Volume XXIII **ISSN: 1555-3760**

PROCEEDINGS OF THE 53RD ANNUAL MEETING

COMMONWEALTH OF PENNSYLVANIA UNIVERSITY BIOLOGISTS

CPUB

Commonwealth of Pennsylvania University Biologists

April 9, 2022

Hosted Virtually By:

Department of Biological Sciences

Lock Haven University

Lock Haven, Pennsylvania

Due to the webinar format and the asynchronous nature of the poster session, all posters are available for viewing on our Conference D2L Site at https://lhu.desire2learn.com/d2l/home/3357219. Login information was sent to you recently. If you need help logging in, please contact Jan Bottorf at jbottorf@lockhaven.edu.

Proceedings of the
Commonwealth of Pennsylvania University Biologists
53RD Annual Meeting, April 9, 2022

Hosted virtually by the Department of Biological Sciences
Lock Haven University
Lock Haven, PA

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Commonwealth of Pennsylvania University Biologists
53RD Annual Meeting, April 9, 2022

Schedule of Events:

8:30 – 9:25 AM	**CPUB Directors' Meeting-** Zoom Invitation from CPUB Interim President Dr. Matthew Foradori
9:30 – 9:45 AM	**Welcome and Introductions: Use link in your registration email** **Webinar ID: 918 7373 3483** Lock Haven University Conference Host: Dr. Heather Bechtold (emcee) Lock Haven University Interim President: Dr. Bashar Hanna CPUB Interim President: Dr. Matthew Foradori, Edinboro University
9:45-10:45 AM	**Keynote Address** Mr. Gregory Turner (PA Game Commission) **"A Scientific Career Path: The Road That Has No End"** Dr. Brent Sewall (Temple University) **"Saving Bats from a Deadly Disease: Ecological Research and a New Hope for Bat Conservation"**
11:00 – 12:15 PM	**Platform Presentations (Ecology and Organismal Biology A) *** **Zoom Meeting ID: 675 2027 178** OR
11:00 – 12:00 PM	**Platform Presentations (Cellular and Molecular Biology A) *** **Zoom Meeting ID: 965 2071 1815**
12:15 – 1:00 PM	**Lunch Break**
1:00 – 2:00 PM	**Platform Presentations (Cellular and Molecular Biology B) *** **Zoom Meeting ID: 972 7457 2143**
2:15 – 3:15 PM	**View Poster Presentations on D2L** and judging
3:30 – 4:15 PM	**CPUB Business Meeting Webinar*** **Zoom Meeting ID: 985 0887 4982**
4:30 – 5:30 PM	**Awards Webinar: Use link in your registration email** **Webinar ID: 918 7373 3483**

Keynote Co-Address:
Gregory Turner and Brent Sewall

GREGORY TURNER

State Mammologist, Pennsylvania Game Commission
Harrisburg, PA, USA

Mr. Turner is a certified wildlife biologist with research experience in disease ecology, behavior, genetic diversity, metabolic and reproductive physiology, and works professionally toward the conservation and management of bats. Mr. Turners research focuses on a wide variety of mammals in the state of PA, but of particular interest is his work on bat pathogens. Bats have the ability to host a wide range of alarming pathogens that have implications for human health. Mr. Turner has been monitoring and researching many aspects of bat ecology including focuses on hibernation dynamics and behavior, migration, foraging parameters, and fall swarm movements. Since 2007 extensive efforts have focused on understanding the spread, impacts, and physiological parameters of White-nose Syndrome (WNS) in North American bats. The technical aspects of the proposed research involve construction of specific data loggers to measure arousal patterns across hibernation, measuring and photographing WNS lesions with UV light, examining changes in BMI, and conducting research on captive wild bats in natural settings. Original development of techniques to be able to accomplish novel tasks along these lines or extensive experience conducting standard research in the field examining these variables are all among the many skills Mr. Turner possesses with prior WNS research. Funding from a variety of sources over the year includes the USFWS, Wildlife Management Institute, PA Department of Conservation and Natural Resources, Wild Resource Conservation Fund, and the National Speleological Society. Specific WNS related research including both published and works in progress include: development a new and non-lethal diagnostic and measurement technique for WNS infections, changes in hibernation physiology, microclimate influences on WNS progression, examining changes in infection load compared to length of time colony exposed to WNS, examining changes in body mass in response to WNS, and the use of antifungal agents to treat captive wild populations with WNS. His work has been published in many top tier journals including the journals Nature, Science, and Plos One and has highly cited methodology papers describing ways to decrease the spread of pathogens by treating bats. This far-reaching collaborative research inherently examines the conservation and management of wildlife and zoonotic diseases that threaten animal and human health globally.

BRENT SEWALL, Ph.D.

Associate Professor, Department of Biology Temple University
Philadelphia, PA

Dr. Brent Sewall's research is to understand and address critical and emerging threats to biodiversity and to develop effective strategies for conservation. Ongoing work focuses on understanding threats to North American hibernating bats caused by the emerging infectious disease known as white-nose syndrome; identifying and addressing critical threats to tropical and temperate biodiversity; and understanding factors underpinning the resilience of ecological communities. His work has focused on cave, forest, and grassland communities in eastern North America and tropical sub-Saharan Africa, including in both intact and human-dominated ecosystems. Dr. Sewall is also providing technical advice on ecology and conservation to the Pennsylvania Mammal Technical Committee and the White-Nose Syndrome Response Team. He has received the American Society of Mammalogists' William T. Hornaday Award for outstanding contributions to mammal conservation, the U.C. Davis Merton Love Award for best dissertation in ecology and evolution, and Temple University's William Caldwell Memorial Distinguished Mentoring Award. Previously, Dr. Sewall was a Research Assistant Professor at Temple and a Visiting Assistant Professor of Conservation Biology at the College of William and Mary. Dr. Sewall received a Ph.D. in Ecology from the University of California, Davis, an M.S. in Conservation Biology from the University of Minnesota, and a B.A. from Penn State University.

2022 OUTSTANDING STUDENT AWARD RECIPIENTS

In 1977, CPUB initiated an Outstanding Student Awards Program to honor a life science student at each Pennsylvania SSHE University who best exemplifies scientific scholarship and academic achievement. These awards are presented each year at the CPUB Annual Meeting. The criteria for student selection are established by the department members at each university.
Student award winners are provided funding by CPUB and the individual departments so that they can attend the Annual Meeting.

This honor of distinction is given to one student at each SSHE University, but it represents the academic virtues possessed by numerous students who attend these Pennsylvania Universities. Many of the previous CPUB Award winners are presently attending various graduate and medical programs. Others have graduated and are presently involved in scientific research, teaching, or medical professions.

Nathan Slotnick, Bloomsburg University

Nathan Slotnick has been selected by the Biology and Allied Health Sciences Faculty at Bloomsburg University as the outstanding CPUB student for 2022. Nathan is a graduating senior majoring in Biology with a Molecular Biology Focus. Upon Graduation, Nathan has applied to attend a biotechnology master's program with the goal of becoming a lab-based scientist. While attending Bloom, Nathan has been a student in the honors college completing an Honors research thesis in the lab of Dr. Kate Beishline. Nathan began researching with Dr. Beishline in the spring of 2021, and has received a Bloomsburg Undergraduate Research and Creative activities fellowship, a Bloomsburg Professional Experience Grant, the CPUB undergraduate research grant, and a National Beta Beta Beta Honor Society student grant, to support his research endeavors. He's presented his work both at the university sponsored research events but locally also regionally at the Susquehanna Valley Undergraduate Research Symposium. Nathan's research has focused on developing a system for studying the mammalian transcriptional regulator BORIS and its function in telomere biology. In addition, Nathan has served as an officer Bloomsburg's Chapter of Beta Beta Beta, the National Biological Honor Society and is an active member of the Biology community on campus. If that all wasn't enough, Nathan is a starting member of the Bloomsburg Men's Soccer team and has been honored both at the university level as an athletic scholar but also honored by the Pennsylvania State Athletic Conference. Nathan undoubtably has a big future for him in the Biotechnology Industry.

Makenzie Cree, California University

Makenzie Cree is majoring in Biology Pre-medicine, minoring in Chemistry, and has a cumulative GPA of 3.927. Her outstanding academic achievements have been recognized by numerous honors, including making the Dean's list every year and as a PSAC Scholar Athlete when she was on the volleyball team. For the past year, Makenzie has been conducting research that examines how Alprazolam affects regeneration in Planaria. She wrote a grant to support this project, which was successfully funded, and has presented her preliminary findings at CPUB and at campus research events. She is president of the Medical Interest Club, and a member of the Alpha Lambda Delta National Honors Society, and volunteers at many campus events and in the community, including the Lions Club and Ruby Memorial Hospital. Makenzie also works part-time as an X-ray technician assistant and plans to attend medical school after graduation.

Kaia Rearick, Clarion University

Kaia is a senior who will graduate in May 2022 with BS Molecular Biology and Biotechnology, BS Medical Technology double major. Kaia is an exceptional student, student researcher, and role model. Throughout her time at Clarion, she has been the lead student on several undergraduate research projects, working with a variety of faculty members on projects ranging from new treatments for infectious diseases to regulation of bone remodeling. Based on her academic performance, she received the Nancy Shaw McKee Scholarship and APSCUF Scholarship in 2021. Kaia is the president of the Translational Research Medicine Club (TRMC) and has been pivotal in organizing many activities including a large symposium on HIV in collaboration with the Rural AIDS Alliance that was open to the public. Kaia additionally serves the department as the head of the microbiology prep room where she organizes three other student workers in making essential reagents for several classes. Throughout all of these extra-curricular activities (including numerous presentations at conferences), Kaia has maintained an excellent 3.86 GPA while studying for a demanding double major. Despite being busy with school, research, and part time jobs, she still makes time for her community by volunteering at the March of Dimes, serving as a missionary through Grace Baptist Church as well as serving as a firefighter at the Hawthorn Fire Department. In her free time Kaia enjoys playing softball, snowboarding, and crafting. Additionally, she has been the Vice-President for her sorority Sigma Sigma Sigma and actively involved in organizing events for them. Following graduation for her BS in Molecular Biology and Biotechnology, Kaia will be attending UPMC Altoona Hospital in Altoona, PA for her clinical placement for her Medical Technology degree. From there Kaia plans to dedicate her career to conducting laboratory work in a clinical setting.

Erin Hunt, East Stroudsburg University

Erin Hunt is a senior Biology major and Chemistry minor at East Stroudsburg University. She will be graduating in 2022, and plans to attend medical school the following year. Erin is an outstanding student and member of the ESU Honors Program, making the Dean's List every semester and earning an overall GPA of 3.996. She has conducted research in both Psychology (on academic success, with Dr. Bonnie Green) and Microbiology (on dual-species biofilms, with Dr. Joshua Loomis). Erin has been a leader in several clubs at ESU, including as both secretary and vice-president of the Rotaract Club, and both secretary and president of the Best Buddies Club, a group which facilitates inclusive activities and meaningful social connections for people with intellectual and developmental disabilities. In addition to these leadership roles, Erin has also been an active participant in the Pre-Med and MedLife Clubs. Erin has been an active volunteer at ESU and in the broader community, including as a volunteer for multiple sclerosis fundraising events, a medical service trip to Haiti, and a local food pantry volunteer. Erin is a student mentor in ESU's Clear Path Program, serving as an academic tutor for STEM students who earned transfer scholarships to ESU from partnering community colleges. While at ESU, Erin has worked as a medical assistant, completed physician shadowing experience, and works as an Emergency Medical Technician. Erin's studies at ESU are supported by the Margaret A. Rosa '83 Pre-Med Endowed Scholarship and the board of Governors Science & Technology Scholarship, both of which are awarded in recognition of academic success. Outside of her academic and professional pursuits, Erin is also a violinist in the community orchestra at Moravian College.

Jonathon Lutz, Edinboro University

Jonathon will graduate in May of 2022 with a Bachelor of Science degree in Biology with a concentration in Biology: Pre-Veterinary and a minor in Psychology. He has made the Dean's list every semester by maintaining a 4.0 GPA. Jonathon earned the Kevin F. "Rocky" Burkhardt Scholarship, a top honor given to elite Edinboro University undergraduate biology students. In his spare time, he works as a crisis counselor for the Crisis Text Line. Jonathon's career focus has shifted to genetic counseling, and he shadowed several genetic counselors over the last two years. After graduation, Jonathon plans on gaining experience as a genetic counseling assistant to gain valuable experience before applying to graduate school for genetic counseling.

Sarah Grandinette, Indiana University

Sarah Grandinette will be graduating in May from Indiana University of Pennsylvania with a BS in Biology with a Cell and Molecular concentration and Biochemistry. She is a member of the Cook Honors College and the Biology Honors Program. She joined Dr. Cuong Diep's lab in her freshman year and has participated in the Biology Undergraduate Research Experience

(BURE), Research Experience for Summer Scholars (RESS), and Undergraduate Summer Opportunity for Applying Research (U-SOAR) programs at IUP. Her research focuses on identifying novel peptides that bind to an essential transcription factor in zebrafish kidney development and regeneration and testing them in vivo to see if they affect zebrafish development. Her experience led to a second author publication in the Journal of Visualized Experiments titled "In Situ Hybridization in Zebrafish Larvae and Juveniles during Mesonephros Development." She had accepted a National Science Foundation funded Research Experience for Undergraduates at Mount Desert Island Biological Laboratories in 2020, but this was canceled due to the COVID-19 pandemic. She also spent a summer at the University of Texas MD Anderson Cancer Center studying the role of a methyltransferase in medulloblastoma (a type of brain cancer). Sarah has presented her research at several conferences including the IUP Scholars Forum and the Commonwealth of Pennsylvania University Biologists (CPUB) poster session. She was awarded the Dean's award and the Woman in STEM award for her oral presentation at the IUP Scholars Forum 2021. She has been awarded several grants including the Cook Honors College Achievement Fund, CPUB grant, Pennsylvania Academy of Science grant, Undergraduate Student Research grant, and the Sushak Undergraduate Biology Fund for Excellence. She has participated in biology and chemistry tutoring, the Biology Mentor program, and volunteered at Monongahela Valley Hospital. She has served as the Health and Safety Officer of the professional chemistry fraternity, Alpha Chi Sigma, and is currently the Master of Ceremonies. She is a member of the National Society of Leadership and Success, Phi Kappa Phi Honors Society, and American Chemical Society. She plans to attend graduate school and conduct gene therapy research to earn her PhD.

