesza, PhD (LECOM professor)

Prenatal exposure to the antiepileptic valproic acid (VPA) is associated with an increased risk of autism spectrum disorder (ASD) in humans and is a validated animal model of ASD. The majority of human subjects with ASD have some degree of auditory dysfunction. VPA exposure results in significantly fewer neurons in the ventral cochlear nucleus (VCN) and fewer VCN neurons send axons to the auditory midbrain and thalamus. The dorsal cochlear nucleus (DCN) is involved in integration of somatosensory information and localization of sound sources in the vertical axis. Based on our previous results, we hypothesize that the changes observed in the rest of the auditory pathway extend to the neurons and projections of the DCN. Our results indicate that prenatal VPA exposure resulted in significantly fewer neurons in the DCN. Surviving neurons were not significantly different from controls in terms of cell body size, however were significantly different in their morphologies.. Finally, we found a significant increase in the proportion of neurons from the VPA-treated animals in the DCN projecting to the CNIC. Our results suggest that VPA has a drastic impact on the brainstem circuits involved in coding sound localization in both the horizontal plane and vertical plane.

5. Combinative Effects of Essential Oils on Growth Inhibition of *Staphylococcus aureus*

Emily Shuffstall*+, Robert Waters MS., Delbert Abi Abdallah Ph.D., Nancy Carty Ph.D., Christopher C. Keller, Ph.D., FNAOME, Lake Erie College of Osteopathic Medicine (LECOM)

Introduction: Staphylococcus aureus is a gram-positive bacterium that causes a variety of significant infections. Previous studies showed that cassia bark (CB), oregano (O), and red thyme (RT) essential oils were effective at inhibiting growth of antibiotic-resistant S. aureus. This study was performed to determine if combining these oils would lead to a synergistic effect on growth inhibition of S. aureus.
Methods: The average zone of inhibition (ZOI) of each oil individually and in combination was determined for three strains of S. aureus using a disk diffusion assay on Mueller-Hinton agar. Ginger oil was used as a negative control. The average ZOIs for each oil preparation were then compared using Kruskal-Wallis analysis followed by Dunn's post-hoc test.
Results: CB, O, and RT oils inhibited the growth of all S. aureus strains consistent with previous findings. Individual oils produced significantly higher ZOIs than those of oils in combination, except for the combination of O and RT oils. All combinations made with ginger oil demonstrated an average ZOI between those of the individual component oils, with ginger having the lowest values. These patterns were consistent for the three S. aureus strains.
Conclusions: Results presented here are consistent with previous results, showing that CB, O and RT oils inhibit the growth of S. aureus. Unexpectedly, there was an apparent antagonistic effect when the oils were combined as the combinations yielded lower ZOIs compared to the individual oils. Therefore, these data illustrate that there must be unique mechanisms of action for these oils.

6. The Effect of Essential Plant Oil Combinations on *Pseudomonas aeruginosa* Growth Inhibition

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Introduction: Pseudomonas aeruginosa is an opportunistic gram-negative rod that can cause a variety of infections, including those involving the skin, lungs, urogenital system, and bone. P. aeruginosa is becoming resistant to many antibiotics, making it difficult to treat. Our previous studies have shown that cassia bark (CB), oregano (O), and red thyme (RT) oils have been some of the most effective at inhibiting the growth of P. aeruginosa. The goal of this experiment was to determine if a synergistic effect would be seen with combinations of CB, O, and RT on inhibiting the growth P. aeruginosa.
Methods: Zones of inhibition (ZOIs) were measured for each individual oil and oil combinations using disk diffusion assays for three different strains of P. aeruginosa (PA01, PA14, ATCC 27853). Ginger oil was used as a control to show that combining oils does not always increase effectiveness. Statistical significance was determined using Kruskal Wallis followed by Dunn's post hoc test.
Results: CB alone significantly inhibited the growth of all strains of P. aeruginosa the most compared to O or RT oils alone. The combination of CB and oregano, as well as CB and RT, had ZOIs between that of each individual oil in the combination, though no statistical significance was found. O, RT, and the combination of O and RT all had very similar ZOIs. The addition of ginger oil to CB, O, and RT decreased the ZOI, though not to a significant extent.
Conclusion: Taken together, results presented here illustrate that these oils do not have a synergistic effect, and thus would likely be better used alone rather than in combination. In agreement with our previous studies, CB more effectively inhibited the growth of P. aeruginosa compared to O and RT. Future experiments could determine if the active ingredients of these oils, rather than the entire oils themselves, have a synergistic effect or if other oil combinations have a synergistic effect.

