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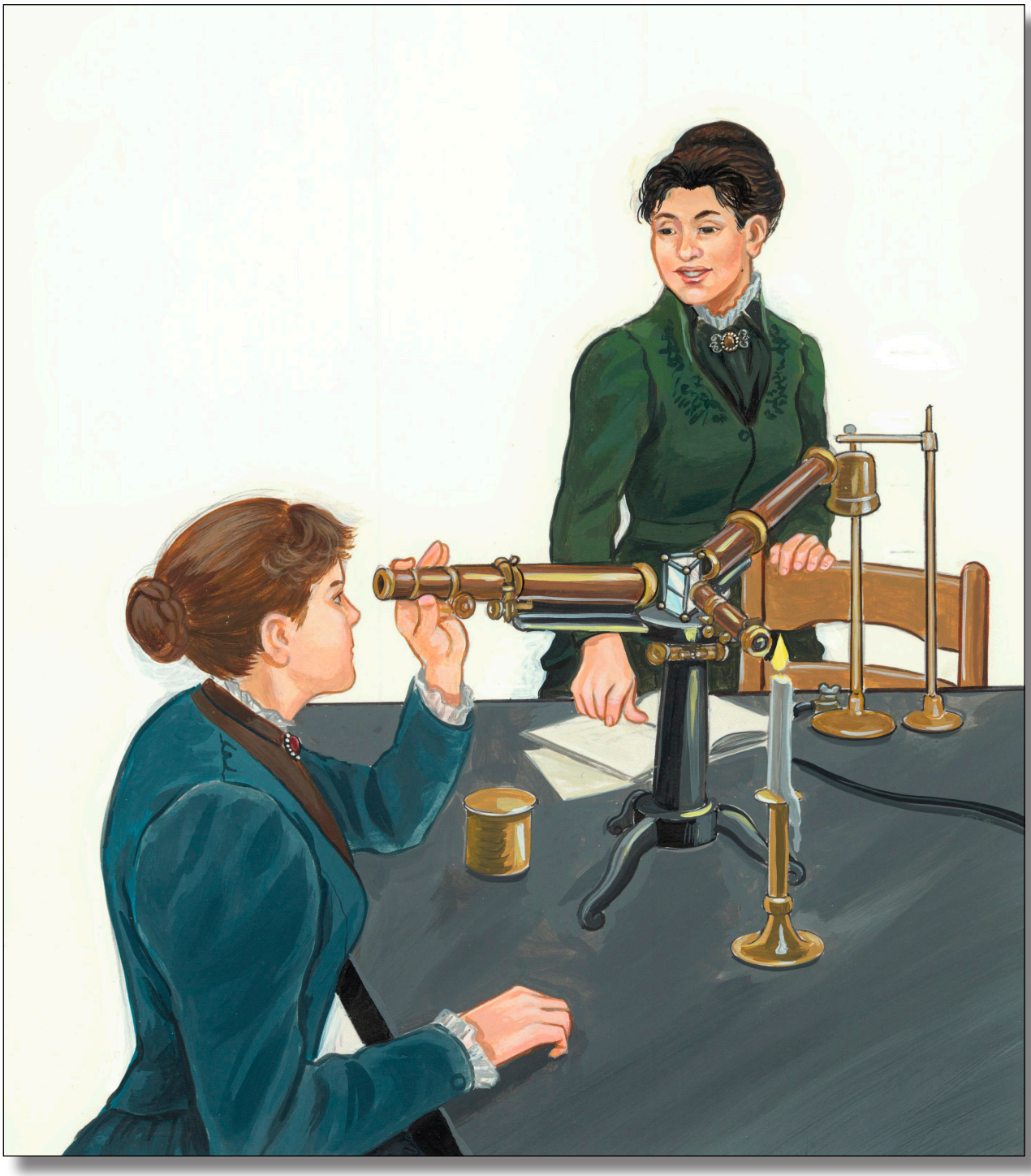
Volume 122
No. 1



The OHIO JOURNAL *of*
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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 Submission of a manuscript is understood to mean that the work is *original* and *unpublished*, and is not being considered for publication elsewhere.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*.

No Page Charges

Publication in *The Ohio Journal of Science* requires authors to be members of The Ohio Academy of Science. **Members of the Academy do not pay page charges to publish in *The Ohio Journal of Science*.** In multi-authored papers, the first author must be a member of the Academy at the time of publication to be eligible for no page charges. Papers that exceed 12 printed pages may be charged full production costs.

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FUTURE ACADEMY MEETINGS

The 132nd Annual Meeting of The Ohio Academy of Science,
April 6, 2024, hosted by Kent State University,
Kent, Ohio.
See: https://www.ohiosci.org/annual-meeting

International Exposure

During the period 01 October 2017 to 30 September 2021, OJS online articles were accessed more than 1,283,116 times by researchers in more than 160 countries at an average rate of more than 878 times per day.

The OJS is an Open Access online journal. According to the *Directory of Open Access Journals* (DOAJ), https://doaj.org, as of 8 December 2023 the number of Open Access journals has grown from 300 in 2003 to 20,218 today—with the number of article records (in excess of 9.6 million, globally) climbing by the hour.

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The Libraries' Open Journal Systems archives issues from March 2014 through October 2023 here:
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This year's articles (Volume 123, No. 2) appear here:
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Date of Issue—December 2023

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CONTENTS

130th Annual Meeting

The Ohio Academy *of* Science

Hosted by
University of Findlay
April 9, 2022

FRONT COVER PHOTO: The University of Findlay's Mazza Museum original work of art from the book, ***Annie Jump Cannon, Astronomer*** written by Carole Gerber, illustrated by Christina Wald. Published by Pelican Publishing Company, 2011. The illustration shows her with her mentor and teacher at Wellesley College, Sarah Frances Whiting, during Annie's time at Wellesley. Photo printed with permission.

The Ohio Academy *of* Science

130th Annual Meeting

Hosted by
University of Findlay
1000 N. Main St.
Findlay, Ohio 45840
April 9, 2022

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!

The University of Findlay welcomes you to the 130th 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 the University of Findlay, Center for Student Life & College of Business building, 301 Davis St., Findlay, Ohio 45840. Two podium venues are located in rooms 232 and 237.