Zachary Glass, Kutztown University

Zachary Glass is a native of Philadelphia who discovered a love for insects and entomology early in his life. What started out as a hobby, would latter develop into a passion and career aspirations. In 2018, Zachary enrolled in the Environmental Science/Biology Program at Kutztown University. By the time that he could take upper-level courses in entomology, Zachary commanded an impressive understanding of insect taxonomy. His course work, lab projects, and reports in General Entomology were exceptional, and his research-grade insect collection would be at home in any fine natural history collection in the world. In Systematic Entomology, Zachary mastered sight identification for 211 insect taxa. Zachary would become a course assistant in these courses and, unofficially, a part-time tutor for other students. Zachary jumped into independent research on insects and has worked on three separate insect-related research projects. In spring 2021, Zachary conducted for-credit independent research on the comparative morphology of the corbel character system in broad nosed weevils. He used Kutztown University's new Scanning Electron Microscope to make an image library to catalog the morphology for future studies. In Fall of 2021, Zac gave a research presentation on this work at the 95th Annual meeting of the Entomological Society of Pennsylvania and was recognized by that Society's Outstanding Young Entomologist Award. At the same time, Zachary started work on a not-for-credit project where he trained to

become an IUCN Red List assessor and contributed to new assessments of several insect species as a part of the Kutztown University Red List Initiative. He created range maps in ArcGIS for three assessments of the endangered Fijian Giant Long Horned Beetles that were published in December 2021. Zachary has recently submitted his own Red List assessment for the Cocoa Weevil Borer (*Pantorhytes biplagiatus*), a clown weevil from the Solomon Islands, which is currently in peer review. Following graduation, Zachary plans to attend graduate school for Systematic Entomology and hopes to teach at the college level. In the meantime, he continues his work on Red List research and help PennState Extension to assess how hygienic bees handle parasitic mite infestations (the third independent project that he started as an undergrad!).

Kayla Forlenza, Lock Haven University

Kayla is a Senior Biology major with minors in Chemistry and in Environmental Studies. Her GPA is 3.968. In addition to the formal classes, she has completed 3 Independent Studies: Readings in Animal Nutrition, Goat Parasites, and Mosquitofish Reproduction.

Kayla has been very active in clubs and organizations and has held leadership roles in several of them. She has been a member of the Pre-Vet Club and served as Treasure and President for the club. She is also a member of the Global Honors Program for which she has been a Group Leader and Council member. She is a member of the Biology and Circle K International Club, for which she is the Secretary. She is a Public Issues Forum Team Member, and she has been a Biology Major Peer Mentor for 3 years. She is a past member of the American Pre-Veterinary Medical Association.

Kayla has also been active in her, and the Lock Haven, community. She volunteers at the Blue Chip Animal Farm Refuge and Clinton County SPCA taking care of the residents. She also has volunteered at Susqueview Nursing Home serving dinner to the residents and their families, and participated in the Lock Haven Hospital Jared Box Project.

Kayla has worked as a lab assistant for the introductory biology courses since her sophomore year. She has won numerous awards here at LHU, including the David White Arts and Science Scholarship, Honors Alumni Coalition Scholarship, Global Honors Program Junior Student of the Year, Mary Pursell Award in Genetics, Paul and Shirley Klens Scholarship, and the 2021 Biology Honors Award.

Kayla has pursued several opportunities to gain valuable experience in veterinary medicine. She started at PetSmart as a cashier, but very quickly moved into a pet care associate, working directly with the animal and their owner, providing basic care. In May 2020, she was hired by Plains Animal Hospital as a veterinary assistant. She is acquiring valuable technical experience, as well as patient care skills, and communication skills with owners, in often difficult circumstances. Kayla continues in that position during semester breaks. Kayla has been accepted by 4 veterinary medicine programs and is in the process of deciding which one is the best match for her.

Jamie Stephan, Mansfield University

Jamie Stephan is a senior at Mansfield University who will be graduating in August 2022 with a B.S. in Biology/Fisheries Concentration. She has a cumulative GPA of 4.0 and has been named to the President's List each semester. Additionally, she has been recognized as an outstanding student in both biology and chemistry and is a General Chemistry supplemental instructor and tutor. Currently, she is collaborating with Dr. Gregory Moyer and Dr. Elaine Farkas to establish baseline microplastic concentrations in first-order streams within Tioga County. With these data, she is also investigating correlations with macroinvertebrate abundances and stream water quality. This project has involved a variety of field sampling, specimen identification, sample processing, and fluorescence imaging. Outside of her coursework and research, Jamie is very active in her field and community – activities include volunteering with Mansfield's Fisheries Program, Trout Unlimited, and Paradise Sportsman's Association as well as interning at Blooming Grove Hunting and Fishing Club. After graduation, Jamie will be attending Stephen F. Austin State University as a research assistant to earn her M.S. in Biology, concentrating on Aquatic Community Ecology

Emily Dalessandro, Millersville University

Emily Dalessandro is a senior who will graduate in May 2022 with a B.S. and Departmental Honors in Biology. Her academic performance has been outstanding, earning Emily several scholarships and a GPA of 3.90. Over the past two years, Emily has been working with Dr. Jonathan Stoltzfus on understanding the genetic changes that have occurred with the evolution of parasitism in nematodes using both genomic and transcriptomic methods. She has elucidated specific changes in genes controlling sex determination in parasitic nematodes and is second author on a recent manuscript entitled "Transcriptional profiles in *Strongyloides stercoralis* males reveal deviations from the *Caenorhabditis* sex determination model" that was published in *Scientific Reports* in April 2021. More recently, Emily has been working on uncovering differences in dauer signaling pathways between free-living and parasitic nematodes. Outside of the lab, Emily has worked as a Biology Academic Mentor since fall 2019, providing support for students in core biology courses. She has additionally worked as a Zoology Laboratory Assistant, helping to prepare specimens and cultures and maintain the lab. Apart from her work in the Biology Department, Emily has been working nearly full-time as a Veterinary Inpatient Nurse Assistant at a local veterinary clinic, which has provided hands-on experiences for her future career in veterinary medicine. Not only is Emily an incredibly talented and dedicated student, she is also a kind and compassionate person. Emily plans to enter veterinary school in fall 2023.

Kelsey Ertwine, Shippensburg University

Kelsey is a senior Biology major with a concentration in Health Professions and a minor in Psychology. Kelsey has an outstanding 4.0 GPA, with recognition of her dedication and hard work from the Shippensburg University Biology department, and support from a Shippensburg University Board of Governors' Scholarship. A Shippensburg University Undergraduate Research award provided funding for her current research project with Dr. Sherri Bergsten, where she and her partners have been able to demonstrate a link between autophagy regulation and cancer cell migration in a glioblastoma cell line. In addition to her academic success, Kelsey has also provided leadership and service to the university as a Chemistry tutor and teaching assistant, and as a Team Leader for the Student Ambassadors that give campus tours and provide guidance to prospective students at admissions events. In the research lab and in her role as a Student Ambassador, Kelsey always willingly steps up to do good work, to assist others, and to provide thoughtful perspective. Kelsey has been accepted into PhD programs, where she will pursue her interest in Biomedical Sciences with plans to continue working in the field of Cancer Biology.

Hannah Dean, Slippery Rock University

Hannah Dean is a senior majoring in Biology and minoring in Chemistry. She currently has a commendable 4.0 GPA. Hannah's academic performance is extremely impressive, especially given her involvement in a multitude of extracurricular activities. Hannah has been the recipient of both SRU SCORE and SRSCA grants to fund research projects she has done investigating the impacts of insecticides on amphibians with Dr. Paul Falso. She is also currently continuing her research doing an independent study. She presented at both the SRU symposium in the Spring of 2021 and recently at the 2022 Society of Integrative and Comparative Biology as first author on poster. She will also be presenting more research at the SRU symposium in Spring 2022. During her time at SRU Hannah expressed a true dedication to the veterinary field and found many ways to gain experience. She completed two internships at Apple Grove Veterinary Clinic with different supervising veterinarians and different responsibilities. Her internship in Winter of 2020 involved providing veterinary care at a livestock sale barn, while her current internship in Spring of 2022 involves working in small animal care and large animal emergencies. She juggles all these activities and excellence in academics while also working part time during the semester and full-time during breaks as a Veterinary Technician. Hannah has been accepted to at least one Doctor of Veterinary Medicine program, which is a true accomplishment given the competitive nature of the programs. Hannah is an exceptional student, extremely friendly, and is one of the top students encountered in the Biology department. She is truly deserving of the Outstanding CPUB Student Award and would represent the best of SRU.

CPUB Student Research Grant Recipients for 2021-2022

Hannah Langkamer-Smith, Kutztown University: "Analysis of Bacteriophage T7 Life History Traits During the Infection of *Escherichia coli* Cells in Stationary Phase", CPUB Faculty Mentor: Dr. Richard Heineman

Mitchell J. Liddick, Bloomsburg University: **"**Using Mesocosms to Investigate the Effects of Polyester Microfibers on Freshwater Biofilm Community Structure and Function", CPUB Faculty Mentor: Dr. Steven Rier

Eric S. Moeller, Bloomsburg University: "The Effect of Repeated Anandamide Treatment on Orexin, Weight Loss, and Physical Activity in Zebrafish (*Danio rerio*) During Caloric Restriction", CPUB Faculty Mentor: Dr. Candice Klingerman

Elefteria Papavasilis, Millersville University: "Monitoring the Biodiversity and Rate of Biological Growth on Two Sunken Boats at Lake Allure, Pennsylvania", CPUB Faculty Mentor: Dr. Dominique A. Didier

Scott Semelsberger, Indiana University: "Finding Novel Molecules that Affect Kidney Development in Zebrafish", CPUB Faculty Mentor: Dr. Cuong Diep

Nathan E. Slotnick, Bloomsburg University: "Inducible BORIS Expression in Infected HCT116 Cells", CPUB Faculty Mentor: Dr. Kate Beishline

CPUB Student Travel Grant Recipient for 2021-2022

Darby Byington, Indiana University: "Population Ecology and Comparison of Methods for Sampling Invasive Round Goby (*Neogobius melanostomus*) in LeBoeuf Lake, Pennsylvania", presentation at the American Fisheries Society Annual Meeting, Baltimore, Maryland, November 6-10, 2021, CPUB Faculty Mentor: Dr. David Janetski

Platform Session

Ecology and Organismal Biology A

Saturday, April 9, 2022
11:00am-12:15pm

Meeting Link

Zoom Meeting ID: 675 202 7178

(Moderator: D. Spooner)

11:00-11:15 **Z.J. Glass, G.P. Setliff*, K. Friehauf (2022)**
A Survey of the Morphology of the Hind Tibial Apex in Broad Nose Weevils (Coleoptera: Curculionidae: Entiminae)
Kutztown University, Kutztown, PA 19530

11:15-11:30 **K. Procopio, C.C. Farmer, B. Steward, C. Hardy*, and M. Klosinska* (2022)**
Exploring adaptation and gene flow between Arabidopsis lyrata populations growing on serpentine and non-serpentine soils.
Millersville University of Pennsylvania, Millersville, Pennsylvania, 17551

11:30-11:45 **Shadle A. and D.E. Spooner* (2022)**
Development of a reliable protocol to measure critical thermal maxima in tessellated darters
Lock Haven University, Lock Haven, PA 17745

11:45-12:00 **M. Patel, L. Taylor, T. Feltman, and H. Sahli* (2022)**
Salt Spray Tolerance in the Genus Monarda
Shippensburg University, Shippensburg PA 17257

12:00-12:15 **L. Green, G. Leonard, and R. Burlingame (2022)**
Why line? Tree Swallow (Tachycineta bicolor) feather lining behavior does not improve reproductive success. Long Term Monitoring of Anuran Communities Using Automated Acoustic
Bloomsburg University of Pennsylvania, Bloomsburg PA, 17815

Platform Session

Cellular and Molecular Biology A

Saturday, April 9, 2022
11:00am-12:00pm

Meeting Link

Zoom Meeting ID: 965 2071 1815

(Moderator: C. Howell)

11:00-11:15 **J.D. Adam, A.E. Rea-Ireland, C.W. Smyth and B.E. Overton* (2022)**
New species of Gymnascella from guano in bat maternity colony
Lock Haven University, Lock Haven, PA 17745

11:15-11:30 **E. J. Dalessandro and J. D. C. Stoltzfus* (2022)**
Evolution of Parasitism: Genetic changes in molecular pathways regulating dauer formation
Millersville University of Pennsylvania, Millersville, Pennsylvania, 17551

11:30-11:45 **S.R. Marx and K.B. Long* (2022)**
Impact of Tumor Cell-Produced Cytokines on Macrophage Polarization
Mansfield University of Pennsylvania, Mansfield PA 16933

11:45-12:00 **A.A. Zayachak, J.D. Adam and B.E. Overton* (2022)**
Toothbrush Bacteria are Associated with Bacterial and Fungal Contamination of Bathroom Environment
Lock Haven University, Lock Haven, PA 17745

Platform Session

Cellular and Molecular Biology B

Saturday, April 9, 2022
1:00-2:00pm

Meeting Link

Zoom Meeting ID: 972 7457 2143

(Moderator: J. Deitloff)

1:00-1:15 **D. Douglas, L. Nicholson*, and P. Caffrey (2022)**
Cardiac Tissue Engineering of Mouse Cardiac- via the Notch 1 Pathway
California University of Pennsylvania, California, PA 15419

1:15-1:30 **S. Bergsten*, K. Ertwine, L. Bankes, and A. Deneau-Klenzing, (2022)**
The Effect of Autophagy on Cell Migration
Shippensburg University, Shippensburg PA 17257