7. Characterization of the binaural interaction component of the auditory brainstem response in an animal model of autism

Ian Koch*+, Michael Furey, Randy J. Kulesza Jr.

Autism spectrum disorder (ASD) is an increasingly common neurodevelopmental disorder associated with hypoplasia in the auditory brainstem. Previous studies have reported objective evidence of binaural processing disorders in ASD human subjects (AbdelMotaleb et al., 2019) by examining the binaural interaction component of the auditory brainstem response (BIC-ABR). The BIC-ABR is a sound-evoked electrical potential recorded via scalp electrodes representing the sum of neuronal activity in the brainstem. Thus BIC-ABR analysis is a promising diagnostic modality for ASD, potentially facilitating identification of this disorder prior to the manifestation of behavioral symptoms. In utero valproic acid (VPA) exposure is a validated animal model of environmental/epigenetic ASD origin and is a useful tool for investigating the neurobiology of this disorder. In this study, we utilize a VPA Sprague Dawley model of ASD to analyze latency, amplitude, and threshold abnormalities within the BIC-ABR of both control and VPA-induced ASD rats. Characterization of binaural coding in the auditory brainstem will contribute to our understanding of hearing difficulties in ASD and will direct sound-evoked enrichment.

8. Impact of In Utero Exposure on Neural Morphology and Connectivity of the Auditory Cortex

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In utero valproic acid (VPA) exposure is a verified and biologically relevant animal model of autism spectrum disorder (ASD). Typically, individuals with ASD have auditory processing dysfunctions within the ascending and descending auditory pathways. In utero VPA exposure in rats disrupts the auditory pathway resulting in abnormal neural responses to sound and hyperexcitability in the central nucleus of the inferior colliculus (CNIC). Furthermore, rats exposed to VPA in utero have fewer neurons and abnormal calbindin expression in the ventral cochlear nucleus (VCN), superior olivary complex (SOC), and CNIC. The auditory cortex (AC) is divided into six auditory association areas, each with a distinct functional role in processing sound and vocalizations, along with six cortical layers, each with distinct neuron morphologies and projections. Based on previous studies, we hypothesize in utero VPA exposure in rats will affect the AC in a similar way as the VCN, SOC, and CNIC. Furthermore, we hypothesize VPA exposure will result in fewer neurons, as well as smaller surviving neurons, fewer GABAergic inhibitory neurons, fewer calbindin positive neurons, and fewer descending neuronal projections from the AC to the ipsilateral CNIC. Within the six cortical layers of each four auditory association areas, we examined the morphology and density of the neurons, the proportion of inhibitory GABA and calbindin positive cortical neurons, and the proportion of retrogradely-labelled fluorogold neurons from the CNIC. Our results suggest that VPA exposure affects the AC similarly to the other regions along the auditory pathway, and therefore impacts sound and vocalization processing.

9. Effects of Frankincense Oil on Growth Inhibition of HPV16 Infected Keratinocytes

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Introduction: Human papilloma virus (HPV) is the causative agent of cutaneous warts and affects approximately 7-12% of the population. Warts caused by HPV can be difficult to treat and are often recurrent. Recent clinical observations have suggested that essential oils, such as frankincense oil (FO), can act as a treatment and preventative application for cutaneous warts. Therefore, the goal of this study was to determine the effects of FO on the percent viability in HPV-immortalized cells.
Methods: Human keratinocyte cells infected with HPV16 (HEK001) were cultured in the absence and presence of varying concentrations of FO, lemon oil (LO), 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, LO, and untreated cells. Statistical significance was determined by Kruskal Wallis test with a Tukey's post-hoc, and results less than 0.05 were considered significant.

Results: HEK001 cells exhibited a significant difference in percent viability when exposed to both FO and LO at concentrations of 1:1,000 when compared to control. Upon morphological observation, membrane blebbing and increased non-adherent cells were seen in FO and LO treated cells compared to control.
Conclusions: Results presented here demonstrate that higher concentrations of both FO and LO significantly reduce the percent viability of cultured HEK001 cells. Further studies should be conducted to determine possible synergistic effects of FO and LO on percent viability and morphology of cultured HEK001 cells.