The Ohio Academy of Science

5930 Wilcox Pl. • Suite F • Dublin, OH 43016
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Fostering curiosity, discovery and innovation to benefit society.

GENERAL SCHEDULE

Saturday, April 9, 2022

All events take place in the Center for Student Life & College of Business building.

7:30 AM - 9:00 AM	Breakfast is available
7:30 AM - 10:00 AM	Meeting Registration
9:00 AM - 10:00 AM	Poster Session (all presenters) (Atrium)

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

10:00 AM - 11:00 AM	Panel Discussion—*Women in STEM: Empowering the Future* (room 232 and 237)
11:00 AM - Noon	Podium Sessions (rooms 232 and 237)
12:15 PM - 1:30 PM	Box lunch pick up (at registration table)
12:15 PM - 1:30 PM	Lunch, All-academy Lecture Cathy L. Pederson, PhD (Atrium)
1:30 PM - 2:30 PM	Podium Sessions (rooms 232 and 237)
2:30 PM - 3:30 PM	Poster Session (all presenters) (Atrium)

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

University of Findlay is known for excellence in its science, health professions, animal science and equestrian studies programs, but also for cultivating the next generation of business leaders, educators and innovative thinkers through a dedication to experiential learning, both in and outside of the classroom. The University was established in 1882 through a joint partnership between the Churches of God, General Conference and the city of Findlay. The University of Findlay has more than 80 bachelor's degrees and offers 11 master's degrees, and four doctorate-level degree programs. Findlay has earned top rankings in U.S. News & World Report's annual survey of "America's Best Colleges" for 12 consecutive years.

More than 3,800 students, including 1,200 graduate students are enrolled at Findlay. Approximately 1,250 students live on campus in University housing. A proud member of the NCAA Division II Great Midwest Athletic Conference (GMAC), Findlay offers 24 men's and women's teams. Our nationally ranked teams are made up of Oiler student-athletes who graduate at 19 percent higher rate than the national average.

Visit www.findlay.edu

University of Findlay®

Thank you to the University of Findlay planning committee for helping to make this a successful meeting.

Erin Best – College of Science

Vincent "Gino" J. Coppola – Behavioral Sciences

Dana Emmert – Chemistry

Minxuan Lan – Criminal Justice

Kerry Teeple – Education

Brian D. Whitaker – Animal Science

Brief Schedule of Abstracts

See **Fields of interest index** on page 17
and **First author index** on page 17

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 Center for Student Life & College of Business–Atrium

See page 8

Podium Sessions 11:00 AM - 11:45 AM

Podium Session 1
Ecology
11:00 AM - 11:45 AM
Meeting Room – Room 232
See page 5

Podium Session 2
Medical Science
11:00 AM - 11:45 AM
Meeting Room – Room 237
See page 6

Podium Sessions 1:30 PM - 2:15 PM

Podium Session 3
Biology
1:30 PM - 2:15 PM
Meeting Room – Room 232
See page 6

Podium Session 4
Education, Environmental Science, and Geology
1:30 PM - 2:15 PM
Meeting Room – Room 237
See page 7

Panel Discussion

Women in STEM: Empowering the Future

10:00 AM to 11:00 AM
Rooms 232 and 237

The *Women in STEM* panel is comprised of accomplished women in various fields of science, medicine, engineering, and education. Interviewed collectively by a young woman still in college, the intention of the panel is for these women to share insight from their careers in topics from workplace challenges to inspiring projects to mentorship. There is much to be learned about the future of STEM from the women who are helping to build it.

University of Findlay Student Moderators:
Lori Leal and Kimberly Sprungl

Panelists:
Stacey Lowery Bretz, PhD
Margaret Goodell, PhD
Carrie Rinker-Schaeffer, PhD
Cathy Pederson, PhD
Angela Wendel, PhD
Mary Floren
Katherine Bruce

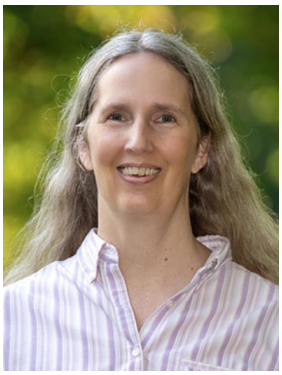
Thank you to the Academy's Board of Trustees member, Halle Miller, and OAS staff for organizing this panel.

All-Academy Lecture

12:15 PM - 1:30 PM
Atrium

Cathy L. Pederson, PhD,
Elizabeth E. Powelson Professor of Biology, Wittenberg University

The Mystery Illness Affecting Millions: Postural Orthostatic Tachycardia Syndrome (POTS)



Dr. Pederson—a college professor trained in physiology and neurobiology—had her life and her research change after her own daughter was debilitated by a mystery illness after a bout with mononucleosis. Her research into the quality of life for people living with postural orthostatic tachycardia syndrome (POTS) has alerted practitioners to the necessity of better symptom management while we race to understand the underlying cause(s) of this disorder. Often cited in scientific literature, Dr. Pederson's work will potentially save lives—particularly of young people with POTS and other chronic invisible disorders.

11:00 AM - 11:45 AM
Podium Session 1
Ecology
Meeting Room – Center for Student Life & College of Business, Room 232

Minxuan Lan PhD and Abigail Clark, presiding

Authors and titles are shown for all presenters.

Peer-reviewed abstracts appear only if results were reported.

11:00 - LAND USE EFFECTS ON CHLORIDE IN OHIO RIVERS, WITH A FOCUS ON LAKE ERIE TRIBUTARIES. Douglas Kane, dkane@heidelberg.edu, Heidelberg University, 4166 Niagara Lane, Perrysburg OH 43551, Nathan Manning, nmanning@heidelberg.edu, Research Scientist, Heidelberg University, Laura Johnson, ljohnson@heidelberg.edu, Director- NCWQR, Heidelberg University.

