EDITORIAL POLICY

General

The Ohio Journal of Science (OJS) has published peer-reviewed, original contributions to science, education, engineering, and technology since 1900. The OJS encourages submission of manuscripts relevant to Ohio, but readily considers all submissions that advance the mission of The Ohio Academy of Science: To foster curiosity, discovery, innovation, and problem-solving skills in Ohio. The Academy produces two issues annually: peer-reviewed April Program Abstracts (Issue No. 1) and peer-reviewed full papers in December (Issue No. 2). The Ohio State University Libraries publishes both issues Open Access online on behalf of The Ohio Academy of Science. The Academy distributes a print version of the April Program Abstracts at the annual meeting. **Peer-reviewed articles are published as accepted throughout the year**. Because the *OJS* is an international multidisciplinary journal, authors should write clearly and concisely, avoid excessive jargon, and include sufficient explanation of underlying concepts to assure broad understanding of the work by those in different fields than the author.

The *OJS* considers original contributions from members and non-members of the Academy in all fields of science, technology, engineering, mathematics, and education. Submission of a manuscript is understood to mean that the work is *original* and *unpublished*, and is not being considered for publication elsewhere. All manuscripts will be peer-reviewed and edited. Any opinions expressed by reviewers or authors are their own and do not represent the views of The Ohio Academy of Science or the *OJS*.

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Please contact the editor directly for general questions regarding content or appropriateness of submissions:

Dr. Barry Allred, Editor, *The Ohio Journal of Science*.
Email: allred.13@osu.edu

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FUTURE ACADEMY MEETINGS

The 133rd Annual Meeting of The Ohio Academy of Science, April 12, 2025, hosted by Miami University, Oxford, Ohio. See: https://www.ohiosci.org/annual-meeting

International Exposure

Abstracts or complete papers for research articles published in *The Ohio Journal of Science* from February 2018 to February 2023 have been accessed online more than 77,000 times. Each article in this published time frame has been accessed online an average of almost 2,000 times.

The *OJS* is an Open Access online journal. According to the DOAJ (*Directory of Open Access Journals),* https://doaj.org, as of 4 November 2024 the number of Open Access journals has grown from 300 in 2003 to 21,097 today—with the number of article records (in excess of 10.52 million, globally) climbing by the hour.

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This year's articles (Volume 124, No. 2) appear here: https://ohiojournalofscience.org/issue/view/367

Date of Issue—November 2024

The OHIO JOURNAL *of* SCIENCE

AN OPEN ACCESS, ONLINE, INTERNATIONAL, MULTIDISCIPLINARY JOURNAL

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131st Annual Meeting

The OHIO ACADEMY *of* SCIENCE

Hosted by
Edison State Community College
April 15, 2023

FRONT COVER PHOTO: The Emerson Center atrium at Edison State Community College. Photo by Edison State Community College, used by permission.

The OHIO ACADEMY *of* SCIENCE

131st Annual Meeting

Hosted by
Edison State Community College
1973 Edison Drive
Piqua, Ohio 45356
April 15, 2023

ABOUT THE ANNUAL MEETING

The Ohio Academy of Science's Annual Meeting is for academic, governmental, and industry scientists and engineers; university and pre-college educators; pre-college, undergraduate, and graduate students; and interested lay citizens in the Ohio region.

WELCOME!

Edison State Community College welcomes you to the 131st Annual Meeting of The Ohio Academy of Science. We invite you to explore our campus and to share in the excitement and opportunities provided in this program.

For further information, please call 614-389-2182.

MEETING LOCATION

The Ohio Academy of Science events take place on the main campus of Edison State Community College, North Hall, 1973 Edison Drive, Piqua, Ohio 45356.

The Ohio Academy of Science

5930 Wilcox Pl. • Suite F • Dublin, OH 43016
Phone 614-389-2182 • Fax 614-389-2470
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*Fostering curiosity, discovery and
innovation to benefit society*.

GENERAL SCHEDULE

Saturday, April 15, 2023

All events take place in North Hall.

7:30 AM - 9:00 AM	Breakfast (Cafeteria)
7:30 AM - 10:00 AM	Meeting registration (North Hall)
8:45 AM	Welcome (Robinson Theatre)
9:00 AM - 10:00 AM	Poster presentations (all presenters)

Note: All posters will be displayed in both morning and afternoon sessions.

10:00 AM - 11:00 AM	Panel discussion—*Workforce Development in Ohio...Where do YOU fit in?* (Robinson Theatre)
11:00 AM - Noon	Oral presentations (Auxiliary Gym and Room 020)
Noon - 1:30 PM	Lunch (Cafeteria)
Noon - 1:30 PM	All-Academy Lecture Dr. Rosalyn (Roz) Hobson Hargraves (Robinson Theatre)
1:30 PM - 2:30 PM	Oral presentations (Auxiliary Gym and Room 020)
2:30 PM - 3:30 PM	Poster presentations (all presenters)

Note: All posters will be displayed in both morning and afternoon sessions.

Annual Meeting of the Members

The Ohio Academy of Science will hold one annual meeting of the members each calendar year. The annual meeting will take place during the first or second calendar quarter of each year, and will be held at a time and place that the Board designates. The purpose of each annual meeting will be to conclude any old business and conduct any new business that may properly come before the members. The business session of this meeting shall be conducted in accordance with the most recently published edition of "Robert's Rules of Order" or "the Modern Rules of Order."

Our Institutional Host

Edison State Community College has followed in the footsteps of its namesake, Thomas Alva Edison, by earning a reputation for being an innovator in providing accessible, quality education and training opportunities for students. The college has grown from modest beginnings in 1973, when it offered 30 courses in a rented facility, to serving more than 4,000 students enrolled today in over 100 degree, certificate, and short-term technical certificate programs.