10. Three-dimensional volume renderings reveal auditory brainstem abnormalities in children with autism spectrum disorder

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The majority of individuals with Autism Spectrum Disorder (ASD) demonstrate some degree of auditory dysfunction including, but not limited to hyperacusis, troubles with sound localization, and difficulty hearing in the presence of background noise. Results from previous studies suggest the Superior Olivary Complex (SOC) is consistently affected in individuals with ASD. More specifically, the Medial Superior Olive (MSO) of the SOC is highly impacted leading to significant dysmorphology and hypoplasia when compared to the neurotypical brain. Based on these previous studies, we hypothesize that the SOC in individuals with ASD occupies less overall brain volume and exhibits abnormal nuclear contours. In order to assess this hypothesis, we created three dimensional models of the SOC in seven children with ASD and three neurotypical subjects using Amira 6.7 software. Results of this study corroborate previous findings that ASD preferentially affects the SOC and in particular the MSO. The three-dimensional reconstructions illustrate this effect and emphasize the alterations in both volume and contour of the nuclei of the SOC. We believe these changes contribute to the collective auditory and social deficits amongst individuals diagnosed with ASD.

11. The Importance of Hand Drawn Maps in Forensic Archaeological Recoveries

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According to Dirkmaat and Adavasio (1997), archaeology and Crime scene reconstruction share common goals of systematically documenting, collecting, and interpreting physical evidence for the purpose of understanding the factors that affected the depositional history of the evidence. The establishing of context and association at an outdoor crime scene is crucial and should not be overlooked. One of the most straightforward ways to ensure context and association are recorded is a hand drawn map. The production of a hand drawn map will show the position and orientation of each element and piece of evidence found in situ at the scene. The goal of the hand drawn map is to produce an accurate depiction of the scene through plan-view and profile maps. The hand drawn map gives precise measurements of the evidence and the scene, providing context and association between one piece of evidence to another, as well as the spatial distribution of the evidence throughout the scene. Hand drawn maps also allow the excess material that is erroneous to the scene to be left out, only presenting the material that is forensically significant. Photographs and 3D scans cannot replace hand drawn maps because they do not exclude the erroneous information that may leave the evidence hidden or confusing. Unlike the hand drawn map, the photographs and scans of the scene do not include the context and association needed to perform a proper taphonomic interpretation. The importance of a hand drawn map in forensic archaeological recoveries is vital for proper reconstruction.

12. Comparison of the Accuracy of Identification Between Non-Human and Human Skeletal Elements

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Forensic anthropologists see a variety of cases, a great number of which are non-human versus human assessments. Without zooarchaeological training, remains may be misidentified. This could consequently lead to an unnecessary investigation into non-human remains or the lack of a pertinent investigation into human remains. Due to this shortfall, there is a consistent need of fully trained forensic anthropologists to assist in potential cases.

Human and non-human skeletal elements were photographed with and without scales and randomized into a singular document. The document was sent through e-mail to 50 participants. The participants consisted of law enforcement officers with no formal training on the topic, Mercyhurst University students with formal training in human osteology only and a culmination of members of the forensic anthropology community with both human osteological and zooarchaeological training. Participants were asked to view each photograph and determine if it was a non-human or human skeletal element. If able to do so, they were further asked to identify the specific bone as well as the species and side. The documents were then returned and compiled for preliminary statistical analysis.

Participants without osteological training demonstrated lower accuracy rates in the identification of human versus non-human skeletal remains. Those with formal human osteological training but no zooarchaeological had a higher accuracy in determining non-human versus non-human skeletal elements along with reporting the specific bone and side. The participants who had received formal training in both human osteology and zooarchaeology had a higher accuracy in identifying human skeletal remains from non-human.

13. Passive System for Removal of Micro- & Meso- Plastic from Presque Isle Bay

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More than 7,800 million metric tons of plastic have been produced from 1950-2017 (Schmaltz et al., 2020). These plastics are used to make products such as water bottles, shopping bags, pipes, paint, and even cosmetics. This surge in plastic use led to inevitable plastic pollution, not only on a macroscale, but on a microscale as well. Plastics over time will degrade into what are known as micro- and meso- plastics (MPs) 5mm and 5-20mm, respectively. These MPs cause great harm to the environment, especially to aquatic ecosystems. MPs tend to affect aquatic organisms lower on the food chain first and could bioaccumulate up through to humans. Given the growing concerns with MPs, new technologies and methods to remove MPs are more crucial than ever.