Road salt (NaCl) used in areas that receive substantial snowfall has increased greatly since the mid-20th century. Heidelberg Tributary Loading Program (HTLP) (1972 to 2019) data were used across 10 rivers in the Lake Erie, Ohio River, and Grand Lake St. Marys watersheds to determine long-term chloride trends. The Cuyahoga River, which has the greatest percent urban land use (39.5%), had the highest watershed yield (approximately 400 to 1,200 kg/ha), and mean concentrations (>100 mg/L) of chloride for any of these rivers. Further, winter levels of chloride exceeded the US EPA chronic water quality criteria concentration of 230 mg/L in more than half of the years of the 21st century, compared to only 1 year exceeding this value in the late 20th century. The increase of chloride in the Cuyahoga River is consistent with the Freshwater Salinization Syndrome, which posits that salt pollution is increasing in human-dominated ecosystems.

11:15 - THE NATURE OF SHRUB CHARACTERISTICS THAT INFLUENCE OBLIGATE GRASSLAND BIRD RESPONSES ON THE WILDS, A RECLAIMED SURFACE MINE. Jenna Jordan, jbjordan@muskingum.edu, Muskingum University, 10 College Drive, Biology Dept., Muskingum University, New Concord OH 43762, Danny Ingold, ingold@muskingum.edu, Professor of Biology, Muskingum University, James Dooley, jdooley@muskingum.edu, Muskingum University.

The encroachment of woody vegetation on reclaimed surface mines has been shown to influence the occupancy patterns of grassland birds on reclaimed mines and other habitats. Most studies that have examined this interaction have quantified woody vegetation at the landscape level (e.g. GIS mapping estimates). It has been well established that shrubs, particularly autumn olive (*Elaeagnus umbellata*) and a shrubby form of honeysuckle (*Lonicera* spp.), have been increasing in their coverage of land at The Wilds, a wildlife preserve constructed on a reclaimed surface mine in Muskingum County, Ohio. To understand the impact of this habitat change for obligate grassland and shrub-oriented bird species, this study recorded the number and height of shrubs within a 15 m radius circle around perching Henslow's Sparrows (*Ammodramus henslowii*), Bobolinks (*Dolichonyx oryzivorus*), Eastern Meadowlarks (*Sturnella magna*), and Common Yellowthroats (*Geothlypis trichas*). ANOVAs were used to compare 2 measures of shrub association (mean shrub count and median shrub height) with grassland species (Henslow's Sparrows, Bobolinks, and Eastern Meadowlarks) and Common Yellowthroats (shrub-oriented species). Grassland bird species were found in areas with significantly lower numbers of shrubs (d.f. = 3, $F = 5.814$, $p < 0.01$) and lower shrub height (d.f. = 3, $F = 4.56$, $p < 0.01$). These results suggest that grassland birds were not only responding to shrub number but also to the size of the shrubs. These results will guide the design of future habitat associations studies at both point count and landscape scales.

11:30 - GRASSLAND BIRD ABUNDANCE TRENDS IN RECLAIMED MINE HABITATS AS DETERMINED BY COLONIZATION AND EXTINCTION PROBABILITIES. Taylor Shimek, tshimek@muskingum.edu, Muskingum University, 10 College Drive, PO Box 1837, Biology Department, New Concord OH 43762, Oliver Rogers, orogers1@muskingum.edu, Undergraduate Student, Muskingum University, Jim Dooley, jdooley@muskingum.edu, Professor of Biology, Muskingum University, Danny Ingold, ingold@muskingum.edu, Professor of Biology, Muskingum University.

Grassland bird species' populations have declined over the past decades more than any other group. Although reclaimed surface mine land such as The Wilds (a 4,000 ha conservation research and education center located in Muskingum County, Ohio) has been observed to be viable habitat, shrub encroachment decreases the habitability for obligate grassland birds. The presence or absence of 4 target grassland bird species (Henslow's Sparrow, *Ammodramus henslowii*; Grasshopper Sparrow, *A. savannarum*; Bobolink, *Dolichonyx oryzivorus*; and Eastern Meadowlark, *Sturnella magna*) were measured at 40 point count stations during May, June, and July of 2013 to 2016 and 2018 to 2021. Additionally, shrub-loving Common Yellowthroats (*Geothlypis trichas*) were also studied during the same periods as a control. *Program Presence* was utilized to estimate colonization and extinction probabilities between each recorded year for each target grassland bird species. Analysis showed that there has been a general decline in colonization probabilities and a rise in local extinction probabilities for grassland bird species and an increase in shrub-loving species, such as the Common Yellowthroat. However, local colonization and extinction rates within the past 2 years appear to be stabilizing for several of the grassland species. This balance could be partially the result of already relatively high local extinction rates, which make it more difficult to have an extinction event in an already small population. Additionally, the observed leveling off could indicate a shift to more preferable habitats by grassland species in which there is reduced shrub encroachment and, for grasshopper sparrows, shorter herbaceous vegetation with some bare ground.

11:00 AM - 11:45 AM
Podium Session 2
Medical Science
Meeting Room – Center for Student Life & College of Business, Room 237

Dana Emmert PhD and Paulina Bucaro, presiding

11:00 - A PRELIMINARY INVESTIGATION OF THE CHOLINERGIC HYPOTHESIS OF COGNITIVE AGING IN BIRDS. Vincent Coppola, vincent.coppola@findlay.edu, University of Findlay, Daniele Nardi, dnardi@bsu.edu, Ball State University, Verner Bingman, vbingma@bgsu.edu, Bowling Green State University.

11:15 - SIGNIFICANCE OF CELL MEMBRANE REPAIR IN PARKINSON'S DISEASE. Isabella Goncalves, goncalves.25@buckeyemail.osu.edu, The Ohio State University, Noah Weisleder, noah.weisleder@osumc.edu, The Ohio State University.

11:30 - EVALUATION OF E-CIGARETTE INHALATION ON BLOOD GLUCOSE AND LIPID METABOLISM USING INDIRECT CALORIMETRY IN C57BL/6J MICE. Jordanne Green, jordannegreen@yahoo.com, Ashland University, Sophia Plew, 15splew@gmail.com, Ashland University, Dolly Crawford, crawford.dolly@gmail.com, Ashland University.