1:30-1:45 **S. Semelsberger, S. Grandinette, and C.Q. Diep* (2022)**
Finding novel peptides that affect kidney development in zebrafish
Indiana University of Pennsylvania, Indiana, PA 15705

1:45-2:00 **J.D. Adam, D. Spooner, and B.E. Overton* (2022)**
Forgotten fungi that could be used to control the spread of the Spotted Lanternfly (Hemiptera: Fulgoridae)
Lock Haven University, Lock Haven, PA 17745

Poster Session

Ecology and Organismal Biology A

Saturday, April 9, 2022
Asynchronous
Posters can be viewed here

(Login information for our Conference D2L site can be found here)

Session A **Z. Lynch and P. Delis* (2022)**
Coverboard Surface Color Effect on Snake Capture Success at A Farmland in Cumberland County, South-Central Pennsylvania: A Potential Technique Optimization
Shippensburg University, Shippensburg, PA 17257

Session A **D.D. Lynn and C.R. Hardy* (2022)**
Genetic and morphological species identification in the Colocasia-Xanthosoma tuber complex in Pennsylvanian Markets
Millersville University of Pennsylvania, Millersville, PA 17551

Session A **K. Plasterer and P. Delis* (2022)**
General Survey of the Herpetofauna of Letterkenny Army Depot, South-Central Pennsylvania
Shippensburg University, Shippensburg, PA 17257

Session A **C.D. Root, G. Carson, G. Moyer*, E. Farkas, and J. Kagle* (2022)**
Sequestration of Toxic Metals by Wild Mushrooms near Abandoned Coal Mine Tailings
Mansfield University, Mansfield, PA 16933

Session A **D.T. Becker and R.C. Maris* (2022)**
Effects of Fertilizers on Phaseolus vulgaris
Mansfield University of Pennsylvania, Mansfield, Pennsylvania 16933

Session A **K. Cherry, A. Mallory, K. Root, and J. Deitloff* (2022)**
Developmental effects on Ambystoma mexicanum (Axolotl salamanders) due to silver nanoparticle exposure
Lock Haven University of Pennsylvania, Lock Haven, PA 17745

Session A **S. Davis and L. Nicholson* (2022)**
Examining the Transgenerational Effect of TCDD on Bone Degradation in Zebrafish
California University of Pennsylvania, California, PA 15419

Session A **H. R. Dean, R. G. Myers, L. V. Marshall, K. L. Gustafson, G. I. Shidemantle, Z. I. Campbell, M. J. S. Falso, and P. G. Falso* (2022)**
Plasma Metabolite Profiling in an Amphibian Following Exposure to a Neonicotinoid Pesticide
Slippery Rock University, Slippery Rock, Pennsylvania, 16057

Poster Session

Ecology and Organismal Biology B

Saturday, April 9, 2022
Asynchronous
Posters can be viewed here

(Login information for our Conference D2L site can be found here)

Session B **M. Drake and P. Delis* (2022)**
Phenology of Anuran Communities Using Automated Acoustic Recording Systems in Southcentral Pennsylvania: Two Relatively Natural Wetlands in Letterkenny Army Depot and Two Disturbed Wetlands in Shippensburg University
Shippensburg University, Shippensburg, PA 17257

Session B **J. Esposito and R.C. Maris* (2022)**
Effects of Road Salts on Plant Growth
Mansfield University of Pennsylvania, Mansfield, Pennsylvania 16933

Session B **K. Gamble and C. Hanna* (2022)**
Testing the Effects of Pesticides on Environmental Preference of Tenebrio Molitor
California University of Pennsylvania, California, PA 15419

Session B **S. Graham, J. Fleming, and J. Deitloff* (2022)**
Spatial distribution of Plethodon cinereus
Lock Haven University of Pennsylvania, Lock Haven, PA 17745

Session B **K. Karpowicz, B. O'Connor, D. Sharp, J. Kilgore, and E. Rollinson* (2022)**
Anthropogenic impacts alter richness-abundance relationship in woody plant communities
East Stroudsburg University, East Stroudsburg, PA 18301

Session B **K. Broche, K. Hoerner, and P. Delis* (2022)**
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Session B **<u>G. Cocanower</u> and P. Delis* (2022)**

Assessment of a Farmland Herpetofauna Assemblage in Franklin Co., South-Central Pennsylvania: Implications for Conservation

Shippensburg University, Shippensburg, Pennsylvania, 17257

Poster Session

Cellular and Molecular Biology A

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Session A **R. Bricker, N. Webb, T. Skalos, S. Hrizo*, and M. Buckley* (2022)**
Utilizing Live Cell Imaging in Drosophila melanogaster Salivary Glands to Determine if Resveratrol Treatment Activates Heat Shock Factor DNA Binding
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Session A **M. Cree, S. Moehring, and L. Nicholson* (2022)**
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Session A **<u>E. Soliman</u> and R. Major* (2022)**
Loss of S-Phase Protein Tipin Results in a Delay and Asymmetry of Tissue Regeneration
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Session A **<u>H. G. Langkamer-Smith</u>, R. H. Heineman***
Bacteriophage T7 life history traits following infection of stationary phase Escherichia coli cells
Kutztown University of Pennsylvania, Kutztown, PA, 19530

Poster Session

Cellular and Molecular Biology B

Saturday, April 9, 2022
Asynchronous
Posters can be viewed here

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Session B **C.R.Lehn, C.M.Arth, S.R.Probst, and C.Scott* (2022)**
Identification of Key Mitochondrial Stress Response Genes Using 2,4-Dinitrophenol
Clarion University of Pennsylvania, Clarion, PA 16214

Session B **S. Herwald, M. Falso*, S. Hrizo (2022)**
Cytotoxic effects of imidacloprid pesticide on HEK 293T human cells
Slippery Rock University of Pennsylvania, Slippery Rock PA, 16057

Session B **M.L. Ruiz and J.L. Bandura*** (2022)
Using EdU labeling to visualize cell division in Drosophila tissue
Lock Haven University of Pennsylvania, Lock Haven PA, 17745

Session B **N. Slotnick, O. Balascio, and K. Beishline* (2022)**
BORIS Expression in HCT116 Cells
Bloomsburg University of PA, Bloomsburg PA, 17815

Session B **I. Huerta, J. Stralka, and D.V. Widzowski* (2022)**
Effects of number of training sessions on conditioned place preference performance for methamphetamine: Optimization of methods for mice.
Indiana University of Pennsylvania, Indiana, PA, 15705

Session B **N. Vasil and D.V. Widzowski* (2022)**
Sex and Strain differences in 5-hydroxytryptophan-induced head twitch in mice.
Indiana University of Pennsylvania, Indiana, PA, 15705

Session B **L. Wiles, D. Douglas, A. Pasculle, and L. Nicholson* (2022)**
Genetic Influences on Opioid Addiction through Dopamine Signaling Pathway Polymorphisms
California University of Pennsylvania, California, PA 15419

Session B **K. Wood and J. Kagle* (2022)**
Comparison of Evolution Rate of Ciprofloxacin Resistance among Staphylococcus epidermidis Isolates
Mansfield University, Mansfield, PA 16933

ABSTRACTS

Alphabetical by last name of first author

J.D. Adam, A.E. Rea-Ireland, C.W. Smyth and B.E. Overton* (2020)
New species of Gymnascella from guano in bat maternity colony
Lock Haven University of Pennsylvania, Lock Haven, PA 17745

The spread of the invasive fungus *Pseudogymnoascus destructans* (*Pd*), the causal agent of White-Nose Syndrome (WNS) prompted culture-based surveys of Pennsylvania cave sediments and guano from bat maternity colonies to better understand and describe the fungal communities present. The emphasis of these studies was the characterization of the native *Pseudogymnoascus spp*. (*Ps*) diversity. The objective of this study was to compare an unusual isolate (G3) from guano in a bat maternity colony in Huntington, PA with a gymnothecial teleomorph (sexual structure) to known species of *Ps* uncovered in these surveys. The G3 isolate lacks conidial development and produces a gymnothecia-like ascomata that differs from native *Ps* species. The G3 isolate produced the gymnothecial stage on oatmeal salt agar similar to native *Ps* species. The objective of this study was to complete ITS rDNA gene sequencing and a comparative morphological analysis to determine if G3 represented a novel *Ps* species or was some other related fungus. The peridial hyphae of the G3 isolate are septate and smooth with distinct appendages that lack conidia. The mycelium produces racket hyphae, which is not consistent with *Ps* species. The colony back color on Sabouraud dextrose agar was first yellow-gray and darkening slightly after 90 days. The ascospores are globose and hat to saturn-shaped and differ greatly from the ascospores of *Ps* species. This ascospore morphology is consistent with the Onygenales not the Leotiomycetes incertae sedis where *Ps* species are derived. The BLAST results from the ITS rDNA region combined with the morphological investigation indicated that this was a novel species within the Onygenales. The G3 species was named *Gymnascella minnisii* in honor of Andrew Minnis and was published in the peer reviewed journal Fungal Planet.

J.D. Adam, D. Spooner, and B.E. Overton* (2022)
Forgotten fungi that could be used to control the spread of the Spotted Lanternfly (Hemiptera: Fulgoridae)
Lock Haven University of Pennsylvania, Lock Haven, PA 17745

The spotted lanternfly, *Lycorma delicatula*, (SLF) is an invasive insect found in the state of Pennsylvania in 2014. There have been many attempts to control the spread of the insect across the state, resulting in a quarantine of 14 counties and the application of various biopesticides in many areas. The fungus that is used as a biocontrol agent is often *Beauveria bassiana* (Sordariomycetes: Hypocreales). In this study, fungal isolates were taken from moribund spotted lanternflies using DOC2 media. This media contains copper and crystal violet both of which inhibit the growth of common saprophytic fungi and have been found to promote the growth of entomopathogenic fungi. Fungal isolates from DOC2 were then identified using the ITS rDNA barcode region via 50 µL polymerase chain reaction (PCR). Three entomopathogenic fungi were identified from the DOC2 media: *Isaria farinosa*, *Fusarium lateritium* and *Cladosporium cladosporioides*. An experiment was conducted to fulfill Koch's postulates. Mealworms (*Tenebrio molitor*) were used as the test organisms for this experiment. The mealworms were exposed to *I. farinosa* and *C. cladosporioides* and a combination of both over the course of the experiment. The degrees of freedom was 3 and the χ^2 value for the null hypothesis was 7.18. All tests performed in the experiment rejected the null hypothesis, with the *I. farinosa* test having a χ^2_{calc} value of 26.14 and the *C. cladosporioides* test having a

χ^2_{calc} value of 86.58. This study identified two of the forgotten fungi that can be used to control the spread of the spotted lanternfly. This finding is important because both species have been previously reported in the literature as potential biocontrol fungi for a variety of insect pests. Future research in our laboratory hopes to test these biocontrol agents against spotted lanternflies directly.

D.T. Becker and R.C. Maris* (2022)
Effects of Fertilizers on Phaseolus vulgaris
Mansfield University of Pennsylvania, Mansfield, Pennsylvania 16933

In agriculture, almost every farm uses fertilizers to enhance their crop yield. Many of these farmers choose to use inorganic fertilizers due to the little amount required to produce a sufficient amount of crops. However, use of inorganic fertilizers can cause environmental damage in water runoff by putting more chemicals into the environment. In today's agriculture, approximately 50% of farmers use inorganic fertilizers on their crops, and in total, farmers use around 23 kilograms of inorganic fertilizer per acre. A different and more environmentally friendly approach to enhance crop yield is the use of natural organic fertilizers. In this study, the effect of organic chicken and cow manures on the growth of green bean plants were compared to the effects of a commercial inorganic fertilizer. Chicken and cow manures were chosen as the organic fertilizers because of the high number of cows and chickens that are in the United States. Here, we designed an experiment to determine if there is a better alternative to fertilize the soil for the growth of bean plants. Specifically, fifteen green bean seeds were planted in separate 4.73-liter containers bearing the same type and amount of potting soil. The fifteen seed containers were separated into three groups for five: the first group had 2.36 liters of chicken manure added to their soil, the second group had 2.36 liters of cow manure added to their soil, and the last group at 15 milliliters of Expert Gardener commercial fertilizer added to their soil. To mimic how the seeds are planted in large agricultural fields, the containers were placed in a straight line directly beside each other approximately eight inches apart. The heights of the plants were measured weekly. It was found that chicken manure produced the best plant growth and the highest yield of beans. Chicken manure also had the best nitrogen, phosphate, and potassium sufficiency after the seeds were grown. These results show chicken manure could be a potentially better alternative for a bean plant fertilizer.

S. Bergsten*, K. Ertwine, L. Bankes, and A. Deneau-Klenzing (2022)
The Effect of Autophagy on Cell Migration
Shippensburg University of Pennsylvania, Shippensburg, PA 17257

Autophagy is a cellular process that is responsible for breaking down materials in the body, such as damaged organelles or proteins. Cell migration is an important process in cancer development; it occurs when tumor cells break away from the primary tumor and spread throughout the body to other locations. Previous studies have shown mixed results, but we hypothesize that stimulating autophagy will increase cell migration while inhibiting autophagy will decrease cell migration. The results were gathered by utilizing wound healing and transwell assays. The wound healing assay scrapes were measured, and quantitative data was collected from them, including the change in diameter and number of cells infiltrating the scrape. The transwell assay was used to gather qualitative data by analyzing the stained cells in the pictures. The results of the wound healing assays have shown that stimulating autophagy slightly increased migration, whereas inhibiting autophagy decreased migration as compared to the control. Additionally, the number of cells that infiltrated the scrape was increased by stimulation, and greatly decreased by inhibition. The qualitative analysis of the transwell assays support the results seen in

the wound healing assays. Preliminary experiment results suggest that autophagy does have an effect on cell migration. The results seem to suggest that the signaling of autophagy, but not necessarily the completion of lysosome degradation, is important in the activation of migration in the glioma cells.