In addition to the 131 acres of rolling green space the Piqua Campus sits on, Edison State has locations in Greenville, Eaton, and Troy. Each regional location focuses on specific programs, with Greenville and Eaton being home to the college's agriculture programs and Troy positioned to be the center of healthcare education in the Upper Miami Valley.

Edison State continues to thrive, experiencing growth in enrollment while adding to an already robust catalog of academic offerings. Today, students can attend classes and receive support services at one of the college's four convenient locations, as well as online. Learn more about Edison State by visiting www.edisonohio.edu .

Thank you to the Edison State Community College planning committee for helping to make this a successful meeting:

- Dr. Paul Heintz, Dean, Arts and Sciences

- Helen Willcox, Administrative Assistant for Finance & Institutional Effectiveness

- Don Walters, Edison State Chef and Julie Walters, AVI Food Systems, Inc.

- Tom Burelison, Maintenance Supervisor, and all of the Edison maintenance personnel

- Amy Crow, Chief Information Officer, and her IT team

Brief Schedule of Abstracts

See **Fields of interest index** on page 12 and **First author index** on page 12

Poster Session 9:00 AM - 10:00 AM
and
Poster Session 2:30 PM - 3:30 PM
Note: All posters will be displayed in both morning and afternoon sessions.

Located in the Emerson Center Atrium
See page 9

Podium Sessions 11:00 AM - 12:15 PM

Podium Session 1
Mathematics and System Software
11:00 AM - 12:15 PM
Meeting Room: Auxiliary Gym
See page 5

Podium Session 2
Chemistry, Physics, and Engineering Tech.
11:15 AM - 12:15 PM
Meeting Room: Robinson Theatre
See page 6

Podium Session 3
Earth and Environmental Sciences
11:00 AM - Noon
Meeting Room: Room 020
See page 6

Podium Sessions 1:30 PM - 2:30 PM

Podium Session 4
Earth and Environmental Sciences
1:30 PM - 2:15 PM
Meeting Room: Auxiliary Gym
See page 8

Podium Session 5
Animal Sciences, Behavioral and Social Sciences, and Biomedical and Health Sciences
1:30 PM - 2:30 PM
Meeting Room: Room 020
See page 8

Panel Discussion

Workforce Development in Ohio… Where do YOU fit in?

10:00 AM to 11:00 AM
Robinson Theatre

The *Workforce Development* panel is composed of experts from the fields of energy, law, and manufacturing. Moderated by OAS staff, the panel aims to highlight the investment in Ohio's future labor and trends of growth across industries. Topics will aim to feature the promotion of entrepreneurial efforts, as well as educational and career tools. With their diverse work histories, the panelists will share their perspective on Ohio's most valuable resource: its people!

Ohio Academy of Science Moderators:
The OAS Staff

Panelists:
Jane Harf, Green Energy Ohio
Suzanne Sumner, Taft Law Firm
Tony George, Techmetals Inc.
Scott Koorndyk, Entrepreneurs' Center

Thank you to the Academy's Board of Trustees members Halle Miller, Martin English, and Bill Beagle—as well as OAS staff—for organizing this panel.

All-Academy Lecture

Noon - 1:30 PM
Robinson Theatre

Dr. Rosalyn (Roz) Hobson Hargraves
Division Director for the Division of Undergraduate Education for the National Science Foundation (NSF)

Dr. Rosalyn (Roz) Hobson Hargraves is Division Director for the Division of Undergraduate Education (DUE). The Division of Undergraduate Education, in the NSF Directorate for Education and Human Resources, strengthens STEM education at two- and four-year colleges and universities. Dr. Hargraves is a Professor of Electrical and Computer Engineering at Virginia Commonwealth University and previously served as an Intermittent Expert for NSF's Directorate for Education and Human Resources. She began her term as NSF division director for DUE on August 1, 2021.

In addition to STEM education, Dr. Hargraves' research interests also include diversity, equity, and inclusion in higher education, machine learning, biomedical signal and image processing, and the role of science and technology in international development. Dr. Hargraves received her Bachelor's, Master's, and Doctorate degrees in Electrical Engineering from the University of Virginia. During her 25 years at Virginia Commonwealth University (VCU), Dr. Hargraves co-founded the VCU College of Engineering Department of Electrical Engineering, and has served in numerous leadership roles, including Associate Vice President for Inclusive Excellence, the Director of the Virginia Commonwealth University - University of KwaZulu Natal International Partnership, Associate Dean in the College of Engineering, and Interim Co-chair in the School of Education Department of Teaching and Learning.

Dr. Hargraves has published over sixty peer reviewed conference and journal publications, been awarded two patents, given over 60 lectures/seminars domestically and internationally and served on expert panels across the United States. She has consulted with private industry in the area

of machine learning and co-founded a start-up, SPT (Signal Processing Technologies), based upon her research in biomedical image processing. She has been awarded sponsored research grants as PI, co-PI, or senior personnel totaling over $25 M from federal, state, foundation, and industrial sources primarily in the area of STEM education and training. Throughout her career she has served on over 80 review committees, conference organizing committees, professional, university, school and department committees. Her professional service has included membership on two National Academies Committees, and she currently is elected to serve on the American Council on Education Council of Fellows board, the Bon Secours Richmond Health System Board, and as a Richmond Memorial Health Foundation Trustee.

Dr. Hargraves has been recognized nationally for her mentoring, teaching, leadership, and diversity initiatives. From 2019-2020 she was one of 38 academic leaders selected for the nationally renowned American Council on Education (ACE) Fellowship, the premier comprehensive leadership development program in American higher education. In 2003-2004 she served as an American Association for the Advancement of Science Diplomacy Fellow at the U.S. Agency for International Development (2003-2004). Among her numerous awards, she received the 2018 National Association for Ethnic Studies Robert L. Perry Mentoring Award and in 2006 Dr. Hargraves was named Engineer of the Year by the Richmond Joint Engineers Council.