The disruption of glucose homeostasis associated with the use of nicotine delivery systems may be due to a shift to lipid metabolism. Indirect calorimetry was used to measure the respiratory exchange ratio (RER) in female (n=21) and male (n=21) C57BL/6J mice exposed to room air (control) or e-cigarette vapor in a 1L chamber to test the hypotheses that lipid metabolism predominates in vaped mice and that a shift to lipid metabolism is associated with an elevated blood glucose concentration. Metabolism was quantified via RER using a GA-200 gas analyzer (iWorx® Systems Inc.) and LabScribe v.4 (iWorx® Systems Inc.) software. Blood glucose levels were assessed from a subset of the population using an Accu-Chek® glucometer (Roche Diabetes Care Inc.). Statistical analyses of preliminary data were conducted using R *v*.4.0.3. Median RER was greater in controls than in vaped animals and was lower in females compared to males. Older females showed a reduction in RER when exposure occurred in the afternoon ($p<0.001$), and in males when exposure occurred in the morning ($p=0.007$). Glucose concentrations (mg/dL) were higher after e-cigarette inhalation compared with controls, but this difference was not significant ($p=0.464$). The reduction in the respiratory exchange ratio supports the hypothesis that e-cigarette inhalation promotes lipid metabolism, and the magnitude of the effect is influenced by gender, age, and time of day.

1:30 PM - 2:15 PM
Podium Session 3
Biology
Meeting Room – Center for Student Life & College of Business, Room 232

Vincent "Gino" J. Coppola PhD and Hannah Caram, presiding

1:30 - PILOT STUDY: THE EFFECT OF COMPLETE DARKNESS ON EARLY DEVELOPMENT OF THE CHINESE MANTID, *TENODERA SINENSIS*. James Muncie, jmuncie@muskingum.edu, Muskingum University, Jamie Rafter, jrafter@muskingum.edu, Muskingum University.

The Chinese mantid (*Tenodera sinensis*) is a diurnal predator. Absence of light may impact feeding rate and early growth and development. Mantids (n=37 per treatment) were reared under complete darkness or a 16:8 (L:D) h photoperiod. The lab was modified to work in darkness using 730 nm red lights. Nymphs were placed in mason jars and were housed in an incubator at 25 °C maintaining their assigned photoperiod. Mantids were reared for 27 days and fed apterous fruit flies daily (15t, t=instar) until switched to appropriately sized crickets (n=4 per day) upon reaching the 3rd-instar. Prey consumed was monitored and remaining prey were removed before feedings. Initial and final mass and length were measured to determine factor of increase of each metric. Maximum instar achieved, and percent survival, was recorded. Factors of increase of length and mass were analyzed via ANOVA. Maximum instar achieved was analyzed via contingency analysis. Mantids in the dark consumed less prey. At the end of the trial, 72.73% of the mantids in the dark treatment survived and 77.14% of the mantids in the light treatment survived ($X^2=0.177$, $p=0.6743$). Regarding growth, 6.67% of mantids from the dark treatment were 2nd-instar and 83.33% 3rd-instar while 92.59% of mantids from the light treatment were 4th-instar and 7.41% 5th-instar ($X^2=51.00$, $p<0.0001$). Mean length and mass increase factors were higher in mantids in the light treatment ($F=142.98$, $p<0.0001$; $F=559.89$, $p<0.0001$ for length and mass, respectively). Absence of light negatively impacts the growth and development of Chinese mantids, suggesting that a period of light is necessary for them to thrive.

1:45 - INVESTIGATING THE INHIBITORY ACTIVITY OF NOVEL BPZ DERIVATIVES AGAINST *TOXOPLASMA GONDII*. Casey Urbanski, urbanskic@findlay.edu, University of Findlay, Elizabeth Adkins, adkinse1@findlay.edu, University of Findlay, Robert Charvat, charvat@findlay.edu, University of Findlay.

Toxoplasmosis is a brain and behavior altering infection caused by the protozoan parasite *Toxoplasma gondii* reported to affect around 30% of the world's population. Accidents and tragedies such as suicide that were once thought to be a product of unfortunate happenstance have increasingly been linked to *T. gondii* infections, and the stark lack of viable treatment options for established toxoplasmosis only amplifies the concern. Consequently, this research aims to not only investigate novel compounds as a potential defense against *T. gondii* infections but also identify which parasitic structures and pathways the compounds target. To date, the effects of 10 compounds—bisphenol Z (BPZ) along with 9 other BPZ derivatives—on *T. gondii*'s ability to replicate within host cell cultures as well as complete its lytic cycle of replication have been investigated. Unexpectedly, 4 of the compounds demonstrated increased inhibition of *T.*

gondii host cell lysis at markedly lower concentrations (0.5 and 1 uM) than were needed to inhibit intracellular parasite replication (25 and 50 uM). This surprising observation suggests that the mechanism of action may differ between BPZ derivatives. Current experimentation uses N-ethyl-N-nitrosourea, a strong mutagenizing agent, to induce mutations in the genome of wild type parasites concomitantly with BPZ selective pressure to create drug resistant parasites. A comparison between the genomes of the 2 strains can pinpoint the site of disruption within the parasites revealing information that may eventually be used to refine the compounds to have improved efficacy.

2:00 - FEMALE MATE PREFERENCE IN A CAPTIVE POPULATION OF BLUEFIN KILLIFISH (*LUCANIA GOODEI*). Kyra Znaczko, znaczkok@findlay.edu, University of Findlay, Brandan Gray, brandan.gray@findlay.edu, University of Findlay.

1:30 PM - 2:15 PM
Podium Session 4
Education, Environmental Science, and Geology
Meeting Room – Center for Student Life & College of Business, Room 237

Kerry Temple EdD and Jaret Nelson, presiding

1:30 - UNDERSTANDING INTERNATIONAL COLLEGE STUDENTS' CULTURAL DIMENSIONS ON ACCULTURATIVE STRESS. Maha Azzazi, azzazim@findlay.edu, University of Findlay, Jennifer Fennema-Bloom, fennema-bloom@findlay.edu, University of Findlay.

Despite the efforts of US universities to enrich their students' experience on campuses, international students still encounter problems with transition to their new life in the United States. These challenges have been expressed in the literature as being social, cultural, and language barriers. However, few studies have investigated factors behind the international students' adaptation process. Thus, this quantitative study investigated the relationship between acculturative stress levels among international student populations and Hofestede's cultural dimensions according to their country of origin. The participants were 47 international students from 23 countries, who were attending 3 US universities in Ohio. The students shared their experiences through a survey that measured their acculturative stress levels. The survey findings were then analyzed in relation to Hofstede's cultural dimensions to understand if a particular dimension as defined by country of origin impacted feelings of acculturative stress. Data analysis showed correlation between the students' cultural dimensions and acculturative stress levels. These findings displayed those students coming from geographical regions with higher power distance and less individualistic countries also recorded high acculturative stress levels while living in US university campuses. This study contributes to the body of literature supporting the improvement of international students' experience in US universities.