R. Bricker, N. Webb, T. Skalos, S. Hrizo*, and M. Buckley* (2022)
Utilizing Live Cell Imaging in Drosophila melanogaster Salivary Glands to Determine if Resveratrol Treatment Activates Heat Shock Factor DNA Binding
Slippery Rock University of Pennsylvania, Slippery Rock, PA 16057

One major stress response pathway is the heat shock response (HSR), which is mediated by the transcription factor, heat shock factor (HSF). The HSR is activated in cells exposed to conditions that induce protein misfolding, such as: high heat, oxidants, and other chemical stresses. Under such stressors, HSF activates expression of the Hsp70 chaperone, which helps cells deal with protein folding stress. However, HSR activation also leads to an increase in reactive oxygen species (ROS), which can damage cellular molecules. To combat this, cells are known to utilize endogenous antioxidants to scavenge free radicals through redox reactions. Therefore, we previously examined the effect of feeding an exogenous antioxidant, resveratrol, on the ability of wildtype Drosophila to withstand heat stress. Treatment with 100uM and 400uM resveratrol increased the ability of the flies to withstand heat stress-induced paralysis. We hypothesize that this result occurred because the flies had increased HSF activity due to the resveratrol treatment. To examine this hypothesis, Drosophila larvae expressing HSF-GFP were dissected to obtain salivary glands. These glands contain large polytene chromosomes that allow for visualization of HSF chromosomal binding using confocal microscopy. The most easily visible binding site is an HSF doublet binding at the Hsp70 loci. Salivary glands at room temperature function as a non-heat shock (NHS) control and exhibit no binding of HSF-GFP at the Hsp70 loci. Salivary glands heated to 37C for 10, 20, 40 minutes function as the positive control and exhibit the expected Hsp70 doublet from HSF-GFP binding of the DNA. We are testing variable concentrations (100uM, 200uM, and 400uM) of resveratrol dissolved in 0.5% DMSO to determine if it activates HSF-GFP binding of the DNA in salivary glands under non-heat shock conditions. Future experiments may examine if the HSF-GFP is transcriptionally active when cells are treated with resveratrol.

K. Broche, K. Hoerner, and P. Delis* (2022)
Survey of Amphibian Communities and Phenology in Vernal Pools and Wetlands at Letterkenny Army Depot, South-Central Pennsylvania: Implications for Conservation
Shippensburg University, Shippensburg, PA 17257

Amphibian communities are declining due to multiple components that negatively affect their lifecycle, such as climate change and anthropogenic factors. Their sensitivity to changes in their environment, classifies many amphibians as bioindicators. In particular, in the Appalachian Mountain Range of South-Central Pennsylvania, temporary vernal pools are critical habitats for these amphibian communities. We will be monitoring several untouched sites at Letterkenny Army Depot (LEAD), Franklin County. Surveys of amphibians will be conducted, determining demographic characteristics such as species diversity, relative abundances, sex ratios, and individual morphometrics. We will use a variety of techniques: dip nets, coverboards, night acoustic surveys, opportunistic identifications and captures from March to early April 2022. Additionally, we will record weather and physiographic data: temperature, precipitation, time of data collection, photos of the vernal pools, size, and depth of the body of water . Data collected at LEAD

in 2022 will be compared with historical data to provide potential evidence of the effect of climate change on this community.

K. Cherry, A. Mallory, K. Root, and J. Deitloff* (2022)
Developmental effects on Ambystoma mexicanum (Axolotl salamanders) due to silver nanoparticle exposure
Lock Haven University of Pennsylvania, Lock Haven, PA 17745

Silver nanoparticles (AgNPs) contain many antimicrobial properties and are most often used in waste-water treatment. The environmental impacts of AgNPs on biological systems are widely unknown. Few studies have examined the environmental effects of nanoparticles and do not demonstrate consistency when comparing the results. Amphibian viability often reveals the quality of the environment in nature due to their increased sensitivity to toxins. With this study, we examined whether development of axolotl salamanders was affected by prolonged silver nanoparticle exposure. We predicted that the growth and development of axolotls would be hindered in response to exposure to AgNPs. We conducted an eight-week experiment at Lock Haven University of Pennsylvania to evaluate the developmental effects in axolotls caused by various concentrations of silver nanoparticles. The concentration groups included a control (0 ng/mL of AgNPs), low-exposure (20 ng/mL of AgNPs), medium-exposure (50 ng/mL of AgNPs), and high exposure (100 ng/mL of AgNPs). Axolotl length was recorded by photographing axolotls weekly and measuring length from these photographs using TpsDig. Axolotl mass and differential mortality was also recorded weekly. Preliminary findings suggest that greater concentrations of AgNPs resulted in decreased length, decreased mass, and increased mortality rates. This research suggests that exposure to silver nanoparticles has negative developmental consequences for axolotls and adds support to the idea that nanoparticles can have detrimental effects in natural environments.

G. Cocanower and P. Delis* (2022)
Assessment of a Farmland Herpetofauna Assemblage in Franklin Co., South-Central Pennsylvania: Implications for Conservation
Shippensburg University, Shippensburg, Pennsylvania, 17257

Anthropogenic activities have resulted in global biodiversity declines. Within Pennsylvania, agriculture puts many taxa at risk. Amphibians are the vertebrate group most at risk of extinction but are important bioindicators in habitat monitoring and medicine. Reptiles are essential to ecosystems as important predator and prey species. Seventy-seven amphibian and reptile species inhabit Pennsylvania, many of designated conservation status. While herpetofauna surveys have been conducted in the state, none in South-Central Pennsylvania have assessed how species respond to intense agricultural pressures. This study will investigate the herpetofauna community at Simms Farm, an active farm near Shippensburg, Franklin Co., Pennsylvania. During the active seasons (March to November) 2022-2023, we will survey the amphibians and reptiles using a variety of methods to document the farm's herpetofauna and to calculate relative abundances when possible. Continuous daily Automated Acoustic Recording Systems (AARS) will be deployed near available wetlands to detect anurans. Monthly visits will involve checking snake cover boards, and turtle traps will be used in May and September. Opportunistic surveys will include anuran chorus surveys on rainy nights in spring and summer, dip netting for larval amphibians throughout the active season, and by-foot road transects to identify live organisms or road mortalities. To determine whether the Simms Farm assemblage is impacted by farm activities, the herpetofauna community structure (richness and taxa) will be assessed for the presence of the 28 amphibian and 27 reptile species known to inhabit Franklin and Cumberland counties, and its relative abundances will be compared to

those of surveys conducted at nearby urban and protected sites. This investigation of herpetofauna community response to farming practices will contribute to the knowledge of herpetofauna response to anthropogenic stressors and will be relevant to herpetofauna conservation through our identification of farming-tolerant species and whether there were threatened species inhabiting a farmed site.

M. Cree, S. Moehring, and L. Nicholson* (2022)
The effects of Alprazolam on wound healing and regeneration in planaria
California University of Pennsylvania, California, PA 15419

Wound healing is a complex process that relies on an intricate network of cellular and molecular communications between the immune system, skin and surrounding extracellular matrix. In addition to these intrinsic mechanisms, wound healing can be influenced by a variety of factors, including age, underlying disease conditions, infection, stress, and certain medications. Wounds are a common-place occurrence, and poor wound healing affects millions of people, so identifying whether commonly prescribed medications that patients may already be taking improve – or interfere with – wound healing is important to determine. As wound response mechanisms are widely conserved, planarian wound healing and regeneration provides a simple model system in which to examine the effects of these commonly prescribed drugs on the wound healing process. One such medication is Alprazolam, a generic form of the benzodiazepine Xanax, which is used to treat anxiety disorders, seizures, and insomnia. Benzodiazepines work by affecting the gamma-aminobutyric acid (GABA) receptors in the brain and increasing the activity of the GABA molecules. GABA molecules reduce brain activity in the areas of the brain responsible for memory, emotion, rational thought, and certain functions such as breathing. This results in the overall slowing down of the central nervous system. As both planaria and humans have GABA receptors, Alprazolam could have similar effect on planaria and humans. We first tested whether Alprazolam could influence anxiety-like responses in planaria, using a light/dark test. Next, to determine whether Alprazolam might influence wound healing, we exposed regenerating planaria to varying physiologically relevant doses of Alprazolam, and compared the results to controls. Initial results suggested that Alprazolam does affect planarian behavior and regeneration, causing it to proceeds more slowly. To test whether changes in cell proliferation are responsible for the slower regeneration, cell proliferation is currently being quantified using Bromodeoxyuridine (BrdU). As aspects of the underlying mechanisms of wound healing and Alprazolam responses are conserved, this research could help us to identify how a commonly prescribed anxiety medication influences wound healing in humans.

E. J. Dalessandro and J. D. C. Stoltzfus* (2022)
Evolution of Parasitism: Genetic changes in molecular pathways regulating dauer formation
Millersville University of Pennsylvania, Millersville, PA 17551

Parasitic nematodes infect billions of humans, animals, and plants across the globe, yet the genetic mechanisms that differentiate development of parasitic versus free-living nematode lifestyles remain largely unknown. The dauer hypothesis, a long-standing theory on the mechanisms underlying the evolution of parasitism, posits that the dauer stage of free-living nematodes, such as of the model organism *Caenorhabditis elegans*, is a pre-adaptation to the infectious third stage larva of parasitic nematodes and thus similar genetic mechanisms are hypothesized to control both. Dauer formation in *C. elegans* is regulated by three molecular pathways: insulin/insulin-like signaling, transforming growth factor beta signaling, and the biosynthesis of dafachronic acids that regulate the nuclear hormone receptor DAF-12. We therefore sought to identify homologs of the genes in these three signaling pathways in a

monophyletic clade of free-living, facultative, and obligate parasitic nematodes. This was performed by conducting reciprocal BLAST searches in each of the nematode species using the bioinformatics platforms Geneious and NCBI. Results were validated using ClustalW protein alignments and neighbor-joining phylogenetic trees. While one-to-one homologs for many of the genes were found in all of the species examined, other genes showed species- and lifestyle-specific duplications. In future work, we plan to further investigate the parasite-specific genetic differences and determine their overall significance in parasite development. Our findings will allow for a more thorough understanding of parasitism as well as the mechanisms that control it, which will ultimately contribute to the control and prevention of parasitic infections.

S. Davis and L. Nicholson* (2022)
Examining the Transgenerational Effect of TCDD on Bone Degradation in Zebrafish
California University of Pennsylvania, California, PA 15419

Agent Orange is a chemical herbicide composed of the two chemicals 2,4-dichlorophenoxyacetic acid (2,4-d) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-t). During the mass production of the herbicide at the height of the Vietnam War over 12 million gallons of contaminated Agent Orange was sprayed on the affected area. Agent orange produces a highly toxic byproduct 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) or dioxin which has been known to cause a variety of gastrointestinal, respiratory, and systematic problems, including a variety of cancers. This highly toxic chemical is now being studied to understand the scope of dioxin-related illnesses. Interestingly, dioxin research has shown that the chemical can devastatingly impact the composition and quality of bone. In this research project, adult and embryonic Zebrafish were exposed to varying concentrations of TCDD and observed throughout breeding and post-exposure stages to understand the effect TCDD has on first-generation-exposure offspring. Alizarin red was used to determine whether fish developing from embryos exposed to TCDD or fish developing from embryos where parents had been exposed to TCDD showed structural changes in bone compared to controls. DNA methylation levels are being quantified to indicate whether exposed embryos and/or offspring show specific structural and molecular changes within the genome that might indicate that TCDD exposure causes epigenetic changes.

H. R. Dean, R. G. Myers, L. V. Marshall, K. L. Gustafson, G. I. Shidemantle, Z. I. Campbell, M. J. S. Falso, and P. G. Falso* (2022)
Plasma Metabolite Profiling in an Amphibian Following Exposure to a Neonicotinoid Pesticide
Slippery Rock University, Slippery Rock, Pennsylvania, 16057

Globally, many amphibian populations are in decline and some populations face the potential of extinction. Previous research supports that localized amphibian population declines may be attributed to chemical contaminant exposure. However, the connection between contaminant exposure and changes in individual or population success may be more difficult to discern in the absence of overt toxicity or mortality. We examined the sublethal influence of exposure to a common contaminant of surface waters on metabolic changes in adult African clawed frogs (*Xenopus laevis).* Adult male *X. laevis* were exposed to environmentally relevant concentrations of the commonly used neonicotinoid insecticide, imidacloprid, by immersion for 48 days. Following exposure, we determined plasma glucose, glycerol, and triglycerides from samples collected in baseline and handling-stressed conditions. This ongoing research will contribute to our knowledge of the factors influencing amphibian decline by providing insight into sublethal influences of chemical exposure on amphibian metabolism.

D. Douglas, L. Nicholson*, and P. Caffrey (2022)
Cardiac Tissue Engineering of Mouse Cardiac- via the Notch 1 Pathway
California University of Pennsylvania, California, PA 15419

Congestive heart failure (CHF) is the most common cardiac disease for Americans forty years and older. CHF causes the irreversible loss of cardiomyocytes, muscle cells that help the heart to beat. If a patient is diagnosed with CHF they have less than five years to live. Stem cell therapies provide a possible means of developing mature cardiomyocytes, which could be inserted into patients' bodies to replenish and repair their heart. Currently, researchers are only able to produce large amounts of primitive cardiomyocytes. This poses a problem because the primitive cardiomyocytes are too small, possess low contractility and low velocity. All these factors stand in the way of achieving efficient and mature cardiomyocytes to use for stem cell therapy. This project examined whether targeting the Notch pathway – a key signaling pathway in cardiomyocyte maturation – can help promote the differentiation of chamber specific cardiomyocytes. Mouse embryonic stem cells were exposed to various levels of Jagged-1 (a ligand of the Notch pathway), in the hopes that increased Notch receptor activation might produce a small but significant increase of proliferation. It was determined that a Jagged-1 concentration of 2 ng/ml resulted in the largest increase, producing 4.57 times more cells compared to control cells without Jagged-1. To determine whether increased activation of the Notch pathway also enhanced cardiomyocyte differentiation, protein expression levels for key markers of cardiomyocyte maturation are currently being analyzed. This research could help inform approaches to stem cell therapy that treats CHF.