Notes:

11:00 AM - 12:15 PM
Podium Session 1
Mathematics and System Software
Meeting Room: Auxiliary Gym

> **First authors and titles are shown for all presenters.**
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> ---
>
> **Peer-reviewed abstracts appear only if results were reported.**

11:00 - IMPLEMENTATION OF ALGEBRAIC STRUCTURES IN CRYPTOGRAPHY. First Author: Yalcin Karatas, karatazy@ucmail.uc.edu, University of Cincinnati Blue Ash College.

11:15 - DETECTION OF ANOMALOUS AIRCRAFT STATE VIA LIVE+SIMULATED FLIGHT ACHINE LEARNING MODELS. First Author: Ahmad Waseem Ghauri, ag592521@ohio.edu, Ohio University, Advisor: Chad Mourning, mourning@ohio.edu, Ohio University.

11:30 - CONVOLUTIONAL DEEP LEARNING FOR ATMOSPHERIC VISIBILITY ESTIMATION ON LOW COST DEVICES. First Author: Justin Murray, jm104018@ohio.edu, Ohio University, Advisor: Chad Mourning, mourning@ohio.edu, Ohio University.

11:45 - NATURAL LANGUAGE APPROACH TO REGRESSION TEST GENERATION IN AVIATION VERIFICATION SOFTWARE: OUNPPM. First Author: Jacob D. Schaupp, js400421@ohio.edu, Ohio University, Advisor: Chad Mourning, mourning@ohio.edu, Ohio University.

The Ohio University Navaid Performance Prediction Model (OUNPPM) is a software package used in the verification of airports worldwide, including, in Ohio: Dayton International, Cleveland Hopkins International, and John Glenn Columbus International. The Federal Aviation Administration (FAA) has strict requirements for expected behaviors when testing compliance of software. Regression testing is a stage in the software development cycle in which behaviors of software are autonomously tested to ensure software changes have not unintentionally impacted other behaviors. This form of testing is lacking in OUNPPM, requiring the expansive combinations of user interactions to be manually tested. Implementing a framework to allow for scalable, efficient, and version flexible tests required creating a scripting approach permitting natural language definition of interface actions to generate the source code for the tests. The framework ingests the user written scripts and generates the executable tests along with automated documentation describing all aspects of the tests from execution steps to behavior verification results. This approach also permits tests to be easily regenerated when changes in software, such as a change in interface layout, might otherwise require the developer to implement fixes in source code. This framework was recently utilized to implement tests in verifying the absence of 95 previously identified bugs in OUNPPM. Automating tests to ensure the proper functionality for each behavior in a timely manner would be a challenge without the use of this generative approach. Additionally, implicit functionality is provided such as automated documentation and program version flexibility without requiring any development in source code.

12:00 - BEATMAP GENERATION. First Author: Bradey Lounsbury, bl396918@ohio.edu, Ohio University, Advisor: Chad Mourning, mourning@ohio.edu, Ohio University.

11:15 AM - 12:15 PM
Podium Session 2
Chemistry, Physics, and Engineering Technology
Meeting Room: Robinson Theatre

11:15 - QUANTUM CHEMISTRY STUDY OF THE DECARBOXYLATION REACTION OF AMINOMALONIC ACID. First Author: Da Gao, drgao8901@gmail.com, Central State University.

11:30 - (PHENYLIODOSYL)BENZENE TOSYLATE DIHYDRATE—A λ5-PERIODINANE SALT. First Author: TJ Smith, tsmith@walsh.edu, Walsh University.

11:45 - CLASSICAL UNIVERSAL INFLATION OUT OF MINISUPERSPACE FALSE VACUUM FLUCTUATIONS. First Author: Mohannad M. Islaieh, mislaieh1@student.cscc.edu, Columbus State Community College.

It has been widely renowned that the creation of the universe relies mainly upon the quantum nature of the consideration. Given that the universe had a starting point, the debate of quantum cosmology now is to find out what kind of point that was. Vacuum bubbles, that begin by virtue of a spontaneous quantum mechanism, expand exponentially as a transition from a quantum state to a classical spacetime. The behavior of large vacuum bubbles is analyzed in which a non-rigorous consideration of a spontaneous creation of the cosmos is employed naturally. The mechanism studied here allows the universe to have a one-way repulsive gravitational inflation as a result of metastable quantum perturbations drawn by the homogeneous and isotropic minisuperspace metric characterized by a single scale factor changing with time, $a(t)$. Constructing the action in the following form

$$ S = \frac{1}{2\kappa} \int (-g)^{1/2} \, d^4x \, \left(R - \frac{9\pi}{G} \, \lambda(v)^2 \right), $$

where $\lambda(v)$ is the expansion rate, it is possible to show that the geometry of quantum potential of the de Broglie-Bohm trajectory theory adds up to a classical expansion of the universe no matter the curvature, where the Friedman equation, for $p = -2$, reads

$$ \frac{\dot{a}^2}{a^2} = \frac{8\pi G}{3} \rho_v + \lambda \left(\frac{3}{4}\right)^2 - \frac{k}{a^2}, $$

where the effective cosmological constant would take a place by reason of the general term

$$ \left(4v \left(\lambda(v)^2 g_{\mu v} \right) \right). $$

The results show that quantum potential is equivalent to an effective cosmological constant which, then, plays the role of inflation when the scalar factor is much smaller than unity ($a << 1$).

12:00 - DETECTION OF NETWORK ATTACKS USING MACHINE LEARNING MODELS. First Author: Alexander Nemecek, an440818@ohio.edu, Ohio University, Advisor: Chad Mourning, mourning@ohio.edu, Ohio University.