The goal of this project is to find a system mimicking natural processes, with minimal environmental impact, to remove MPs from Presque Isle Bay. This will be done through a floating wetland style system utilizing natural vegetation to capture and filter microplastics from the water. This design will make use of both plastic capture through roots of vegetation as well as mechanical straining through the stalks. After collection, vegetation will be analyzed for plastic removal and the productivity of the design determined. The desired outcome is to create a safe, natural, and sustainable way to clean our waterways with minimal environmental impact.

14. Capturing Micro- & Meso- Plastics in Presque Isle Bay using an Active System

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Plastic pollution is a global issue, affecting marine and freshwater environments. When ingested, plastic can have adverse health effects on aquatic life. Systems like the one created by Ocean Cleanup aim to collect marine plastic that accumulates in patches because of ocean currents. Plastic pollution also impacts surface waters, like Lake Erie, that are important sources for drinking water, recreation, industry, and food. Lake Erie has had some of the highest recorded plastic concentrations of all the Great Lakes, with especially polluted water near the highly populated southern coast. Our project aims to remediate this problem by collecting plastic in areas of highest density found offshore of urban areas. The active system will operate under solar power to separate and remove plastics (micro- & meso-) from water by capitalizing on plastic's relatively low density. Our project aims to make a small scale version of what can hopefully turn into a large scale solution to the micro plastic pollution problem seen in big bodies of water, specifically Lake Erie.

15. Microplastics: Atmospheric Deposition and Transport

Daniel T. Kaufmann*+ & Simontae Taylor*+, Gannon University

Microplastics are quickly becoming ubiquitous in the global environment. Microplastics found in precipitation illuminate a transport mechanism for their dispersal in ecosystems unaffected by anthropogenic means and an avenue for entering localized and global food webs. In this research precipitation samples will be obtained over the course of late fall, winter, and early spring to determine the amount of microplastics that exist in this medium. Two precipitation collectors will be used to collect samples and will be located in an urban and suburban area. Collection and analysis will take place after each precipitation event and each sample will be filtered and examined using fluorescence microscopy to identify microplastics less than five millimeters in size. With these data a more complex level of research can take place in the future to determine the types of microplastics present, chemicals of potential concern, and tracking methods to determine points of origin. Therefore, a quantitative analysis of these microplastics within this mobile system of atmospheric precipitation can give a better understanding of how to remediate, prevent, and keep clean our soil, oceans, and freshwater systems. This information will be valuable in preserving the integrity of the Laurentian Great Lakes and their respective watersheds as they hold nearly twenty percent of the world's freshwater, and supply drinking water to nearly thirty million people throughout the United States and Canada.

16. Synthesis and Spectroscopic Characterization of Manganese(III) Tetraphenylporphyrin Halide Complexes

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Manganese porphyrins are often used as precursors for high-valent Mn-(di)oxo intermediates, which are key species in several reactions, one of which is olefin oxidation. In order to understand these species, it is important to investigate their geometric properties and electronic structure. This work focuses on the synthesis and spectroscopic characterization of simple high-spin [MnIII(TPP)X] (X=F,Cl,I,Br) complexes. While their synthesis has been previously published, emphasis has been placed on the characterization of these complexes given their propensity to photodegradation. UV-vis, NMR, and MS spectroscopies, and elemental analyses have been conducted to achieve this goal. The chloro-complex was studied in detail using variable-temperature variable-field magnetic circular dichroism (VTVH MCD) spectroscopy to generate polarizations of the different electronic transitions that are observed in the optical spectra. Time-dependent density functional theory (TD-DFT) was used to assign the deconvoluted bands, and understand the origin of the unusual Soret band that is characteristic of high-spin

manganese(III) porphyrins. The unique Soret band is explained by the strong mixing of key porphyrin and chloro-Mn orbitals causing the intensity of the Soret band to spread into the higher energy charge-transfer region of the optical spectrum. The heavier ligands demonstrate different absorption features that are not found in Fe porphyrins. DFT calculations on the bromo- and iodo- complexes show enhanced orbital mixing and increased separation of the Soret band, supporting this conclusion. The insight garnered from studying the unique features of high-spin manganese(III) porphyrins may be leveraged to develop new types of reaction chemistries within this group of compounds.