M. Drake and P. Delis* (2022)
Phenology of Anuran Communities Using Automated Acoustic Recording Systems in Southcentral Pennsylvania: Two Relatively Natural Wetlands in Letterkenny Army Depot and Two Disturbed Wetlands in Shippensburg University
Shippensburg University, Shippensburg, PA 17257

Wetlands are crucial habitats providing the necessary requirements for reproduction and life cycle needs in anurans. Amphibians are of special importance because they are bioindicators. This research continues an 18-yearlong study on amphibian populations in Letterkenny Army Depot (LEAD), located in Franklin County, Pennsylvania. In collaboration with LEAD's Office of Natural Resources, natural and restored wetlands have been surveyed to describe anuran communities. In 2021, Automated Acoustic Recording Systems (AARSs) were placed in LEAD at a well-studied natural vernal pool, Twin Pond and a newly manmade wetland, "New Wetland". In 2022, the recordings from these AARSs units will be compared with results from newly deployed units in two manmade sites at Shippensburg University Campus: the "Biopond" and "Burd Run Restored marsh". The acoustic data collected will be interpreted using Kaleidoscope software to determine diversity and relative abundance of anurans. I will compare old data to that gathered in this research. Based on prior surveys, we expect to confirm the presence of *Pseudacris crucifer, Anaxyrus americanus, Lithobates catesbeianus*, *Lithobates sylvaticus*, *Lithobates palustris, Hyla versicolor*, *Pseudacris feriarum*, *Scaphiopus holbrookii* and *Lithobates clamitans* in LEAD and *Pseudacris crucifer, Anaxyrus americanus, Lithobates catesbeianus*, and *Lithobates clamitans* at SU. The continuation of this study is crucial because multi-year data analyses allow us to investigate the effects of climate change, and associated temperature and precipitation abnormalities on patterns of reproduction in a known anuran assemblage. The addition of the two new sites will also bring insight onto weather or not human disturbance affects these patterns.

A.E. Easling and J. Kagle* (2022)
Developing an extraction protocol for high quality phage DNA from sewage sludge
Mansfield University of Pennsylvania, Mansfield, Pennsylvania 16933

Extracting DNA from sewage sludge can be useful in predicting viral outbreaks or tracking horizontal gene transfer of antibiotic-resistant genes, but it is often a long, expensive process. Through a combination of various published protocols, a relatively inexpensive and shortened process has been developed to extract phage DNA from sewage sludge. Phage particles were separated from biosolids and bacteria through centrifugation followed by filtration through 0.2 um filters. The phages were then concentrated via filtration. DNA was released from bacteriophage capsids with proteinase K treatment and was purified using a commercially available MoBio spin column kit. It was deemed unnecessary to include DNase treatment to remove environmental DNA, a step included in most other protocols. The quality and purification of DNA were determined via nanodrop using 280/260 and 230/260 absorbance readings. All samples were significantly close to the desired 1.8 280/260 absorbance range which confirms that DNA was extracted. All samples extracted also had a 2.0-2.2 230/260 absorbance confirming DNA purity. This simplified protocol allows for the extraction of phage DNA from sewage sludge with common lab equipment at a reasonable cost.

J. Esposito and R.C. Maris* (2022)
Effects of Road Salts on Plant Growth
Mansfield University of Pennsylvania, Mansfield, Pennsylvania 16933

Road salts are used to melt snow and ice to make sure roadways are safe for people to drive on. The runoff from the melted snow can impact roadside vegetation. Here, we studied the potential impact of road salt runoff by measuring growth rates and height changes in pea plants (*Pisum sativum).* Three seeds were planted per container in potting soil and were allowed to sprout for one week prior to the start of the experimental treatment. The plants in the experimental group were exposed to varying levels of a road saltwater mixture: Group 1 received 150 g of salt, Group 2 received 50 g of salt, and Group 3 received 50 g of salt. The control group just received water. For each group, there were three independent containers. We found in each of the experimental groups growth rate and end height were significantly lower compared to the control. The overall growth of the plant was halted by the road saltwater mixture, which supports the hypothesis that the use of road salts has a negative effect on nearby vegetation.

K. Gamble and C. Hanna* (2022)
Testing the Effects of Pesticides on Environmental Preference of Tenebrio Molitor
California University of Pennsylvania, California, PA 15419

Pesticide use is a major ecological concern that affects a large portion of the world, with over 1.8 billion people engaging in agricultural activities and many using pesticides to protect commercial crops of significance. Largely debated among the public is what the effect of pesticide use is on the environment and its biological components, where issues such as behavior, mutation, toxicity, and contamination have become a topic of discussion. Many pesticides are specifically targeted towards killing insects, and these same insects often play important roles in ecosystems where they may act as pest control for other insects that pose a threat of damaging commercially important crops. To determine if there may be a behavioral component due to pesticide effects, we set out to observe environmental preference of *Tenebrio molitor*,

commonly known as the mealworm. Environmental preference of *T. molitor* will be monitored both with and without the presence of pesticides. The pesticides that will be used and compared in testing behavioral influence are "Sevin" and "Ortho" brand pesticides, which respectively have the active ingredients Carbaryl and Bifenthrin. Initial data indicate that pesticide use appears to have an influence on environmental preference in relation to time spent between damp and dry environments. The results of this study will provide us with information regarding the potential effects of pesticides on the behavior of *T. molitor*, which may help in future investigations into the effects on other invertebrates with beneficial agricultural roles.

Z.J. Glass, G.P. Setliff*, K. Friehauf (2022)
A Survey of the Morphology of the Hind Tibial Apex in Broad Nose Weevils (Coleoptera: Curculionidae: Entiminae)
Kutztown University, Kutztown Pennsylvania, 19530

The comparative morphology of the corbel system on the hind tibial apex in broad nosed weevils (Curculionidae: Entiminae) was examined to assess the character system's value for phylogenetic reconstruction. The corbel is a flat bevel located at the distal end of the tibial apex that is often enclosed within a row of setal combs. True corbels occur when the bevel is fully enclosed within a setal comb, the center of which may be filled with setae or scales, alternatively, the center can be bare. False corbels occur when the inner margin of the tibial apex bevel is not fully enclosed by a secondary row of setae. The majority of Curculionidae do not have corbels, with true corbels only occurring in Entiminae and Brachycerinae. Researchers have debated the phylogenetic value of the corbel character system, suggesting that the state was specific to the different tribes within Entiminae. A total of 89 species, representing 23 tribes of Entiminae, from all geographic regions were examined in this study. The tibia were removed from the body and examined using Scanning Electron Microscopy. Preliminary findings from 35 species mostly align with previously published literature. Multiple types of corbels were only found in tribes that are known to be paraphyletic such as Naupactini. Tribes thought to be monophyletic showed one corbel type based on our sample.

R.M. Grabill and M.M. Valkanas* (2022)
Investigating Antibiotic Resistance and Biofilm Formation in Bacteria Found within Passive Remediation Systems Designed to Treat Acid Mine Drainage
California University of Pennsylvania, California, PA 15419

The formation of acid mine drainage (AMD) and the high levels of heavy metals associated with it, is a large environmental problem faced within the mining industry. AMD and metal leaching are of particular concern because they continue to have negative effects on the environment, long after mining has finished. AMD results in high metal contamination and, often, low pH which contaminate downstream drinking water sources. The bacteria growing in these systems must adapt and evolve to survive, even thrive, in the heavy metal environment. Efflux pumps are a mechanism used by bacteria to pump heavy metals and antibiotics outside of the cell. Organisms isolated from AMD are more likely to have genes associated with efflux pumps as a mechanism of survival. This can also indirectly result in an increase of antibiotic resistance. A secondary mechanism bacteria utilize in extreme environments is biofilm formation. Biofilm development allows bacteria to participate in mass sharing of resistance genes, while being less subjected to harsh environmental pressures such as low pH and high levels of metals. The genomes of ten isolates, collected from Boyce Park Passive Remediation System, were surveyed for the presence of genes

associated with efflux pumps, as well as association of drug-resistance to ampicillin, methicillin, tetracycline, fluoroquinolone, and streptomycin. Findings from the genome analysis showed presence for both efflux pump genes and antibiotic resistant genes (ARGs) for the isolates. Bacterial genomes were also surveyed for biofilm forming associated genes. Genes were detected in the isolates that attributed to primary attachment and adhesion, intracellular signaling, and quorum sensing. An increase in antibiotic resistance in contaminated watersheds has the potential to impact human health by decreasing the effectiveness of antibiotics for the treatment of common infections.

S. Graham, J. Fleming, and J. Deitloff* (2022)
Spatial distribution of Plethodon cinereus
Lock Haven University of Pennsylvania, Lock Haven, PA 17745

Plethodon cinereus (Eastern Red-backed Salamander) can be found abundantly throughout the Eastern United States. They live in damp forests and on rocky hillsides. Individuals of this species establish and defend territories, and typically remain near these territories when foraging for prey. Territories can be beneficial for finding prey, attracting mates, and sheltering from harsh weather conditions during dry or warm weather. In this study, we observed the movement, density, and spatial distribution of *Plethodon cinereus* using capture-mark-recapture methods. We used six study plots, and each plot contained fifty artificial coverboards. When a salamander was captured, we tagged them with a unique color code using an elastic polymer in multiple colors. For animals that were recaptured, we recorded the color code and marked the salamander as a recapture. We recorded sex and snout vent length (SVL) of all the adult salamanders (>30mm) captured. To assign sex, we used three categories: male (vas deferens present), gravid females (no vas deferens but eggs present), and non-gravid females (no vas deferens or eggs present). In general, we found more gravid females than non-gravid females, and more females than males. We also found that the salamanders tended to stay within a specific area and, often, were recaptured under the same coverboards. This demonstrates site fidelity in our population of salamanders. The number of salamanders captured and recaptured between plots differed. Possibly, the different plots contain variability in territorial quality or prey availability. Recording site fidelity and movement patterns could help us understand the intraspecific and territorial behaviors of *Plethodon cinereus.*

L. Green*, G. Leonard, and R. Burlingame (2022)
Why line? Tree Swallow (Tachycineta bicolor) feather lining behavior does not improve reproductive success.
Bloomsburg University of PA, Bloomsburg PA, 17815

Many avian species utilize feathers in nest construction because feathers may provide parasite protection and thermoregulation for chicks. *Tachycineta bicolor* (Tree Swallows) are secondary cavity nesters and among the most studied birds that create nest feather linings. Despite this, little is known about the number of feathers used in nest construction. In 2020 and 2021, a total of 124 abandoned nests were measured and collected from nest boxes placed in a three artificial wetland sites near Bloomsburg University. Sites varied in size, vegetation and age. We compared the number of nest feathers, the feather number to nest volume ratio and quantified the reproductive success of Tree Swallows between the two years. Comparisons of feathers across sites were made using Analysis of Variance (ANOVA) in JMP. There were no significant differences in feather number across sites or between years. Feather numbers were similar between years 53.5 + 6.8 (mean + s.e.) in 2020 and 52.6 + 5.4 in 2021. Feather number to volume ratio was significantly higher in 2021 (0.06 + 0.006) than in 2020 (0.02 + 0.008) but there were no differences among sites. The lower feather number to volume ratios in 2020 were due to significantly

greater nest volumes. We also regressed feather measurements and estimates of reproductive success (number of hatchlings, number of fledglings and percent fledglings). There were no significant relationships between feather number or feather number to volume ratio and reproductive success in either year. The relative consistency in feather number across years and sites may reflect an innate behavior. Feather use in Tree Swallow nests may be adaptive to environmental fluctuations found in natural nest cavities which are likely dampened in nest boxes. Evaluating patterns in feather use and reproductive success across sites with greater ecological variability and over time will elucidate whether feather lining behavior represents a fixed action pattern or a response to environmental factors.

D.R. Greener, A.M. Johnson, M.E. Hynds, C.M. Scott* (2022)
Genetically Linking ERAD and UPR via Expression of Antitrypsin.
Clarion University of Pennsylvania, Clarion, PA 16214

In humans, approximately 12 to 15% of proteins are misfolded and must be removed or they could cause certain genetic disorders. Removing these proteins could cause problematic stress on the cell. Endoplasmic Reticulum Associated Degradation, or ERAD, is one of the processes involved in removing these misfolded proteins. The 26S proteasome, which requires the *add66* gene, is involved in the ERAD system. Even with a proper conformation, ERAD can be overwhelmed and signal the activation of the Unfolded Protein Response, or UPR. Both of these processes are taxing on the cell and can lead to apoptosis, or cell death, if active for too long due to an excessive number of misfolded proteins. Despite the importance of ERAD and UPR in managing cellular stress, the mechanisms of these biochemical pathways or how they work together has not been completely understood. To hopefully gain insight on these processes, our project will study the growth of different yeast strains in an *ADD66* background strain to determine if they are involved in ERAD or the UPR. By studying how ERAD and the UPR work, ways to mitigate the effects of excess misfolded proteins can be determined.

L. Griffith and K.B. Long* (2022)
T cell impact on tumor microenvironment and therapy resistance
Mansfield University of Pennsylvania, Mansfield, Pennsylvania 16933

Cancer can be very aggressive, and it can happen unexpectedly. Researchers are continuously working to develop new and more effective anti-cancer therapies. Through the use xenograft models, researchers can study and manipulate human tumors at the systems level. However, to allow for successful implantation of human tumor cells into mice without rejection by the mouse's immune system, mice are often genetically modified to lack T cells. While this model allows investigators to test therapies at the system level, successful outcomes in these models are not always observed in humans because these models typically do not reflect a natural tumor microenvironment. The goal of our study is to determine the influence of T cells on the developing tumor microenvironment and how this natural landscape impacts responsiveness to anti-cancer therapies.