During the COVID-19 pandemic, many institutions made the switch to be fully online. This upwards trend in connectivity positively correlates with attacks on Internet of Things devices. A distributed denial-of-service (DDoS) attack is an attempt to interrupt or disable network traffic by overwhelming a system or network, preventing users from accessing resources. Machine learning (ML) is a promising approach for the detection of DDoS attacks. This study evaluates a range of classifiers, including Deep Neural Network (DNN), AdaBoost, K-Nearest Neighbor, XGBoost, Decision Tree, Random Forest, Support Vector Machine, Linear and Quadratic Discriminant Analysis, Logistic Regression, Stochastic Gradient Descent, and Naïve Bayes to assess accuracy and identify the best-performing classifiers. Preprocess techniques were utilized and applied to the CIC-DDoS2019 dataset including feature selection, manipulation, normalization, and reduction to split the data into training and testing datasets. The dataset includes packet captures of benign and common DDoS attacks. Eleven of the ML models achieved an accuracy of 90% or higher, with DNN and AdaBoost exhibiting the highest accuracies. The results hold promise of reducing parameters and size comparable to the original dataset while resulting in similar accuracy measures. The findings have implications for the potential of ML improving the detection and prevention of DDoS attacks. However, the study has limitations, such as the data do not mimic all types of DDoS attacks which occur in real-world environments. Future research could explore alternative ML algorithms, feature selection approaches, and different evaluation metrics to enhance the detection of network attacks in the cybersecurity community.

11:00 AM - Noon
Podium Session 3
Earth and Environmental Sciences
Meeting Room: Room 020

11:00 - ASSESSMENT OF CORN ROOT LODGING USING RGB AND MULTISPECTRAL AERIAL IMAGERY. First Author: Alex Lindsey, lindsey.227@osu.edu, The Ohio State University, Department Horticulture and Crop Science; Barry Allred*, barry.allred@usda.gov, and Luis Martinez, luis.martinez@usda.gov, USDA - Agricultural Research Service, Soil Drainage Research Unit; Greg Rouse, grouse@rosscountyswcd.org, Ross County Soil and Water Conservation District; Peter Thomison, thomison.1@osu.edu, The Ohio State University, Department Horticulture and Crop Science. *Presenter and correspondence.

Corn root lodging occurs when strong winds combined with heavy rains (i.e., *derecho* weather events) push the plants over and pull roots partway out of the ground. Derechos are becoming more frequent within the midwestern US. In order to assess the economic impacts of derechos (i.e., decreased corn production), effective and efficient methods are needed for estimating corn root lodging damage across agricultural fields. It is hypothesized that aerial imagery obtained via remotely controlled aerial vehicles (RCAVs – i.e., drones) may provide the information needed to assess crop damage due to derechos. Consequently, the objective of this reported research was to utilize imagery from an RCAV to accurately quantify crop canopy height, yield, and kernel weight trends in the imagery data after root lodging was imposed at multiple growth stages. Simulated corn root lodging experiments were conducted in 2018 and 2019, with lodging treatments applied at 4 growth stages (V10, V14, VT/R1, and R3). At the R4 growth stage, RGB (visible-color), multispectral (MS), and thermal infrared (TIR) images were collected from each trial; although, due to low TIR resolution, analysis focused on RGB and MS. Measured corn canopy height was found to strongly correspond with the corn canopy height estimate based on the digital surface

model generated by RCAV RGB imagery (adjusted $R^2 = 0.957$, Y (inches) $= 1.058X + 4.018$, $p < 0.001$). Normalized difference vegetation index (NDVI) and normalized difference red edge (NDRE) maps generated from MS imagery were found to have fairly strong correlation with yield and kernel weight ($r > 0.5$, $p < 0.001$). Overall, RCAV imagery proved viable for estimating certain aspects of corn root lodging damage.

11:15 - GROWING SEASON MAPPING OF AGRICULTURAL SUBSURFACE DRAINAGE SYSTEMS WITH RGB AND MULTISPECTRAL AERIAL IMAGERY. First Author: Barry Allred, barry.allred@usda.gov, USDA - Agricultural Research Service, Soil Drainage Research Unit; Greg Rouse, grouse@rosscountyswcd.org, Ross County Soil and Water Conservation District; Luis Martinez, luis.martinez@usda.gov, USDA - Agricultural Research Service, Soil Drainage Research Unit.

There exists a need for effective, efficient, and nondestructive methods for locating buried agricultural drainage pipes due to concerns, both economic (i.e., retrofitting old subsurface drainage systems by adding new drain lines to improve soil water removal efficiency and thereby improve crop yields) and environmental (i.e., improved watershed risk assessment of adverse environmental consequences due to subsurface drainage practices). Previous research documented drainage mapping feasibility with RGB (visible – color), multispectral, and thermal infrared imagery obtained via remotely controlled aerial vehicles (RCAVs – i.e., drones). This past research focused on RCAV imagery obtained outside the growing season, from harvest to planting, when substantial bare ground is commonly present. It is hypothesized that drain lines can also be detected within the growing season; therefore, more assessment of RCAV drainage mapping capabilities within the growing season (i.e., from planting to harvest) was warranted. Consequently, RCAV imagery was obtained during the 2022 growing season, at 10 Ohio sites, in fields planted with corn or soybeans. Aerial imagery, both RGB and multispectral (green, red, red edge, and near infrared wavelength bands, along with NDVI and NDRE vegetation index values), were obtained at all 10 sites, early and late in the growing season (27 RCAV surveys total). Aerial imagery drain line responses were compared to known drainage system maps for the 10 sites in order to evaluate drainage pipe detection success. Overall, RCAV drainage mapping within the growing season was fairly successful, mapping most of the drainage systems present in 60% of the surveys conducted. Early growing season drainage responses depicted in RCAV imagery were due to either better establishment of corn/soybeans over drain lines or spatial variations in soil reflectance where there was still substantial bare ground present between plants. The best late growing season drainage responses were due to corn/soybean senescence occurring first over the drain lines. What worked best, RCB or one of the multispectral wavelengths/indices, varied by survey, but overall, RCAV growing season imagery proved viable for drainage mapping.