1:45 - A 10-YEAR STUDY OF DUG RUN AT THE UNIVERSITY OF NORTHWESTERN OHIO. David Zuwerink, zuwerink@yahoo.com, University of Northwestern Ohio.

Dug Run is a tributary of the Ottawa River and has been used over the past 10 years to teach ecology students about the stream. The university began construction of the campus in the early 1970s when water was directed to the stream through connectivity pipes from parking lots. In 2008, the university began developing the western side of campus which was designed to prevent stormwater from reaching the stream. The studies conducted at the university have shown significantly better stream quality monitoring index scores ($p<0.001$) and darter abundance ($p<0.001$) in the section of campus where stormwater is filtered through the soil compared to the section of campus where stormwater is directed to the stream. These studies found the culvert on the urbanized section of campus appears to have negatively affected fish diversity ($p<0.001$). An abrupt decline in mayfly nymphs and caddisfly larvae was noticed from 2015 to 2017 on the western side of campus. In 2019, a total of 0.22 mayfly nymphs per sample were counted on campus compared to 5.63 mayfly nymphs per sample off campus. Also, 0 caddisfly larvae per sample were counted on campus compared to 14 caddisfly larvae per sample off campus. No sampling took place on the western section of campus from the summer 2019 until the summer 2021. In summer 2021 an increase in mayflies (2 per sample) and caddisflies (3.3 per sample) were seen, suggesting that disturbance due to student sampling may have contributed to declines observed in stream quality monitoring index scores on the western half of the campus.

2:00 - FOSSILS OF THE MIDDLE DEVONIAN DUNDEE LIMESTONE USED AS BUILDING STONE IN TOLEDO, OHIO, USA. Mark Camp, mark.camp@utoledo.edu, University of Toledo, Alysha Pirolli, alysha.pirolli@rockets.utoledo.edu, University of Toledo, Sue Mayesky, smayesky@yahoo.com, retired.

In the late 1930s, the Works Progress Administration constructed numerous county and municipal structures across the nation and in the Toledo area. One source of building stone was from the old Welfare Farm (later the Toledo Workhouse) in Whitehouse, Ohio, where a shallow quarry, exposing the upper part of the fossiliferous Dundee Limestone, was worked by inmates and the stone marketed locally. The wide use of this formation in building materials leads to an untapped resource of fossils readily available for use by teachers to supplement their earth science lessons, provide field trip opportunities where strata are not naturally exposed, and provide additional data on the fauna of the little studied Dundee Limestone. Preliminary work on a compilation of a faunal list has been undertaken at 6 structures and fences at the Toledo Zoo, Glass Bowl Stadium at the University of Toledo, and the West Toledo Library. The standard procedure was to photograph and estimate abundance of fossil taxa within a 10 cm square and note any sedimentary structures or features in each wall slab, up to 2.5 m from the ground. Identification was made in the field or from closer examination of photographs. Fossiliferous mudstone, wackestone, packstone, and grainstone lithologies dominated the slabs examined at all sites. Concentrations of brachiopod-pelmatozoan hash marked occasional tempestite horizons in a typical shallow subtidal environment characteristic of mid-continent Devonian seas. Cnidaria represented by *Coenites reticulata*, *Cystiphylloides americanum*, *Emmonsia polymorpha*, *Eridophyllum seriale*, *Syringopora* sp. and *Zaphrentis perovalis*; Bryozoa including *Acanthoclema* sp. and *Fenestella erectipora*; Brachiopoda including *Aythris* sp., *Brevispirifer gregarious*, *Camarotoechia* sp., *Leptaena* sp., *Pseudoatrypa* sp., *Rhipidomella vanuxemi*, and *Strophodonta demissa*; Mollusca represented by *Limoptera macoptera*, *Euryzone arata*, *Loxonema pexatum*, and *Murchisonia* sp.; pelmatozoan columnals; and *Thalassinoides* burrows and unidentifiable traces are among the taxa identified and support the shallow marine environment leading to the deposition of the Dundee Limestone.

Poster Sessions
9:00 AM – 10:00 AM
and
2:30 PM – 3:30 PM
Center for Student Life & College of Business–Atrium

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

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Peer-reviewed abstracts appear only if results were reported.

Poster Board No. 01 - PREDILECTIONS OF *SITTA CAROLINENSIS*, *POECILE ATRICAPILLUS*, AND *BAEOLOPHUS BICOLOR* FOR BIRD FEEDER COLOR. Olivia Kitchen, ogkitchen1@malone.edu, Malone University, Amy VanLew, alvanlew1@malone.edu, Malone University, Olivia Zilinski, ozilinski1@malone.edu, Malone University, Jenna Zimmerman, jnzimmerman1@malone.edu, Malone University, Steven Lane, slane@malone.edu, Malone University.

Since 1970, North America has lost 2.9 billion breeding adult birds. Research indicates bird feeding evidently enhances passerine survival rates. Previous studies have focused on the impacts of feeder design and seed preference on feeder usage, with fewer studies exploring the impact of feeder color, although birds rely heavily on sight for foraging. Here, the preference for red- or green-colored hopper bird feeders was tested at a forested site in northeast Ohio during the non-breeding months. It was hypothesized that passerines would prefer the green feeder due to it more closely resembling the surrounding foliage. In October 2021, red and green feeders (n=361) were hung approximately 1.5 m off the ground and 0.3 m apart on the same branch of a tree in a beech-maple forest. Feeder preference was collected via 3 motion-activated trail cameras and in-person observations from a distance of 20 m. Three species were observed over the 3-week study (n=number of visits to either feeder): White-breasted Nuthatch (*Sitta carolinensis*) (n=133), Black-capped Chickadee (*Poecile atricapillus*) (n=129), and Tufted Titmouse (*Baeolophus bicolor*) (n=99). *Sitta carolinensis* and *B. bicolor* preferred the green feeder (χ^2=56.91, p<0.001 and χ^2=26.27, p<0.001, respectively) while *P. atricapillus* preferred the red feeder (χ^2=15.70, p<0.001). Differences in feeder preference may be associated with the adaptive value of camouflaging to birds of different body sizes and social roles within mixed species flocks.