Previous studies in our laboratory have demonstrated that T cell presence during tumor development creates a tumor microenvironment that is resistant to a specific therapy, LipoCurc, while tumors in an environment void of T cells respond to LipoCurc treatment. Gene expression analysis between responders and non-responders suggested a difference in myeloid cells within the tumor may contribute to differences in therapy response. Thus, we evaluated macrophage presence by using immunohistochemistry. Specifically, macrophages in tumor sections were identified using an anti-F4/80 antibody and a compatible HRP-labeled secondary antibody and visualized using a DAB kit. We found that the T cell-depleted groups had a lower number of macrophages in their tumors compared to the T cell-replete groups tumors. These data support our initial gene expression data. Our findings suggest that T

cells play an important role in solid tumor development. This brings us to question how T cells influence macrophage presence. By understanding how T cells influence other cells in the tumor microenvironment, we can create mouse models that better recapitulate a normal tumor microenvironment while still maintaining the benefits of testing anti-cancer therapies against human tumor cells at the systems level.

S. Herwald, M. Falso*, S. Hrizo (2022)
Cytotoxic effects of imidacloprid pesticide on HEK 293T human cells
Slippery Rock University of Pennsylvania, Slippery Rock PA, 16057

The goal of this project is to determine the potential cytotoxic effects of the pesticide imidacloprid. Imidacloprid is a widely used pesticide in the United States agricultural system despite being banned in Europe due to its damaging effects on non-target species. This compound is a neonicotinoid and has been consistently used for insect control on crops in the United States since the late 1980s. Previous studies indicate possible DNA damage of human cells and significant cellular absorption in the human gastrointestinal tract. This study will use human embryonic kidney cells to determine how imidacloprid may affect the metabolic activity of human cells. Cells will be treated with 0.1-100μM imidacloprid. The effects of imidacloprid will be determined using cellular proliferation and cytotoxicity assays that determine the number of viable cells after treatment. It is expected that results will show dose-dependent toxicity of imidacloprid on HEK 293T cells. This study will provide further insight into the toxicity of imidacloprid and develop a valuable model system to further analyze these effects.

I. Huerta, J. Stralka, and D.V. Widzowski* (2022)
Effects of number of training sessions on conditioned place preference performance for methamphetamine: Optimization of methods for mice.
Indiana University of Pennsylvania, Indiana, PA, 15705

Methamphetamine (METH) is an addictive stimulant drug for which there are no approved pharmacological treatment options and significant problems with relapse years after patients stop using. Conditioned place preference (CPP) is a neurobehavioral test used to study drug dependence in mice and other species. The CPP protocol involves habituation, conditioning, extinction, and reinstatement phases, including a preference test after each phase where the mice are free to explore the whole apparatus. During conditioning sessions, the mice are restricted to either the METH (e.g., striped walls) or placebo/vehicle (VEH) chamber (grey walls) for 20 minutes, where they learn to associate METH experiences to a specific chamber. The test assesses if the mice show preference by spending more time in one chamber (e.g., METH) when allowed to explore both. While optimized protocols have been developed for rats, they have not been established for mice. Previous experiments in our lab using a 6-session procedure for CPP showed weak METH-conditioning (55 to 60% average preference), so the purpose of the ongoing study was to test different numbers of training sessions (8 to 12) and compare the effects on post-conditioning preference and reduction of preference over 22 days of extinction. We report here on results for pre-conditioning, post-conditioning, and extinction tests for 8 or 12 training sessions. After 8/12 conditioning sessions, mice spent significantly more time in the METH-paired chamber (67 to 70% average preference). During the 21-day extinction phase average preference decreased, despite day-to-day variability. By extinction day 14, the preference decreased to 65% and at day 21 it further decreased to 58%. Post-conditioning preference for the METH-chamber 8 or 12 training was indistinguishable. Ongoing analyses are focused on extinction and reinstatement phases. These results show that 8 or 12 training sessions yield significantly greater preference conditioning than 6 sessions and suggest that more training sessions (e.g., 16) may result in even more effective conditioning.

K. Karpowicz, B. O'Connor, D. Sharp, J. Kilgore, and E. Rollinson* (2022)
Anthropogenic impacts alter richness-abundance relationship in woody plant communities
East Stroudsburg University, East Stroudsburg, PA 18301

Plant communities can be characterized in many ways, including species richness and abundance of individual plants. The relationship among these characteristics can vary, and are often shaped by environmental context and land use. The goal of our study was to assess how the relationship between species richness and individual abundance varies depending on human influence on a landscape. In 2020, we characterized woody plant communities in seventeen 400 meter-squared plots in the American Northeast as part of an Ecological Research as Education Network (EREN) study focused on studying Plants in the Human-Altered Environment (PHAE). Woody plants with diameters >1 cm at breast height (1.3 m) were identified to species and tallied. We compared these plant communities (in human-altered environments) to reference woody-vegetation plots from the Harvard Forest site (in central Massachusetts) of the National Ecological Observatory Network (NEON). The relative human impact was quantified by estimating the area of impervious surface in the plot (with averages of 15% in local plots, and no impervious surface in NEON plots), as well as determining in-plot canopy cover using the National Land Cover Dataset (averages of 56% in local plots, and 83% in NEON plots). The relationship between woody species richness and individual abundance differed between the NEON reference site and the PHAE human-impacted sites. Although the relationship between richness and abundance was positive in both sites (PHAE r = 0.85; NEON r = 0.62), the reference site had a larger increase in abundance per unit increase in species richness than did the local human-impacted sites (p = 0.003). This result suggests that human impacts have a more negative effect on abundance than richness, perhaps due to retention of larger diameter woody plants and removal of smaller woody plants during land conversion activities. By comparing local human-altered environments to reference woody vegetation sites, we can quantify the effects of our anthropogenic influence in these landscapes.

H. G. Langkamer-Smith, R. H. Heineman*
Bacteriophage T7 life history traits following infection of stationary phase Escherichia coli cells
Kutztown University of Pennsylvania, Kutztown, PA, 19530

Bacteriophages, viruses that infect bacteria, have been widely studied during infection of exponentially growing cells in logarithmic (log) phase. Much less is known on phage infection of stationary phase cells, in which growth has plateaued due to nutrient depletion. Stationary phase cells exist in myriad places throughout the environment, such as in the mammalian colon, where bacteria levels are high and competition for nutrients is intense. This research project aimed to understand the life history traits of bacteriophage T7 when infecting stationary phase *Escherichia coli*. Two assays were used to measure lysis time, burst size, and adsorption constant in log and stationary phase cells. In lysis, cells break open, releasing up to hundreds of newly produced phage particles. Data was collected based on turbidity, or optical density, of the cell solution after infection, with lower turbidity indicating that more cells had lysed. While log phase cells exhibited the characteristic phage lysis time from 15 to 17 minutes after infection, stationary phase cells altogether failed to lyse. Burst size is the number of newly produced phage particles released per infected cell. Data was collected to determine the number of infected cells and the number of new viruses released after infection of stationary and log phase cells. Stationary phase cells released far fewer phage particles than log phase cells, but due to the variation in the log phase burst sizes this difference was not significant (p = 0.103). The adsorption constant measures how likely a phage is to

attach to a host cell. Adsorption was lower in stationary phase cells but this difference was not significant (p = 0.257). While we were not able to demonstrate this conclusively for all life history traits studied, our results are consistent with stationary phase cells being poor hosts for bacteriophages, possibly due to their altered cellular morphology and slower metabolism.

C.R.Lehn, C.M.Arth, S.R.Probst, and C.Scott* (2022)
Identification of Key Mitochondrial Stress Response Genes Using 2,4-Dinitrophenol
Clarion University of Pennsylvania, Clarion, PA 16214

Cellular stress responses are an understudied, yet vital part of a cell's physiology. Metabolic biochemical pathways have many implications in human diseases, such as Cystic Fibrosis and Leigh Syndrome. These pathways are subjected to alterations when they are under cellular stress. One such pathway is the Krebs Cycle, which occurs in the mitochondria of eukaryotic cells. Using *Saccharomyces cerevisiae* as a model organism, our research project utilizes a yeast knockout library, which is an isogenic collection of mutant strains, to identify genes involved in mitochondrial stress response. This library can help identify which genes are involved in the cell's response to its exposure to 2,4-dinitrophenol (DNP), a known causative agent of cellular metabolic stress. The screen was performed by inoculating a specified optical density (600 nm) of yeast into complete nutrient media, to ensure consistency of growth. Sterile filter discs were placed on the media and the yeast strains were exposed to predetermined concentrations of DNP. These spot assays were incubated for three days with images taken every twenty four hours to monitor growth. By using three parental wild-type strains as baseline controls (BY4742, RSY607, and W303), a screening of various yeast knockout strains were assayed for their associated mitochondrial function. Seventy mutant strains have been studied to date with differences in yeast growth being recorded and statistically analyzed. Furthermore, future experiments should elucidate which genes are involved in mitochondrial stress response pathways as well as better define how these biochemical pathways operate.

Z. Lynch and P. Delis* (2022)
Coverboard Surface Color Effect on Snake Capture Success at A Farmland in Cumberland County, South-Central Pennsylvania: A Potential Technique Optimization
Shippensburg University, Shippensburg, PA 17257

Herpetology field research relies on protocols that maximize safety and effectiveness. Coverboards have been used as effective and safe method for capturing amphibians and reptiles and proven useful in snake field studies. Snakes seek shelter under coverboards for protection from predators and temperature regulation. Snakes, as ectotherms, need to warm up on cooler days and cool off on warmer days. Coverboards made of different materials and colors have various physical properties and snake affinity. This research will examine the thermal properties and capture effectiveness of two different surface color coverboards: metal vs. dark green colored. These surfaces will potentially influence the environment thermal dynamics thus affecting the snake capture rates. In this research, we will randomly deploy 19 pairs of metal and green coverboard combinations, side by side, 5 cm apart, to ensure same microclimates and physical environment. The specific locations follow ecotones, forest, and farm edges, which maximizes the probability of catching snakes of different species. Coverboards will be checked monthly from March to November 2022. On sampling days, we will use thermal instruments to record coverboard surface, ground, and snake body temperatures. Snakes will be hand captured, identified, measured, sexed, examined for reproductive status and health condition, photographed, and tagged. Thereafter, snakes will be released back to the same location of capture. Statistical analysis will determine if there are significant

differences in effectiveness of snake capture between the coverboard types. Our expectation is that the higher thermal properties of green boards will result in higher snake capture rates.

D.D. Lynn and C.R. Hardy* (2022)

Genetic and morphological species identification in the Colocasia-Xanthosoma tuber complex in Pennsylvanian Markets

Millersville University of Pennsylvania, Millersville, PA 17551

Xanthosoma sagittifolium, *Colocasia esculenta*, and *Colocasia antiquorum* are members of the philodendron family, Araceae, and are grown as subsistence crops in the tropics for their edible tubers. In Pennsylvanian markets their tubers are found under a variety of names including taro, American taro, dasheen, malanga, yautia, or eddo, but with apparently little fidelity to their true species identity. A survey in area markets has found very similar looking tubers sold under very different common names and one can also find the same common name applied to tubers with very different morphologies. Unfortunately, the literature on how to tell species in the complex apart is based only on features of leaves and flowers, not the tubers, making them indistinguishable in the marketplace. The goal of this research is a multi-faceted approach to identifying these tubers in markets: traditional systematic botany and DNA barcoding. In one approach, tubers have been cultivated after collection from area markets morphologically distinguishing *Xanthosoma* and *Colocasia*. These efforts have revealed that the lanceolate and tapered tubers produce leaves ascribable to *Xanthosoma sagittifolium* (what should be labeled as “yautia” or “American taro”). In contrast, the round or elliptic tubers produce leaves ascribable to *Colocasia* (what should be labeled as “taro” or “Pacific taro” or "eddo”). DNA has also been extracted and chloroplast genes amplified from a large sample of these tubers, and it is hoped that DNA sequencing might increase support for my morphology-based inferences that the tapered tubers are those of *X. sagittifolium* and the round and elliptic tubers are those of either *Colocasia* species. DNA sequences should further resolve which of the rounder tubers belong to *C. esculenta* and which belong to *C. antiquorum*. The data will be used to quantify the relative frequencies with which each tuber species are sold in area markets and to produce a dichotomous taxonomic key to the tubers in the marketplace using morphology.

S.R. Marx and K.B. Long* (2022)

Impact of Tumor Cell-Produced Cytokines on Macrophage Polarization

Mansfield University of Pennsylvania, Mansfield, PA 16933

The immune system recognizes and destroys pathogens and tumors through several pathways, including inflammation. However, inflammation is dangerous when misdirected, causing the immune system to attack healthy tissues and potentially support tumor growth and survival. Cytokine signaling proteins are crucial to inflammation; they recruit and activate different immune cells at the inflammatory site. Specifically, antigen naïve macrophages are polarized to perform different effector functions depending on the signals they receive. Our research seeks to understand how the specific combinations of cytokines influence macrophage phenotype and activity. We utilized naïve macrophages (MØ) that can be polarized to the anti-tumor (M1) or pro-tumor (M2) phenotype depending on signals within tumor microenvironments. For our experiments, three groups of MØ macrophages were exposed to cytokine-containing tumor supernatant produced by three genetically identical, yet unique tumor cell lines *in vitro*. The tumor cell lines were previously shown to produce distinct cytokine profiles, and when implanted into mice, they developed into phenotypically different solid tumors. Using the differences in cytokine production of these tumor cell lines and thus, the resulting differences in macrophage polarization, we seek to understand what controls the phenotypic shift of macrophages during inflammation. MØ, M1, and

M2 macrophage reference genes were selected and used to design primers to identify macrophage polarization states via qRT-PCR. MØ, M1, and M2 macrophage controls were generated by isolating murine bone marrow-derived cells and using appropriate stimulation with M-CSF followed by a combination of IFN-gamma/ LPS or IL-4/IL-13 respectively. Known gene expression profiles were generated by converting isolated RNA to cDNA and testing expression levels via qRT-PCR. Experimental groups of MØ macrophages were exposed to the three unique tumor supernatants and their gene expression profiles were generated in the same manner. Experimental gene expression profiles were compared to the controls', and we determined that each tumor-produced supernatant polarized macrophages in a unique manner which phenotypically changed their behavior. This research is important to help determine the cytokines driving macrophage polarization during the general inflammatory response.