11:30 - COLDWATER CREEK CHLORIDE, HIGH CONCENTRATIONS IN A TRIBUTARY TO GRAND LAKE ST. MARYS. First Author: Douglas D. Kane, dkane@heidelberg.edu, Heidelberg University, Department of Biology and Environmental Science and Heidelberg University, National Center for Water Quality Research; Nathan F. Manning, nmanning@heidelberg.edu, Heidelberg University, National Center for Water Quality Research; Stephen J. Jacquemin, stephen.jacquemin@wright.edu, Wright State University-Lake Campus; and Laura T. Johnson, laura.johnson@heidelberg.edu, Heidelberg University, National Center for Water Quality Research.

Chloride levels are increasing in several of Ohio's rivers. These increases can mainly be tied to increased application of road salt in suburban and urban areas during the last 40 years. However, among the highest values for chloride yields in Heidelberg University's Tributary Monitoring Program can be found in Coldwater Creek, a tributary to Grand Lake St. Marys. In fact, in the last 5 years chloride yields in Coldwater Creek have exceeded 400 kg/ha and approached 600 kg/ha, values only seen in rivers that have mainly urban/suburban land use. Therefore, this study was conducted to determine if the reason could be found for these high chloride levels in Coldwater Creek. Previous research indicated that a driving force behind the increase in chloride in the river could be linked to discharge from St. Henry's Water Treatment Plant lagoon. Using available data, we found that mean chloride load when there was a lagoon discharge (9.22 metric tons per day (n=642)) was significantly (t-test, $p < 0.001$) greater than mean chloride load when there was not a lagoon discharge (1.42 metric tons per day (n=923)). Further, there was a significant linear relationship (linear regression, $r^2 = 0.65$, $p < 0.01$) between large discharges (>10 MG) and 5-day chloride loads (metric tons). Finally, due to highest chloride levels in the fall we took monthly measurements of chloride upstream and downstream of the water treatment plant outflow during the fall of 2022. This study found that downstream samples (N=5) had a greater median value of 659.9 mg/L, compared to the median value of 270.5 mg/L of the upstream samples (N=5) and the upstream/downstream sites were significantly different from one another (Mann-Whitney test, W=17.0, $p < 0.037$). Further chloride sampling and in-situ salinity sampling near the outflow of the lagoon are planned for the coming year. Finally, increased chloride levels in some Ohio watersheds may not be due to urban/suburban land use and thus each watershed needs to be analyzed individually to determine what is the driver of chloride dynamics in that system.

11:45 - CONCENTRATION AND DISTRIBUTION OF MICROPLASTICS IN WETLANDS OF WEST-CENTRAL OHIO. First Author: Mitchell Link, Link.73@wright.edu, Wright State University, Advisor: Katie Hossler, katie.hossler@wright.edu, Wright State University.

1:30 PM - 2:15 PM
Podium Session 4
Earth and Environmental Sciences
Meeting Room: Auxiliary Gym

1:30 - QUANTITATIVE ASSESSMENT OF WETLAND SOIL CONDITION: A COMPARISON OF ACCURACY AND EFFICIENCY. First Author: James Retherford, retherford.12@wright.edu, Wright State University, Advisor: Katie Hossler, katie.hossler@wright.edu, Wright State University.

2:00 - CORRELATION BETWEEN WATER DEPTH AND DIVERSITY OF SHOREBIRDS AT STOPOVER HABITATS IN OHIO. First Author: Taylor G. Shimek, tshimek@muskingum.edu, Muskingum University, Advisor: James Dooley, jdooley@muskingum.edu, Muskingum University.

Shorebird populations are globally on the decline. Particularly, those species of shorebird that migrate through the interior of North America are in greater decline than those that migrate along the coast. It is crucial that research is done to determine what the optimal conditions are for stopover habitats. Shorebirds are highly specialized feeders as their beaks are adapted to a particular feeding ecology. One potentially important factor that has received little investigation is the correlation between water depth of the site and diversity. This study was conducted using data from eBird®, a citizen science platform, to determine presence-absence of species at a given site. ArcGIS® was then used to determine mean water depth and to map the locations and their diversities. For statistical power, 30 sites were selected. Tests of the original hypothesis indicated there was no evidence that water depth influenced species richness ($F=1.90$, $df=17$, $p>0.18$). However, additional analyses indicated significant differences in species richness among the 5 regions ($F=10.432$, $df=4$, $p<0.000$). Post-hoc analyses indicated significant differences between Southeast and Central ($p<0.002$), Northeast ($p<0.001$), Northwest ($p<0.033$), and Southwest ($p<0.000$). Consideration of the differences in species richness among individual regions led to further consideration of geologic history. Ongoing analyses are exploring the relationship between glacial history and nearshore slope as a possible explanatory parameter for explaining current patterns in species richness.

1:30 PM - 2:30 PM
Podium Session 5
Animal Sciences,
Behavioral and Social Sciences, and
Biomedical and Health Sciences
Meeting Room: Room 020

1:30 - THE NATURE OF SHRUB CHARACTERISTICS THAT INFLUENCE GRASSLAND BIRD RESPONSES ON A RECLAIMED MINE. First Author: William Kline, wkline1@muskingum.edu, Muskingum University, Advisor: Danny Ingold, Ingold@muskingum.edu, Muskingum University.

1:45 - THE DIVERSITY AND ABUNDANCE OF GRASSLAND AND FOREST-EDGE BIRDS ON A PARTIAL RECLAIMED SURFACE MINE. First Author: Emma Jimison, ejimison1@muskingum.edu, Muskingum University, Advisor: Danny Ingold, ingold@muskingum.edu, Muskingum University.