Poster Board No. 02 - IDENTIFICATION OF *CYTAUXZOON FELIS* IN DOMESTICATED FELINE WITHIN THE SOUTHWEST OHIO REGION. Jake Jubach, jakejubach@gmail.com, Wilmington College, Amanda Rollins, amanda_rollins@wilmington.edu, Wilmington College, Elliott Zieman, eazieman@eiu.edu, Eastern Illinois University.

Cytauxzoon felis is a bloodborne apicomplexan protozoan parasite common to bobcats; it is transmitted by a tick vector. It is only mildly symptomatic, resulting in fevers that occur in bobcat kittens. Bobcats are native to Ohio, and this parasite has been zoonotically diagnosed in domestic cats in the Midwest. In addition, *C. felis* has been identified in wild opossum carriers in southwest Ohio. This suggests that domestic cats are also at risk in this region. *C. felis* infection is typically lethal for infected domestic cats even with medical treatment, and mortality rates approach 100% for those without treatment. DNA was extracted from blood samples from 56 local feral cats and tested for genetic evidence of *C. felis* infection. Preliminary results warrant a broader investigation of the prevalence of this dangerous parasite and the potential risk to domestic cats.

Poster Board No. 03 - Withdrawn.

Poster Board No. 04 - CORRELATION BETWEEN POLYCHLORINATED BIPHENYLS AND REPRODUCTIVE HORMONE LEVELS. Caroline Cramblit, ccramblit@capital.edu, Capital University, Kerry Cheesman, kcheesma@capital.edu, Capital University.

Poster Board No. 05 - THE EFFECTS OF QUERCITIN SUPPLEMENTATION DURING OOCYTE MATURATION ON IN VITRO FERTILIZATION DURING EMBRYONIC DEVELOPMENT. Cameron Nau, nauc@findlay.edu, University of Findlay, Makayla Throop, throopm@findlay.edu, University of Findlay, Kimberly Sprungl, sprunglk@findlay.edu, University of Findlay, Brian Whitaker, whitaker@findlay.edu, University of Findlay.

Poster Board No. 06 - ESTABLISHING A LONG-TERM ASSESSMENT STUDY ON WATER QUALITY OF THE RIVERS AROUND DEFIANCE, OHIO, USA. Mollie Sorrell, msorrell@defiance.edu, Defiance College, Autumn Saddler, asaddler001@defiance.edu, Defiance College, Lauren Criblez, lcriblez001@defiance.edu, Defiance College, Noelani Schmidt, nschmidt002@defiance.edu, Defiance College.

Poster Board No. 07 - ANTHOCYANIN CONTAINING PLANT EXTRACTS INCREASE APOPTOSIS IN THE HUMAN MELANOMA CELL BOWES LINE. Madison Buckles, bucklesmm@hiram.edu, Hiram College, Julie Maxson, Maxsonjm@hiram.edu, Hiram College.

Thousands of people die every year from melanoma, a form of skin cancer. While surgery is the main treatment option, chemotherapy to shrink tumors may also be warranted. Many plant-derived secondary metabolites have been identified as anticancer agents, including Paclitaxel from the bark of the Pacific yew tree and Camptothecin from the wood of the *Camptotheca acuminata* tree. This research highlights the anticancer properties of anthocyanin-containing plant extracts from *Salvia nemorosa*, *Rudbeckia hirta*, *Taraxacum officinale*, *Cichorium intybus*, and a pure anthocyanin, delphinidin. Ethanolic extracts were tested for their effects on Human Melanoma Cell Bowes (HMCB) cell viability, apoptotic morphology, DNA fragmentation, and calcium release. Using the WST-8 assay, *S. nemorosa*, *T. officinale*, *C. intybus*, and 10 uM delphinidin induced significant decreases in HMCB cell viability after 48 hours (30%, 27%, 16%, and 18%, respectively) when compared to the solvent control (T-test p-values<0.05). DNA fragmentation, a hallmark of apoptosis, was assessed qualitatively by the comet assay with the longest tail lengths observed following *S. nemorosa* and delphinidin treatment for 48 hours. Apoptotic morphology was viewed with the fluorescent nucleic acid stain Syto16. *T. officinale*, *C. intybus*, and delphinidin treatment induced HMCB apoptotic body formation within 48 hours. Calcium

release was qualitatively viewed with the calcium specific fluorescent dye Calbryte. All plant extracts induced calcium release into the cell within 24 hours as compared to untreated cells which may be indicative of apoptotic signaling. Further studies will attempt to optimize the time course of apoptosis induction and identify specific pathway intermediates.

Poster Board No. 08 - THE EFFECTS OF QUISQUALIC ACID AND L-*a*-AMINO BUTYRATE SUPPLEMENTATION DURING IN VITRO OOCYTES MATURATION IN PIGS. Skyla Reynolds, reynoldss3@findlay.edu, University of Findlay, Kimberly Sprungl, sprunglk@findlay.edu, University of Findlay, Makayla Throop, throopm@findlay.edu, University of Findlay, Brian Whitaker, whitaker@findlay.edu, University of Findlay.

Poster Board No. 09 - A FEW EXPLORATIONS OF THE ANTIMICROBIAL EFFICACY OF FEVERFEW (*TANACETUM PARTHENIUM*). Emma Barney, e-barney@onu.edu, Ohio Northern University, Dr. Linda Young, l-young@onu.edu, Ohio Northern University.

Poster Board No. 10 - ENERGETIC COST OF DIGESTION OF PROTEIN AND CARBOHYDRATE RICH MEALS IN THE MADAGASCAR HISSING COCKROACH. Macy Salem, salemms2022@mountunion.edu, University of Mount Union, Spiro Mavroidis, mavrois@mountunion.edu, University of Mount Union.