17. Effects of harvest intensity on stream chemistry and macroinvertebrate communities.

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Forest management practices may further impact aquatic ecosystems in Pennsylvania watersheds with acidified streams. Timber harvesting increases the N〖O_3〗^--N, acidifying soils, decreasing pH and acid neutralizing capacity (ANC) (Siemion et al. 2011). Harvesting near streams reduces macroinvertebrate diversity, especially the order Ephemeroptera. The effects of harvest intensity on water quality and sensitive macroinvertebrate orders were monitored in six 100-200 acre watersheds in the Allegheny National Forest. Two watersheds were partially harvested (25-35%), and four served as uncut references. Water quality parameters, including pH, temperature, total dissolved solids (TDS), and conductivity were monitored from May to October in 2018 and 2019 using an HI-9828 multimeter. ANC was determined by titration in the lab. Kick net samples of macroinvertebrates were sub-sampled in the lab, and then sorted to order (EPT). Macroinvertebrate diversity decreased across all sites from 2018-2019. Trichoptera were uncommon in these headwater streams, and by 2019 Ephemeroptera abundance decreased by 50% or more in most streams. Five watersheds showed an increase in pH (range: 0.07-1.63), however Whitney Run (reference) decreased by 2.65 after 2018. Temperature increased across all six watersheds by an average of 3.3 degrees, but conductivity and TDS hardly changed. Removing less basal area could explain this response, as described by Siemion et al. 2011, and the macroinvertebrate response was also consistent with diversity responses to timber harvest. These results help us to gain insight into the possible effects of harvest intensity on macroinvertebrates and stream chemistry in headwater streams

18. Pre-restoration summary of organic matter content in Little Arnot Creek, Allegheny National Forest

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Many small streams in Pennsylvania have become incised due to human activity. This channel deepening has led to a myriad of issues including stream bank erosion and increased discharge during storm events. Headwater streams serve as a critical link between terrestrial and downstream ecosystems in transporting organic material. Both dissolved (DOC) and particulate organic carbon (POC) play a role in the global carbon cycle and serve as an energy source for aquatic heterotrophic bacteria. In the Allegheny National Forest, we are implementing adaptive management strategies on Little Arnot Creek to document changes in organic material. These improvements include placement of whole trees (with canopy and rootwad) as well as logs in the stream and floodplain, planned to begin in the summer of 2021. The goals of the project are to slow the movement of water, raise the water table, disperse more water onto the floodplain, and to increase the storage capacity of organic material within the watershed. We have collected replicate water samples monthly since September 2019 to assess baseline conditions of DOC and POC concentration and DOC quality (absorbance and fluorescence). Water samples are collected by hand at six permanent stations on Little Arnot Creek. We also collect water from a two stations within Cherry

Run (control stream). Preliminary data suggests the DOC concentration and quality vary seasonally and that POC concentrations are low.

19. Heavy Metal Analysis of Sediment Within Creeks, of Erie County, PA

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The primary focus of our study is to analyze the amount and types of heavy metals in the sediment of certain creeks in Erie County, PA. More specifically, we would like to compare and contrast the heavy metal concentrations in suburban and rural creeks. Understanding this information can lead us to future studies of potential sources, their effects on the surrounding environment, as well as how to minimize these pollutants. We will be collecting core and dredge samples from each site, and analyzing the samples through inductively coupled mass spectrometry for 25 different types of metals. The creeks we will be focused on are Elk Creek (rural), Cascade Creek, and Mill Creek. After collecting core samples, we would like to determine the concentrations of heavy metals at the various sediment pore levels. We will determine our sampling sites within the creeks by hypothesizing locations we feel would have a greater chance of having heavy metals inputted. We will mark these locations on a GPS to retain the exact coordinates of the sampling site.

20. Acid Mine Drainage Remediation for Big Run Creek Site

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Acid mine drainage is a major issue across the world but is especially detrimental within the Appalachian region encompassing western Pennsylvania. This project will look at revitalizing an acid mine drainage remediation site within Indiana County, PA. The proposed site already has a system in place consisting of a limestone bed, a stilling pond and a cattail pond. However, the system has not been as effective as is necessary within the removal of metals from the water for discharge into the local creek. Water and sediment samples will be gathered in order to evaluate the current rate of metal removal. An analysis of the current process will be completed in order to create a multi-step system to meet Pennsylvania EPA standard removal of metals from the mine drainage. The newly implemented passive system will include multiple organic materials focused towards removal of heavy metals from the water while still utilizing the lime and vegetation currently in place. One of the constraints for design is using natural and readily available materials. With this, the materials being considered for design have been narrowed down to mussel shells, activated carbon, and clays. By using a system of these materials, the removal of metal will exceed that of the current system.