2:00 - OBLIGATE GRASSLAND BIRDS PRESENCE/ABSENCE TRENDS ON RECLAIMED SURFACE MINE LANDS. First Author: Alexis Sharb, asharb1@muskingum.edu, Muskingum University, Advisor: Danny Ingold, ingold@muskingum.edu, Muskingum University.

2:15 - MONARDA SUPPRESSES LPS-INDUCED INFLAMMATION IN MOUSE GRANULOSA CELLS. First Author: Makkenzi Converse-Olson, m-converse-olson@onu.edu, Ohio Northern University, Advisor: Jill Bennett-Toomey, j-bennett-toomey@onu.edu, Ohio Northern University.

Poster Sessions
9:00 AM – 10:00 AM
and
2:30 PM – 3:30 PM
Located in the Emerson Center Atrium

Note: All posters will be displayed in both morning and afternoon sessions.

> **Authors and titles are shown for all presenters.**
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>
> **Peer-reviewed abstracts appear only if results were reported.**

Poster Board No. 01 - ANALYSIS OF THE PORTRAYAL OF SCIENCE AT THE CREATION MUSEUM (PETERSBURG, KY). First Author: Lydia Adejumo, ladejumo@capital.edu, Capital University, Advisor: Dr. Kerry Cheesman, kcheesma@capital.edu, Capital University.

Poster Board No. 02 - EXPLORING THE EFFECTS OF MIR-379-5P ON BREAST CANCER CELLS. First Author: Fernanda Aiala, aiala_f1@denison.edu, Denison University, Advisor: Dr. Lina Yoo, yool@denison.edu, Denison University.

Poster Board No. 03 - CANCER CELL COMPETITION PROJECT. First Author: Mason Boatwright, boatwrightm@findlay.edu, University of Findlay, Advisor: Dr. Michael Edelbrock, edelbrock@findlay.edu, University of Findlay.

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Poster Board No. 05 - MINERALOGICAL TRENDS IN THE UTICA SHALE AND POINT PLEASANT FORMATION, APPALACHIAN BASIN, OHIO. First Author: Caleb Coppess, coppescn@miamioh.edu, Miami University, Advisors: Mark P. Krekeler, krekelmp@miamioh.edu, Miami University, and Brian S. Currie, curriebs@miamioh.edu, Miami University.

Poster Board No. 06 - EFFECT OF LOW SALINITY ON SEA URCHIN DEVELOPMENT. First Author: Serina Dweh, dweh_s1@denison.edu, Denison University.

Poster Board No. 07 - DO ENVIRONMENTAL CUES AFFECT SOCIAL AND AGNOSTIC BEHAVIORS OF RED-BACKED SALAMANDERS? First Author: Courtney Fouke, fouke_c1@denison.edu, Denison University, Advisor: Geoff Smith, smithg@denison.edu, Denison University.

Poster Board No. 08 - ANALYSIS OF RESULT CONSISTENCY OF DIRECT-TO-CONSUMER ANCESTRY REPORTS FOR IDENTICAL TWINS. First Author: Katherine Freeland, kfreeland2@capital.edu, Capital University, Advisor: Dr. Kerry Cheesman, kcheesma@capital.edu, Capital University.

Poster Board No. 09 - OPTIMIZING DASHBOARD DESIGN TO IMPROVE STUDENTS' MOTIVATION IN ONLINE LEARNING. First Author: Fei Gao, gaof@bgsu.edu, Bowling Green State University.

Poster Board No. 10 - EFFECTS OF HUMAN FOOT TRAFFIC ON ENVIRONMENTAL TETRACYCLINE RESISTANCE LEVELS. First Author: Nathan Gibbs, ngibbs629@gmail.com, Capital University, Advisor: Dr. Kerry Cheesman, kcheesma@capital.edu, Capital University.

Poster Board No. 11 - DETERMINATION OF ALTERED SOX7 VARIANT V379A C-TERMINAL PROTEIN-PROTEIN INTERACTIONS. First Author: Elena Gioiello, egioiell1@walsh.edu, Walsh University, Advisor: Dr. Adam Underwood, aunderwood@walsh.edu, Walsh University.

Poster Board No. 12 - THE EFFECT OF WASTEWATER TREATMENT ON DISSEMINATION OF ANTIBIOTIC RESISTANT BACTERIA. First Author: Hannah Houseknecht, hannah.j.houseknecht@wilmington.edu, Wilmington College, Advisor: Amanda Rollins, amanda_rollins@wilmington.edu, Wilmington College.

Poster Board No. 13 - ASSESSING GENETIC VARIATION IN ASARUM ROSEI USING ISSR. First Author: Jenna Howard, howard3@otterbein.edu, Otterbein University, Advisor: Brandon T. Sinn, sinn1@otterbein.edu, Otterbein University.

Poster Board No. 14 - A SHORT-TERM WATER QUALITY ASSESSMENT OF THE UPPER MAUMEE RIVER WATERSHED UTILIZING DIATOM FRUSTULES. First Author: Michaela Hunt, mhunt002@defiance.edu, Defiance College, Advisor: Sabrina Brown, sabrown@defiance.edu, Defiance College.

Poster Board No. 15 - NUTRIENT REDUCTIONS OF RESTORED GRAND LAKE ST. MARYS WETLANDS. First Author: Stephen J. Jacquemin, stephen.jacquemin@wright.edu, Morgan Grunden, morgan.grunden@wright.edu, Kenneth Kline, kline.54@wright.edu, Madison Gels, gels.5@wright.edu, and Skye Wendel, grube.13@wright.edu, Wright State University – Lake Campus.