M. Patel, L. Taylor, T. Feltman, and H. Sahli* (2022)
Salt Spray Tolerance in the Genus Monarda
Shippensburg University, Shippensburg, PA 17222

As the climate continues to change, the threat of increased sea levels poses new stresses that plants must adapt to. One such stress is that plants close to the coast are experiencing increased salt spray. We studied tolerance to salt spray across populations of *Monarda citriodora* and *Monarda punctata*. Plants grown from seeds from one inland population of *Monarda citriodora* and two populations of *Monarda punctata* were sprayed with either salt water or distilled water (control) for two weeks and salt tolerance was assessed. Transplants from the resulting treatments were sprayed again three months later to determine if tolerance persisted or was affected by previous exposure to salt spray. For the first experiment, the salt spray treatment caused a reduction in stem growth and leaf area, and increased the proportion of leaves damaged in all populations; however, there was not a significant difference in salt tolerance across the populations. Stomatal density was significantly reduced in *Monarda citriodora* plants that received the salt treatment compared to the control treatment. For the second experiment, prior exposure to salt did not affect any population's tolerance to salt. Plants from the three populations varied in several traits that may affect salt tolerance, including succulence and plasticity in stomatal density. The lack of large differences in salt tolerance between the three populations studied, one of which was from an arid, inland environment, suggests that adaptation to dry environments may pre-adapt plants to the stress of salt spray.

K. Plasterer and P. Delis* (2022)
General Survey of the Herpetofauna of Letterkenny Army Depot, South-Central Pennsylvania
Shippensburg University, Shippensburg, PA 17257

Biologists are witnessing a global biodiversity crisis which is being exacerbated by an ongoing climate crisis. Amphibians and reptiles are key organisms, considered bioindicators, and alerting us of the health of natural environments. The Commonwealth of Pennsylvania currently has 10 herpetofauna species that are classified as endangered and 3 more species that are classified as threatened. Long-term field studies can shed light on the biodiversity trends, especially when addressing sensitive species such as amphibians. This research is a continuation of a herpetofauna monitoring program, at Letterkenny Army Depot (LEAD), Franklin Co, south-central Pennsylvania, originally started in 2003. This survey identified 15 amphibian and 14 reptile species respectively. From February to August 2022, I will survey amphibians and reptiles at LEAD using a variety of techniques: dip nets, drift fences, coverboards, aquatic traps, road

transects, nocturnal acoustic surveys, and opportunistic captures among others. Individuals seen or captured will be identified to species, measured, and sexed, when possible, assessed for health or injuries, photographed, and marked if feasible. All individuals will be released back at the site of capture. The data collected and analyzed will provide us with diversity and demographic trends. This comparison will shed light on the consequences of anthropogenic disturbances such as pollution, habitat alteration, and climate changes experienced in south-central Pennsylvania by the herpetological community.

K. Procopio, C.C. Farmer, B. Steward, C. Hardy*, and M. Klosinska* (2022)
Exploring adaptation and gene flow between Arabidopsis lyrata populations growing on serpentine and non-serpentine soils.
Millersville University, Millersville, PA 17551

Arabidopsis lyrata, a close relative of the model plant *A. thaliana*, is often used in studies of plant ecology and evolution. *Arabidopsis lyrata* grows on rocky substrates, including on nutrient-poor serpentine high in heavy metals. We study local adaptation and evolution of this species through examining gene flow between *A. lyrata* populations growing on more hospitable, non-serpentine soils and those on serpentine barrens which exist as habitat "islands" along the Pennsylvania/Maryland state line. Gene flow between populations is being investigated through comparison of alleles of selected microsatellite loci. Our preliminary data show serpentine soil populations exchange genetic material mainly with other serpentine soil populations, though there is also some input from their non-serpentine neighbors. In addition to microsatellite loci, we set out to examine a conserved chloroplast locus, trnL-F, which is used in species identity determination, but shows some sequence variation within *A. lyrata*. We aim to determine, whether this locus shows sequence differences between non-serpentine and serpentine populations, in agreement with our microsatellite data.

C.D. Root, G. Carson, G. Moyer*, E. Farkas, and J. Kagle* (2022)
Sequestration of Toxic Metals by Wild Mushrooms near Abandoned Coal Mine Tailings
Mansfield University, Mansfield, PA 16933

There is an increasing risk in the modern world of toxic inorganic substances infiltrate throughout our local environment through anthropogenic and natural weathering processes. The metals accumulating in our food webs, soil, and water sources have been known to cause neurological and enzymatic disfunctions leading to organ failure. Mushrooms are tolerant to high levels of metals and promote growth in neighboring plants making them ideal for bioremediation. To reduce the amounts of metals in the environment in a cost-effective passive manner, mushrooms have been explored for their unique abilities in sequestering and transforming a variety of metals. To investigate the bioaccumulation of metals, mushrooms were collected near mine tailings piles along two streams near Blossburg Pennsylvania, where there where mining operations between 1860-1960. The samples where dried, pulverized, and digested for analysis using inductively coupled plasma mass spectrometry (ICP). Soil and water samples were collected and analyzed for the same set of metals. The analyzed metals consisted of Al, Zn, Mn, As, Cd, Fe, Pd, Ba, and Sr being chosen for there toxic relationship to humans. The soils analysis showed Fe with the highest percentage followed by Al, Cd having the lowest. The mushroom analysis showed similar accumulations. The mushrooms were grouped by family for statistical analysis showing differences in uptake between family and metal ion. All metals analyzed were taken up by at least one species of mushroom, while Al, As, Fe, and Pb metal ions were found in all mushroom samples, suggesting that uptake of metals may be related to specific species and environmental conditions rather than family.

Knowing what mushrooms are best in uptake for certain inorganic toxins can be incredibly useful in bioremediation efforts as well as a warning to foragers in areas known to have high concentrations of toxic pollutants.

M.L. Ruiz and J.L. Bandura* (2022)
Using EdU labeling to visualize cell division in Drosophila tissue
Lock Haven University of Pennsylvania, Lock Haven PA, 17745

Proper cell division is needed for normal development and cancer can result when cells divide uncontrollably. To be able to visualize DNA replication in *Drosophila* tissues we have optimized a 5-ethynyl-2'-dioxyuridine (EdU) labeling procedure. EdU is a thymidine analog that is incorporated into chromosomes during DNA replication which can be subsequently detected, allowing labeling of cells in S phase. The EdU labeling procedure is faster and maintains tissue morphological better than the traditional BrdU protocol. Other labs have utilized this established technique, but we needed to determine the ideal conditions to perform the labeling in our lab. We will discuss the results of our experiments. Ultimately, we are interested in using the perfected EdU labeling procedure on *Usp5* mutant tissue, because preliminary data suggests *Usp5* mutants experience ectopic cell proliferation.

S. Semelsberger, S. Grandinette, and C.Q. Diep* (2022)
Finding novel peptides that affect kidney development in zebrafish
Indiana University of Pennsylvania, Indiana, PA 15705

Kidney disease is a serious global health concern with limited and insufficient treatment options due to the lack of regeneration in humans. However, by studying the process in which zebrafish use stem cells to regenerate new kidney tissue, new treatments may be achievable. The kidney stem cells in zebrafish express the lhx1a protein, which plays an important role in activating kidney stem cells during development and regeneration. By understanding the mechanisms behind the lh1xa protein, proper manipulation of this protein may lead and contribute to a new kidney regenerative treatment. We hypothesize that the new molecules found to bind to the lhx1a protein may alter stem cell regulation. Our lab previously isolated 9 peptides that bound to lhx1a. However, we found mutations in the vector outside of the peptides that resulted in stop codons after the peptides. In my current research project, I will remake the 9 peptides in a PR3N-intein prey vector and exclude the mutations. The new peptide plasmids will be sequenced to confirm no mutations exist. They will then be tested for their interaction with lhx1a using the yeast two hybrid system (with the bait plasmid expression lhx1a). After validating these 9 peptides for their interaction with lhx1a, the peptides will be fused in the middle of GFP and injected as mRNA into the 1-cell zebrafish embryo to assess the peptides' effect on kidney development. If the peptides bind to lhx1a and affect kidney development, they can be used as a tool to decipher the molecular mechanism of lhx1a, such as dimerization. The end goal is to better understand zebrafish kidney development and regeneration and possibly contribute to a regenerative therapy for humans.

A. Shadle and D.E. Spooner* (2022)
Development of a reliable protocol to measure critical thermal maxima in tessellated darters
Lock Haven University, Lock Haven, PA 17745

Understanding the thermal performance of freshwater organisms is a critical research need. With unpredictable flow regimes and global temperatures rising, there is concern that less thermally tolerant

species may be lost. Such decreases in key species may also result in a causing a decrease in diversity and a change in the system of that shift in ecosystem function (nutrient recycling) and ecosystem health environment. Critical thermal maxima (CTM) is a physiological metric that is commonly used to assess the thermal performance of consumers. It is defined as the maximum threshold temperature at which an organism loses locomotive functions prior to the onset of death. Critical thermal maxima is relevant to environmental managers because it can inform the extent of species thermal limits. The purpose of our study was to develop an experimental method to assess critical thermal maxima for freshwater darters. With global temperatures rising, less tolerant species may be lost causing a decrease in diversity and a change in the system of that environment. Our goal was to characterize CTM in the tessellated darter under two different acclimation temperatures and evaluate if CTM might be related to the excretion of nitrogen and phosphorus. We ran multiple preliminary trials using different configurations of temperature equipment to develop the best method to reliably measure CTM. Here, we present the results of our work to date and the experimental design of our final experiment.

N. Slotnick, O. Balascio, and K. Beishline* (2022)
BORIS Expression in HCT116 Cells
Bloomsburg University of PA, Bloomsburg PA, 17815

Recent studies suggest CTCF plays an important role in regulating eukaryotic telomeres, genomic structures at the ends of chromosomes that serve a protective role for the genetic material. CTCF is a chromatin and transcriptional regulator found in all human cells. Its only paralog, BORIS, is naturally expressed in spermatocytes but has been shown to be turned on in many cancer cell models. Unlike CTCF, the role of BORIS in telomere biology is yet to be understood. The goal of this project is to create a cell model which can be utilized to study BORIS function in telomere biology. One BORIS plasmid was created using a ligation and lipofectamine transfection to be expressed in HCT116 cells. Another BORIS plasmid with tetracycline inducible expression was infected into HCT116 cells via a retroviral package. Both cell lines have been validated to measure BORIS expression at mRNA and protein level, by RT-PCR or IF-staining and Western blots respectively.

E. Soliman and R. Major* (2022)
Loss of S-Phase Protein Tipin Results in a Delay and Asymmetry of Tissue Regeneration
Indiana University of Pennsylvania, Indiana, PA 15705

Failure to maintain and regenerate damaged tissue is an important contributor to human disease. To better understand mechanisms of tissue repair we have chosen a simple planarian flatworm as our model organism. We have conducted two trials of timeless-interacting protein (tipin) knockdown using RNA interference and examined post-amputation blastemal growth and photoreceptor regeneration. Results suggest that loss of tipin activity leads to a decrease in the rate of regeneration. These phenotypes appear to be unique to tipin as knockdown of one of its binding partners, Timeless, does not result in similar regenerative changes. We believe that our ability to manipulate tipin function provides a novel way in which to slow down the rate of regeneration in the planarian. To more directly assay the role of tipin in planarian regeneration, we will use immunohistochemistry to compare the level of proliferating stem cells between normal and tipin-deficient tissues.

N. Vasil and D.V. Widzowski* (2022)
Sex and Strain differences in 5-hydroxytryptophan-induced head twitch in mice.
Indiana University of Pennsylvania, Indiana, PA, 15705

Previous studies in our laboratory have shown differences in head twitch responses (HTRs) in female and male C57Bl6 mice when injected with 5-Hydroxytryptophan (5-HTP), a precursor to serotonin. Female C57Bl6 mice consistently exhibited about 3 times as many HTRs (37.5) compared to males (12.5) at a 5-HTP dose of 300 mg/kg. Males and females had peak HTR responses at 15-20 minutes after 5-HTP injection. While there are consistent sex differences in C57Bl6 mice, it is unclear if sex differences will be found in other strains of mice. The purpose of the present study was to compare the HTRs induced by 5-HTP in a different strain, BALBc mice, and compare the results to those of the previous C57Bl6 studies. Adult male and female BALBc mice were injected with 300 or 400 mg/kg of 5-HTP and then observed up to 50 minutes. Numbers of HTRs were counted for 5-minute intervals from 15-35 minutes after injection with 5-HTP. In female BALBc mice administered 400 mg/kg of 5-HTP, peak HTRs occurred at 35-40 minutes post dose. The peak average number of HTRs at 400 mg/kg was 16.6, while the peak average HTRs at 300 mg/kg of 5-HTP was 3.5. In male BALBc mice administered 400 mg/kg, peak HTRs were observed between 25 and 40 minutes. The peak average number of HTRs in male BALBc mice was 3.50. Female BALBc mice showed 4.7 times as many HTRs as males at peak time, indicating a clear sex difference in 5-HTP-induced HTRS. Female BALBc mice differed from female C57Bl6 mice in their response to high doses of 5-HTP in two ways. First, the peak number of HTRs for the BALBc mice was lower than that of the C57Bl6 mice. Second, the time to reach the peak number of HTRs was longer for BALBc female mice (35 min) compared to female C57Bl6 mice (15 min). Male BALBc mice exhibited approximately 4-times fewer HTRs than male C57Bl6 mice, confirming a large strain difference.