21. Macroinvertebrate and Benthic Algae Recovery after Abandoned Mine Remediation in Bear Run, Indiana County, Pa

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This study investigates the biological condition of the Bear Run Watershed following remediation from abandoned mine drainage. While water quality has improved dramatically, recovery of the aquatic insect communities has been sluggish. To investigate the role of substrate quality in this slow recovery, we measured macroinvertebrate density and algal abundance on artificial and natural substrates at three control sites (North Branch, Keal Run, and Banks #1) and three acid mine drainage sites (South Branch, Below Silo, and Murray Run). As a possible cause of declined macroinvertebrate recovery, the iron composition on natural substrate was analyzed using the Astre-dry mass method. Alkalinity, pH, total dissolved solids, and water temperature were also collected during each collection period. Preliminary results indicate that substrate type explains at least some variation in algal growth and macroinvertebrate density. A two-way ANOVA for Chlorophyll a and Pheophytin result in a minimal difference between

natural and artifical substrate; however, a graphical analysis indicates possible site-specific responses. A times-series regression analyzes the algae growth throughout three collections over six months. The results also indicate variation in the macroinvertebrate collection between Hess samplers and Hester-Dendy samplers. We anticipate our findings will inform remediation efforts in streams impacted by abandoned mine drainage.

22. The Effects of Gas and Oil Extraction on Insects in the Allegheny National Forest

MyKenna Zettle*+
University of Pittsburgh at Bradford

Large sections of Pennsylvania's forests are dedicated to crude oil and gas extraction. This extraction causes fragmentation and the formation of edge habitats. In this study, the abundance of insects was measured via blue vane traps and bee bowls to compare well-pads and interior regions of the Allegheny National Forest in Pennsylvania. Of the 12 sites studied, half contained *K. latifolia*, or mountain laurel, as an abundant pollen source. In addition to a well-pad, shorter vegetation, and higher sun exposure characterized well-sites, while interior sites were dense forest patches and had high canopy coverage. The highest proportion of individuals of the orders Acari, Aranea, Collembola, Coleoptera, Diptera, Homoptera, and Hymenoptera were found at the interior sites where mountain laurel was present. These sites were damper, detritus-rich, and had little exposure, which likely explains why some of those orders were more abundant there. The well-sites had more than double the abundance of insects than interior sites, meaning that the species there must be more tolerant of high-exposure habitats. In this study, well-pads were not found to negatively harm insect abundance or species richness. With additional changes to the study, mainly an increase in sample number, the effects of oil and gas extraction site on insects can be better understood.

23. 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 during the last five hunting seasons, and from two counties in West Virginia last season. 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 2014-15 and a low of 30.9% in 2016. Individual mean infection with *Ascarida* were significantly lower during the 2016 and 2018 seasons than during the other 3 seasons. The infection rates of *Heterakis* have remained relatively similar throughout all five seasons with the greatest infections occurring during 2017 and the lowest during 2018. During 2018, and for all four seasons combined, juvenile grouse had significantly greater mean infections of both *Ascarida* and *Heterakis* than did adult grouse. There were no significant differences between the sexes. We are currently working on data from 2019 (delayed by the pandemic shutdown), and including more data from West Virginia to allow comparison between states.

24. Green Infrastructure for an Urban Campus

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When precipitation falls onto an urban area it does not have the opportunity to infiltrate the ground, instead most of it enters the stormwater system where the water gets dumped into a nearby body of water. Stormwater picked up multiple contaminants along the way; solids, metals, pathogens, nitrogen, phosphorus, synthetic compounds, petroleum hydrocarbons, etc. Gannon University is located within the city of Erie making it an urban campus. Green infrastructure creates a landscape that helps with the management of stormwater by restoring or mimicking the natural water cycle. It allows water to be

naturally filtered by infiltrating the ground or through a treatment system that helps the removal of some pollutants. Gannon's campus was broken up into 29 different site locations with a total acreage of 50.61 acres. Interference with the city streets or other properties that were not owned by Gannon are not allowed to occur. The goal is to create a green infrastructure master plan for Gannon University which will help eliminate pollutants that are in storm water and decrease the amount of water that ultimately reach the stormwater system. Within the property owned by Gannon, there are multiple ways that green infrastructure could be implemented and achieve the goal of limiting the amount of water that enters the stormwater system. Green infrastructure implementations that are under exploration include rain gardens, permeable pavement, downspout disconnection, rainwater collecting, etc. The techniques are site specific to the location of the proposed implementation.