Nearly all wetlands in Grand Lake St. Marys Watershed (Ohio, USA) were drained over the past 150 years. This natural habitat loss, coupled with large concentrations of nutrients from non-point agricultural runoff, has led to degraded water quality in the streams and lake. However, over the past decade there has been a concerted local effort to restore some of these natural wetlands to improve water quality in the watershed. The objective of this study was to assess how much these systems have impacted harmful nutrient runoff in 2022. It was hypothesized that nutrient loading would be reduced resultant of wetland hydrology and nutrient processing potential. Weekly stream inflow and wetland outflow from 3 of these restored systems (Coldwater Creek, Prairie Creek, and Beaver Creek) was analyzed for a variety of parameters including nutrients, sediment, and hydrology. In total, these wetlands treated approximately 500 to 525 million gallons of water in 2022 (representing between 2 and 10.5% of the annual streamflow of these tributaries) with average nutrient reductions (nitrogen and phosphorus) up to 75% and sediment reductions up to 70% depending on time of year, stream conditions, and hydrologic residence time within the wetland. In general, wetlands were most

effective when water was retained longer (up to 4 to 5 days) during the late spring to early summer period. These results are part of a larger long-term study on effectiveness of restored wetlands and have implications for conservation of the GLSM watershed as well as the larger Great Lakes drainage basins.

Poster Board No. 16 - ALPHAFOLD PROTEIN STRUCTURES COMPARED TO HUMAN-CURATED HOMOLOGY MODELS. First Author: Dustin Kreiner, dkreiner1@walsh.edu, Walsh University, Advisor: Thomas M. Freeland, tfreeland@walsh.edu, Walsh University.

Poster Board No. 17 - CONSERVATION GENETIC ASSESSMENT OF DECLINING GRAY FOXES (*UROCYON CINEREOARGENTEUS*) IN OHIO. First Author: Megan Lenoy, mlenoy@capital.edu, Capital University, Advisor: Christine Anderson, canders2@capital.edu, Capital University.

Poster Board No. 18 - DIET COMPOSITION OF YELLOW PERCH AND WHITE PERCH IN THE CENTRAL BASIN OF LAKE ERIE. First Author: Sawyer Lorentz, sqlore32@thomasmore.edu, Thomas More University, Advisor: Doug Kane, dkane@heidelberg.edu, Heidelberg University.

Poster Board No. 19 - THE EFFECTS OF AMPICILLIN ON THE GUT MICROBIOME OF LABORATORY MICE, *MUS MUSCULUS*. First Author: Destiny Martin, destiny.d.martin@wilmington.edu, Wilmington College, Advisor: Amanda Rollins, amanda_rollins@wilmington.edu, Wilmington College.

Poster Board No. 20 - WGA LECTIN STAINING IN SKELETAL MUSCLE AFTER SIMULATED PARTIAL GRAVITY. First Author: Nate Mazza, mazzan1@xavier.edu, Xavier University, Advisor: Kelly Crowe, crowek7@xavier.edu, Xavier University.

Poster Board No. 21 - HOW QUICKLY DERMESTID BEETLES (*DERMESTES FRISCHII*) CONSUME DESICCATED CHICKEN UNDER DIFFERENT DAYLIGHT CYCLES. First Author: Kelsey Merriman, kelsey.l.merriman@wilmington.edu, Wilmington College, Advisor: Amanda Rollins, amanda_rollins@wilmington.edu, Wilmington College.

Poster Board No. 22 - A DATA MINING METHOD FOR FINDING HUMAN GENE VARIANTS CONTRIBUTING TO DISEASE CONDITIONS. First Author: Clare Mewhinney, cmewhinn1@walsh.edu, Walsh University, Advisor: Thomas M. Freeland, tfreeland@walsh.edu, Walsh University.

Poster Board No. 23 - CHANGING CARDIOVASCULAR AND RESPIRATORY RESPONSES TO VARYING ALTITUDE CONDITIONS IN ECUADOR. First Author: Christina Mickelson, cmickelson2@capital.edu, Capital University, Advisor: Kerry Cheesman, kcheesma@capital.edu, Capital University.

Poster Board No. 24 - EXPRESSION OF NATIVE AND VARIANT SOX18 PROTEINS FROM PH6HCT-HALOTAG T7/SOX18 PROKARYOTIC CONSTRUCTS. First Author: Mike Mitchell, mmitchel2@walsh.edu, Walsh University.

Poster Board No. 25 - ASSESSING NUTRIENT LOAD REDUCTION IN A CONSTRUCTED WETLAND: A CASE STUDY FROM BROOKS PARK. First Author: Justin Myers, justin.myers@wright.edu, Wright State University.

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Poster Board No. 27 - ALGAL ABUNDANCE AND TOXIN CONCENTRATIONS IN GRAND LAKE ST. MARYS. First Author: Silvia Newell, silvia.newell@wright.edu, Wright State University.

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Poster Board No. 29 - UTILIZING PARALLELISM AND MULTITHREADING FOR ITERATIVE REFINEMENT OF ANTENNA PATTERN VISUALIZATION. First Author: Brady Phelps, bp309420@ohio.edu, Ohio University, Chad Mourning, mourning@ohio.edu, Ohio University, Advisor: Chang Liu, liuc@ohio.edu, Ohio University.