L. Wiles, D. Douglas, A. Pasculle, and L. Nicholson* (2022)
Genetic Influences on Opioid Addiction through Dopamine Signaling Pathway Polymorphisms
California University of Pennsylvania, California, PA 15419

In 2019 alone the United States has experienced nearly 50,000 deaths from drug overdoses involving opioids other than methadone, according to the Center for Disease Control. The impact of this crisis is so severe that the United States Department of Health and Human Services declared it a public health emergency in 2017. While the opioid crisis has disproportionally affected rural areas of the US and those with low socioeconomic statuses, opioid use disorder is a multifactorial disease with a significant genetic component. Dopamine signaling is involved in reward-based pathways associated with addiction, and variations in the dopamine D2 receptor have now been shown to be associated with an increased risk of opioid use disorder. This study investigated these potential associations by collecting salivary DNA samples of individuals who also completed an IRB-approved anonymous survey that asked about demographics and addiction status. The volunteers were then separated into different cohorts based on addiction history and current addiction status and the resulting data was used to determine whether genetic variants in dopamine signaling pathway genes are associated with opioid-use disorder. Ultimately, the results from this study can be used to gain an improved understanding of the role played by genetics in opioid-use disorder.

K. Wood and J. Kagle* (2022)
Comparison of Evolution Rate of Ciprofloxacin Resistance among Staphylococcus epidermidis Isolates
Mansfield University, Mansfield, PA 16933

Species of bacteria are constantly evolving due to mutations. Mutations can happen from a mistake in DNA replication and can then be passed down generations if they allow the bacteria to grow more successfully

in the presence of stressors like antibiotics. Since the prevalence of antibiotics has increased, more strains of bacteria are being identified which have antibiotic resistance abilities. Antibiotic resistant bacterial infections can be life threatening because they are more challenging to treat. One such example is methicillin-resistant *Staphylococcus aureus* (MRSA). Some strains of MRSA have become resistant to beta-lactam antibiotics through genetic mutation. The goal of this study was to determine if *S. epidermidis* strains vary in the rate of evolution concerning antibiotic resistance from different human samples or if the process is random and independent from the initial genetic background. Isolates of *Staphylococcus epidermidis* (a close relative of *S. aureus*) were stressed in stepwise concentrations of the antibiotic ciprofloxacin to encourage the growth of strains with resistance-conferring mutations. This process was continued until each strain was able to grow in the presence of 2.2 ug/mL ciprofloxacin, the accepted definition of ciprofloxacin-resistant bacteria. There was no significant difference among strains in the number of transfers required to reach full resistance, and most followed a similar pattern of resistance evolution. Three samples from two of the initial isolates, however, evolved resistance at a much faster rate. Understanding the factors influencing the evolution of antibiotic resistance could be used in the future to prevent the development of resistance before it impacts public health.

A.A. Zayachak, J.D. Adam, and B.E. Overton* (2022)
Toothbrush Bacteria are Associated with Bacterial and Fungal Contamination of Bathroom Environment
Lock Haven University, Lock Haven, PA 17745

The objective of this study was to isolate bacteria from the human mouth and compare it to the bacteria isolated from toothbrushes of different age classes. It is unclear whether bacterial biofilms on toothbrushes come from the human mouth or the bathroom environment and what this means for oral health. All isolations were compared on Trypticase Soy Agar, (TSA II), at room temperature. Toothbrushes greater than six months old had 208 colony forming units (CFU's) comprising five different morphotypes at a 1/1000 dilution. The two-month old toothbrush had 82 CFU's comprising three different morphotypes at a 1/1000 dilution. The two-week old toothbrush had 5 CFU's comprising two morphotypes at a 1/100 dilution. Surprisingly, DNA sequences showed similar results from toothbrushes, even though they were from different individuals. The genus *Pantoea* was found on both the two-week and greater than six-month old toothbrush. The two-month and greater than six-month old toothbrushes also shared the Genus *Staphylococcus*, after DNA sequencing. The greater than six-month old toothbrush had a *Sporobolomyces sp.* which is an emerging fungal pathogen previously reported from bathrooms. To determine whether the bacteria on the toothbrushes were coming from the environment or from the human mouth, swabs were taken from the bathroom environment where the toothbrushes were from. DNA sequencing of the bathroom isolates is ongoing, although morphologically the isolates from the toothbrush and the environment appear to be similar. In conclusion, it appears that bacteria on toothbrushes are from both the human mouth and the environment and toothbrush disposal or sterilization is suggested after two-months.

Historical Highlights of APSCUB/CPUB

- The Association of Pennsylvania State College and University Biologists (APSCUB) was formed in 1969.

- The First Annual Meeting was held in April 1970 at Shippensburg.

- The Fifth Annual Meeting was held in connection with the Annual Meeting of the Pennsylvania Academy of Science at Bloomsburg.

- The tradition of awarding Outstanding Student Awards was initiated at the Eighth Annual Meeting at Indiana in 1977.

- The nuclear reactor accident at Three Mile Island occurred on the morning of day one of the Tenth Annual Meeting at Millersville.

- The Fourteenth Annual Meeting was held at Mansfield in 1983, marking the point at which each member institution had hosted an annual meeting.

- APSCUB changed its name to Commonwealth of Pennsylvania University Biologists (CPUB) in 1984.

- Regional meetings were held during the 1980‘s.

- APSCUB/CPUB has been an active voice for Biology Faculty concerns since its inception. During the 1972-1973 academic year, the APSCUB Executive Committee prepared a
  position paper entitled “Position to be Taken in Negotiations on Behalf of the State College and University Biologists (Scientists)” that was instrumental in faculty obtaining 1 credit for 1 contact hour of laboratory teaching (1:1) in the collective bargaining agreement.

- CPUB position papers were again prepared in the 1980‘s, 2003 and as recently as 2016 when contract negotiations resulted in concerns over the loss of 1:1 for laboratories. CPUB has consistently played an important role in expressing and representing the concerns of our State System Science Faculty.

- APSCUB/CPUB prepared position papers expressing support for the teaching of evolution and opposition to the teaching of creationism in the 1980‘s and again in 2001.

- A CPUB position paper opposing below ground storage of long half-life, low-level nuclear wastes was approved by the membership in 1987.

- APSCUB/CPUB has supported faculty professional development since the 1970‘s. Faculty Professional Development Institutes were held starting in the late 1970‘s on topics such as
  Electron Microscopy, Natural History-Ecology, Marine Science, Organismal Physiology, Photography, Gel Electrophoresis, Heart Stress Analysis, Microcomputers, High Performance Liquid Chromatography, as well as Annual Wildflower Studies.
  Symposia were held in the 1980‘s on topics such as Genetic Engineering and The Battle Against AIDS.
  More recently, workshops have been held on topics such as Paleontology of Pennsylvania, Molecular Techniques, and Geographical Information Systems (GIS). Mini- workshops have also been offered during numerous CPUB Annual Meetings.

- CPUB Student Grants were first awarded in 2001 as “Student Travel Grants for Scholarly Presentations”. The CPUB Student Grants became research grants in 2002. Awards were initially set at a maximum of $200, but the maximum award has been increased to $600. In 2019, the CPUB Student Grants Committee started funding research presentation travel grants in addition to research grants.

- The abstracts of CPUB Annual Meetings were originally compiled into large volumes that spanned a number of years. Starting with the Annual Meeting at Millersville University in 2005, the program of the meeting was given an ISSN number. Programs of subsequent meetings have been published annually as proceedings under the same ISSN number.

- The 2020 CPUB Annual Meeting that was scheduled to take place at Shippensburg was cancelled due to the COVID-19 pandemic. This was the first time in 50 years that a CPUB Annual Meeting was cancelled.

- The 2021 CPUB Annual Meeting that was hosted by Shippensburg University was held virtually in keeping with guidance from the CDC due to the ongoing COVID-19 pandemic. This was the first time that a CPUB Annual Meeting was held as a virtual event.

Additional Information on the early history of CPUB can be obtained by reading the history sections of Volumes 1-3 of the APSCUB/CPUB Proceedings (1969-1987).

Carol C. Mapes, CPUB President 2003-2007 (updated April 2019 & April 2021)

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CPUB Presidents

Term	President	Institution
1969---1970	Kenneth Michel	Slippery Rock University of PA
1970---1971	Kenneth Michel	Slippery Rock University of PA
1971---1972	Gould Schrock	Indiana University of PA
1972---1973	Carmela Cinquina	West Chester University of PA
1973---1974	Joseph Vaughn	Bloomsburg University of PA
1974---1975	Gordon Kirkland	Shippensburg University of PA
1975---1976	Blair Carbaugh	Lock Haven University of PA
1976---1977	Barry Hunter	California University of PA
1977---1978	William Morrison	Slippery Rock University of PA
1978---1979	Robert Reed	Shippensburg University of PA
1979---1980	Henry Vallowe	Indiana University of PA
1980---1981	Alex Henderson	Millersville University of PA
1981---1982	Ronald Rhein	Kutztown University of PA
1982---1983	Clifford Kelsey	East Stroudsbug University of PA
1983---1984	Foster Billheimer	California University of PA
1984---1985	Florence Lewis	Cheyney University of PA
1985---1986	David Dobbins	Millersville University of PA
1986---1987	Jay Davidson	Shippensburg University of PA
1987---1988	Andrew Browe	Indiana University of PA
1988---1989	Eugene Jones	Cheyney University of PA
1989---1990	Dave Flesch	Mansfield University of PA
1990---1991	Roger McPherson	Clarion University of PA
1991---1992	Frank Hoffman	Slippery Rock University of PA
1992---1993	Ernie Bernice	Edinboro University of PA
1993---1994	Jerry Chmielewski	Slippery Rock University of PA
1994---1995	Bill Barnes	Clarion University of PA
1995---1996	Robert Maris	Mansfield University of PA
1996---1997	Robert Maris	Mansfield University of PA
1997---1998	Robert Maris	Mansfield University of PA
1998---1999	Robert Maris	Mansfield University of PA
1999---2000	Carolyn Steglich	Slippery Rock University of PA
2000---2001	Carolyn Steglich	Slippery Rock University of PA
2001---2002	Carolyn Steglich	Slippery Rock University of PA
2002---2003	Carolyn Steglich	Slippery Rock University of PA
2003---2004	Carol Mapes	Kutztown University of PA
2004---2005	Carol Mapes	Kutztown University of PA
2005---2006	Carol Mapes	Kutztown University of PA
2006---2007	Carol Mapes	Kutztown University of PA
2007---2008	Richard Stewart	Shippensburg University of PA
2008---2009	Richard Stewart	Shippensburg University of PA
2009---2010	Richard Stewart	Shippensburg University of PA

CPUB Presidents *(continued)*

Term	President	Institution
2010---2011	Richard Stewart	Shippensburg University of PA
2011---2012	Ryan Wagner	Millersville University of PA
2012---2013	Ryan Wagner	Millersville University of PA
2013---2014	Ryan Wagner	Millersville University of PA
2014---2015	Ryan Wagner	Millersville University of PA
2015---2016	Nathan Thomas	Shippensburg University of PA
2016---2017	Nathan Thomas	Shippensburg University of PA
2017---2018	Nathan Thomas	Shippensburg University of PA
2018---2019	Nathan Thomas	Shippensburg University of PA
2019---2020	Sarah Meiss	California University of PA
2020---2021	Sarah Meiss	California University of PA
2021---2022	Sarah Meiss	California University of PA
2021---2022	Matthew Foradori (Interim)	Edinboro University of PA

CPUB Annual Meetings

2024 – California University of Pennsylvania
2023 – East Stroudsburg University of Pennsylvania
2022 – **Lock Haven University of Pennsylvania - virtual**
2021 – Shippensburg University of Pennsylvania - virtual
2020 – Cancelled (COVID Pandemic)
2019 – Edinboro University of Pennsylvania
2018 – Mansfield University of Pennsylvania
2017 – Kutztown University of Pennsylvania
2016 – Millersville University of Pennsylvania
2015 – Indiana University of Pennsylvania
2014 – Bloomsburg University of Pennsylvania
2013 – Clarion University of Pennsylvania
2012 – Slippery Rock University of Pennsylvania
2011 – California University of Pennsylvania
2010 – East Stroudsburg University of Pennsylvania
2009 – Lock Haven University of Pennsylvania
2008 – Shippensburg University of Pennsylvania
2007 – Edinboro University of Pennsylvania
2006 – Kutztown University of Pennsylvania
2005 – Millersville University of Pennsylvania
2004 – Indiana University of Pennsylvania
2003 – Shippensburg University of Pennsylvania
2002 – Lock Haven University of Pennsylvania
2001 – Bloomsburg University of Pennsylvania

Acknowledgements

Lock Haven University Administration:

Dr. Bashar W. Hanna, *Interim President*
Dr. Ron W. Darbeau, *Provost & Vice President for Academic Affairs*
Mr. Walter A. Eisenhauer, *Interim Dean, College of Natural, Behavioral & Health Science*

Lock Haven University Department of Biological Sciences Planning Committee:

Dr. Heather Bechtold, *meeting co-organizer, CPUB Director*
Dr. Jennifer Bandura, *meeting co-organizer, CPUB Assistant Director*
Dr. Joseph Calabrese
Dr. Jennifer Deitloff
Dr. Carina Howell
Dr. Shonah Hunter
Dr. Amy Kutay
Dr. Barrie Overton
Dr. Steven Seiler
Dr. Daniel Spooner

Webinar Coordination, Electronic Registration, and Website Building:

Ms. Jan Bottorf, *Administrative Computing, Lock Haven University*
Mr. Carey Probst, *Information Technology, Lock Haven University*

Welcoming Remarks:
Dr. Bashar W. Hanna, *Interim President, Lock Haven University*
Dr. Matthew Foradori, *CPUB Interim President*

Keynote Speakers:
Mr. Greg Turner, *State Mammologist with the Pennsylvania Game Commission*
Dr. Brent Sewall, *Associate Professor in the Department of Biology, Temple University*

Judging Coordinators:
Dr. Stacy Hrizo and Paul Falso, *Biology Department, Slippery Rock University*

Platform and Poster Judging:
All CPUB Faculty Judges

Platform Session Moderators
Dr. Jennifer Deitloff, Dr. Carina Howell, and Dr. Daniel Spooner, *Department of Biological Sciences, Lock Haven University*