The energetic efficiency by which an animal processes a meal during digestion may determine what proportion of the caloric content of that meal ultimately becomes available as assimilated energy to be used for other energy-demanding components of its energy budget. The macromolecule composition of the food may have a significant impact on the cost of digestion, or Specific Dynamic Action (SDA), of that food. Madagascar hissing cockroaches (*Gromphadorhina portentosa*) inhabit the island of Madagascar and consume the fallen fruit, vegetation, insects, and decaying animal matter on the forest floor. The objective of this study was to compare the cost of digestion of protein (tofu) and carbohydrate-rich (sweet potato) meals by *G. portentosa*. It was hypothesized that the cost of digestion would be greatest for the high protein meal in this species. Animals were housed at 23 °C with a 12:12 LD photoperiod. Following feeding, metabolic rates were determined by measuring CO_2 production. Two trials using high protein meals and 3 with carbohydrate meals were run. There was a significant difference in the cumulative CO_2 production post-feeding (SDA) between the 2 meal types ($F_{1,5} = 426$, $p = 0.002$), with carbohydrate meals having significantly greater energetic cost. Additionally, the time to complete digestion was approximately twice as long (approximately 48 h) for animals on carbohydrate-rich diets. The short-lived, low-level metabolic response to a protein diet may be this species' inability to easily process a high concentration of these macromolecules and may have adapted to what is more commonly available to them naturally.

Poster Board No. 11 - EVIDENCE THAT HUMAN INTERACTION WITH THE ENVIRONMENT INCREASES THE AMOUNT OF ANTIBIOTIC RESISTANT BACTERIA IN SOIL. Karen Kanke, kkanke@capital.edu, Capital University, Kerry Cheesman, kcheesma@capital.edu, Capital University.

Poster Board No. 12 - EFFECTIVITY OF NOVEL TREE BIOACTIVES ON LEUKEMIA AND MELANOMA CELL DEATH. Jacob Moncher, Moncherj18@gmail.com, Hiram College, Julie Maxson, Maxsonjm@hiram.edu, Hiram College.

Poster Board No. 13 - OPTIMIZING EXPRESSION OF NATIVE AND VARIANT SOX7 PROTEINS FROM PH6HCT-HALOTAG T7/SOX7 PROKARYOTIC EXPRESSION CONSTRUCTS. Makenna Hodges, mhodges1@walsh.edu, Walsh University, Jeremy Prokop, jprokop54@gmail.com, Michigan State University Grand Rapids Research Center, Adam Underwood, aunderwood@walsh.edu, Walsh University.

All 20 SRY-related box (SOX) proteins contain highly conserved High Mobility Group (HMG)-box DNA binding domains that facilitate function as transcription factors. Most SOX research focuses on the HMG-box, while the function of regions outside this domain and interactions with potential protein binding partners remain unknown. In the current study, a computational system of deep evolutionary analysis has found conserved domains in these unorganized regions. In SOX7, a conserved, rare variant was identified by multiplying PolyPhen2 damage predictions by our conservation score, a 21 codon sliding window score, and allele frequency in gnomAD. In this SOX7 variant, at the c-terminus, alanine (A) is replaced with a valine (V) at residue 379 and was predicted to modify SOX7 protein binding interactions. The purpose of this project was to produce prokaryotic SOX7 expression constructs to synthesize and purify native and variant SOX7 6X Histidine HaloTag fusion proteins. These proteins will be used in future co-immunoprecipitation and mass spectrometry studies to characterize protein interaction differences. First, the coding regions of human SOX7-A379 and SOX7-V379 were PCR amplified with primers encoding EcoRI and XhoI restriction sites. Amplicons and the pH6HTC-His6HaloTag® T7 vector (Promega) were cleaved with EcoRI and XhoI and SOX7 amplicons were ligated into pH6HTC-His6HaloTag® T7. Vectors were then transformed into Zymo XJb(DE3)-Autolysis competent cells. Protein expression was induced with 0.7 mM IPTG. Expressed proteins were then purified using Zymo HisSpin protein mini preparation followed by SDS PAGE and western blots. Immunoblots were visualized on a BIO-RAD ChemiDoc MP. Future experiments to identify SOX7 binding partners are underway.

Poster Board No. 14 - EFFECTS OF QUERCETIN SUPPLEMENTATION DURING OOCYTE MATURATION ON CUMULUS CELL EXPANSION, GSH AND ROS CONCENTRATION. Kimberly Sprungl, sprunglk@findlay.edu, University of Findlay, Cameron Nau, nauc@findlay.edu, University of Findlay, Skyla Reynolds, reynoldss3@findlay.edu, University of Findlay, Brian Whitaker, whitaker@findlay.edu, University of Findlay.

Poster Board No. 15 - ANALYSIS OF THE METAL BINDING PROPERTIES OF RIBOFLAVIN BINDING PROTEIN. Tracey Murray, tmurray2@capital.edu, Capital University, Austin Bealer, abealer2@capital.edu, Capital University, Jordan Chapman, jchapman63@capital.edu, Capital University.

The generally accepted function of riboflavin binding protein (RBP) is as a carrier and store of riboflavin (vitamin B2) for embryo development in egg-laying animals. This lab and others have demonstrated that RBP can also bind to Cu^{2+} and other metal cations. This finding has led to the hypothesis that RBP may play a role as a metal ion carrier as well. In order to investigate this potential additional role for RBP, the binding ratio

of metal ions to RBP was measured. Chicken eggs were acquired from a local supermarket. The egg yolk was separated from the egg whites and RBP was purified from the whites using ion-exchange chromatography and ammonium sulfate precipitation. RBP was dialyzed in metal ion solution to allow for binding. Unexpectedly, it was discovered that previously purified RBP that had been stored in the freezer (-20 °C) did not bind to metal ions at the expected ratios. In addition, newly purified RBP which was frozen and then thawed did not bind to the metal ions as expected either. When newly purified RBP which had only been stored in a refrigerator (4 °C) was used, the average binding ratio of 0.71:1 for Cu^{2+}:RBP was determined; a smaller ratio than the published 1:1 ratio for Cu^{2+} and RBP but consistent with other findings in this lab. Further investigation of the effects of freezing on RBP structure and metal ion binding are needed.