The Ohio University Navaid Performance Prediction Model (OUNPPM) is a globally used tool for the certification of navigational aid compliance and safety at airports. The main purpose of OUNPPM is to calculate multipath interference from structures close to the navigational aid equipment. Initially, the tool created a single, fixed-precision antenna pattern visualization; this computation would halt the program until calculations completed, which could take upwards of 30 seconds. Through the addition of multithreading and parallelism, dynamic rendering practices were implemented which yielded significant improvement in pattern resolution and interactivity. This approach involves substituting the original linear computation with an iteratively refined loop of background and foreground patterns. An overall increase in rendering speed was achieved, improving initial visualization times from 13.424 seconds to 0.38 seconds. In 0.38 seconds, the program renders a less refined isosurface, and as time passes, it iterates overtop of itself and rerenders with increasingly refined visualizations including more refined renderings at 0.901 seconds, 1.38 seconds, 1.9 seconds, etc. This creates a visual effect of an isosurface which becomes increasingly clear as time passes. These implementations lead to an accelerated rendering process and provide a smoother user experience. This allows users to immediately engage with the program or use the program once they see a version of refinement which suits their needs. This process improves the interactivity and efficiency of the program for future users; this benefits a variety of public, private, and military airports across the world.

Poster Board No. 30 - USING MACROINVERTEBRATES AS BIOINDICATORS OF WATER QUALITY IN CAESAR CREEK AND ITS SURROUNDING TRIBUTARIES TO ANALYZE THE EFFECTS OF ANTHROPOGENIC ACTIVITY ON STREAM HEALTH. First Author: Taylor Powell, taylor.r.powell-abbinante@wilmington.edu, Wilmington College, Advisor: Amanda Rollins, amanda_rollins@wilmington.edu, Wilmington College.

Poster Board No. 31 - EMERALD ASH BORER (*AGRILUS PLANIPENNIS*) LARVAE INFESTATION ASSESSMENT IN A NORTH CENTRAL OHIO WETLAND. First Author: Jessi Raubenolt, jessiraubenolt@gmail.com, Ashland University, Advisor: Patricia Saunders, psaunder@ashland.edu, Ashland University.

Poster Board No. 32 - CAPTURE AND EVALUATION OF FREE-FLOATING MICROPLASTICS IN THE UPPER MAUMEE WATERSHED, OHIO. First Author: Autumn Saddler, asaddler001@defiance.edu, Defiance College, Advisor: Sabrina Brown, sabrown@defiance.edu, Defiance College.

Poster Board No. 33 - MISSION REBUILD WORKFORCE IN OHIO THROUGH ADV. MANUFACTURING RESEARCH & TRAINING OF K14 TEACHERS. First Author: MD Sarder, msarder@bgsu.edu, Bowling Green State University.

Poster Board No. 34 - CHARACTERIZATION OF THE FIRST COMPLETE ASARUM (ASARACEAE) PLASTOMES. First Author: Cassidy Shaver, shaver1@otterbein.edu, Otterbein University, Advisor: Brandon Sinn, sinn1@otterbein.edu, Otterbein University.

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Poster Board No. 37 - EVALUATING SITES FOR THE PRESENCE OF SPOTTED LANTERNFLY INFESTATION IN THE NORTHERN OHIO VALLEY. First Author: Melody J. Vetrovec, ojvetrovec@gmail.com, Franciscan University of Steubenville, Chris Payne, cpayne@franciscan.edu, Franciscan University of Steubenville.

Lycorma delicatula (spotted lanternfly; SLF), an invasive insect that has rapidly spread to 15 states since introduction to the United States in 2014, is now causing significant forestry and agricultural damage across the eastern US. Due to the risk of further western spread of this insect, regular surveying was initiated adjacent to the westernmost quarantine area in 2021 and continued through 2022 to support multi-state efforts in monitoring. Specifically, regular visual and sticky-trap surveys were performed every 10 days during the insect's active season—an interval from early June through November in 2021 and 2022—along 14 resurvey plots strategically located near high-traffic roadways and rail-lines along the Ohio-West Virginia border. Only one SLF was detected through the end of 2021 (the 3rd SLF documented in Ohio), but incidence and severity of infestations significantly increased by December 2022 with the capture of 31 individuals across 2 sites. The single 2021 capture occurred in close proximity to a railway, as was consistent with projections from the Ohio Department of Agriculture at the time. However, 1 of the 31 SLF captured in 2022 was found on a college campus more than a mile from the nearest railway. This could indicate that college campuses, in addition to land adjacent to railways, are likely invasion sites and thus should be closely monitored. College campuses are hubs of frequent out-of-state traffic and may likely become infested by human-facilitated dispersal events. Data from this survey is valuable in the short-term to anticipate where and how quickly SLF will spread into and throughout eastern Ohio; in the long-term, this study contributes to models of long- and short-distance SLF dispersal in the northern Ohio Valley.

Poster Board No. 38 - ANALYZING DIATOM COMMUNITIES ACROSS DIFFERENT COASTAL ENVIRONMENTS OF LAKE ERIE. First Author: Hallie Webb, hwebb001@defiance.edu, Defiance College, Advisor: Sabrina Brown, sabrown@defiance.edu, Defiance College.

Poster Board No. 39 - COMPARISON OF INSECT AND SPIDER BIODIVERSITY BETWEEN TWO SOLAR ARRAYS. First Author: Sophia Yager-Motl, yagerm_s1@denison.edu, Denison University.

Poster Board No. 40 - A COMPARATIVE STUDY OF THE ACCURACY OF GLUTEN-FREE FOOD PRODUCT LABELING OF EUROPEAN AND MIDDLE EASTERN PRODUCTS TO THAT OF THE UNITED STATES. First Author: Daryna Zaitseva, dzaitseva@gmail.com, Capital University, Advisor: Kerry Cheesman, kcheesma@capital.edu, Capital University.

Poster Board No. 41 - A LATE CARBONIFEROUS MARINE VERTEBRATE FAUNA OF THE PORTERSVILLE SHALE (CONEMAUGH GROUP) OF OHIO. First Author: Daniel Cline, cline.74@wright.edu, Wright State University, Advisor: Charles Ciampaglio, chuck.ciampaglio@wright.edu, Wright State University.

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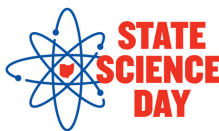
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