Poster Board No. 16 - EFFECTS OF VANILLIC ACID SUPPLEMENTATION DURING OOCYTE MATURATION ON IN VITRO FERTILIZATION DURING EMBRYONIC DEVELOPMENT. Makayla Throop, Throopm@findlay.edu, University of Findlay, Cameron Nau, Nauc@findlay.edu, University of Findlay, Skyla Reynolds, Reynoldss3@findlay.edu, University of Findlay, Brian Whitaker, whitaker@findlay.edu, University of Findlay.

Poster Board No. 17 - APOPTOSIS OF LEUKEMIA CELLS FOLLOWING CANNABIDIOL (CBD) OIL TREATMENT. Rugiatu Kamara, kamarar1@hiram.edu, Hiram College, Julie Maxson, Maxsonjm@hiram.edu, Hiram College.

Cancer is a leading cause of death in the United States. Several treatments involve demanding rounds of chemotherapy which can result in lifelong side effects. Ongoing research is needed to find targeted therapies that are more specific to cancer cells. Cannabidiol (CBD) oil has been shown to have low toxicity to mammalian cells and may provide health benefits in treating pain, inflammation, and other health problems. This study examined the effects of CBD oil on human leukemia (HL-60) cell growth. Viability and morphological assays indicated that 5 uM and 10 uM CBD oil were capable of inducing HL-60 cell apoptosis within 24 hours. Consequently, further research is justified in delineating the pathway of CBD oil-induced apoptosis as a potential therapeutic, yet less toxic, chemotherapy drug.

Poster Board No. 18 - THE RELIABILITY OF "GLUTEN FREE" LABELS FOUND ON INTERNATIONAL FOOD PRODUCTS IN COMPARISON TO SAMPLES FROM THE UNITED STATES. Sara Fathala, sfathala@capital.edu, Capital University, Daryna Zaitseva, dzaitseva@capital.edu, Capital University, Kerry Cheesman, kcheesma@capital.edu, Capital University.

Gluten is a protein complex found in wheat, barley, and rye, and even in foods that do not normally contain these grains. Previous work in the lab has shown that roughly 30% of labeled "gluten-free" products in the United States have significant gluten in them. This study was designed to investigate the reliability of "gluten-free" food labels in the international consumer marketplace. This research aims to inform and potentially caution those with gluten intolerance, especially with Celiac disease, to avoid gluten cross contamination and be skeptical of the gluten levels in food products advertised as "gluten-free." A total of 58 samples labeled "gluten-free" were obtained from grocery stores internationally. The samples used for this study were obtained from 18 countries around the world, including countries in Europe and the Middle East. A NIMA Partners Gluten Sensor (antibody based colorimetric assay) was used to determine if gluten content was <20 ppm, the maximum allowed by the European Commission and local Middle Eastern produce, for a product labeled "gluten-free." In total, 58 samples were tested and 51 of them were confirmed to be "gluten-free" (<20 ppm). When European and Middle Eastern samples are compared to those from the United States, it appears that the food from these countries are more accurately labeled than in the United States. While results reveal that "certified gluten-free" labeling can be trusted in most cases, the risk of cross contamination with gluten is still possible and poses some risks to those who are gluten intolerant.

Poster Board No. 19 - BODY LOCATION FACTORS IN WAYNE COUNTY, MICHIGAN. Maris Hollowell, hollowellm@findlay.edu, University of Findlay, Jaymelee Kim, kim@findlay.edu, University of Findlay.

Poster Board No. 20 - Withdrawn.

Poster Board No. 21 - OPTIMIZING HEMATITE THIN FILM ELECTRODES FOR PHOTOELECTROCHEMICAL DEGRADATION OF ORGANIC DYES. Karah Grace, gracek2@ohiodominican.edu, Ohio Dominican University, Daniel Little, littled2@ohiodominican.edu, Ohio Dominican University.

Poster Board No. 22 - RECOVERY FACTORS IN BODY LOCATION IN WAYNE COUNTY, MICHIGAN. Kristine Johnson, Johnsonk13@findlay.edu, University of Findlay, Jaymelee Kim, kim@findlay.edu, University of Findlay.

Current debates in forensic anthropology suggest that there is an ethical obligation of the anthropologist to contextualize the casework in which they are engaged. However, little casework has been studied in this manner. Contextualization stands to inform where remains may be found and why they may be found in that manner. Anthropological cases are often those of delayed recovery (decomposition), and this retrospective case analysis examines 132 cases from the Wayne County Medical Examiner's Office (WCMEO) that took place from 2014 to 2021. Categorical variables of indoor or outdoor location (p-value=0.656), vacant or inhabited indoor location (p-value<0.001), and presence of debris at location (p-value=0.011) are analyzed for statistical significance using one sample binomial tests or chi-square tests. Trends in time of day and day of week are discussed through descriptive statistics. The relationship to human remains and vacant spaces is consistent with the sociocultural context of Wayne County, Michigan, and can assist in decreasing the time between death and recovery.

Poster Board No. 23 - DETERMINATION OF COPPER AND CHROMIUM IN BIRD SHELLS USING ATOMIC ABSORPTION SPECTROSCOPY. Anna Dudziak, anna.dudziak@ursuline.edu, Ursuline College, Emily Shrader, emily.shrader@ursuline.edu, Ursuline College, Kayla Huffman, kayla.huffman@ursuline.edu, Ursuline College, Ciani Kensey, ciani.kensey@ursuline.edu, Ursuline College, Alex Harris, alexander.harris@ursuline.edu, Ursuline College, Melissa Barranger Mathys, mbarrangermathys@ursuline.edu, Ursuline College.

Poster Board No. 24 - INVESTIGATION OF BAY SUBSTITUTED PERYLENE-3,4,9,10-TETRACARBOXYLIC TETRAESTERS AS PHOTOSENSITIZERS FOR PDT. Nickolas Eneix, neneix1@walsh.edu, Walsh University, Timothy Smith, tsmith@walsh.edu, Walsh University.

Photodynamic therapy (PDT) holds the promise of using light to destroy cancerous tissue. Singlet oxygen ($^1\Delta g$) is a highly reactive intermediate causing oxidative

stress within biomolecules showing toxic effects due to oxidation of lipids, proteins, and nucleic acids. The lifetime of singlet oxygen is short. This renders site-specific destruction of cancerous tissue with minimal risk of unwanted damage to healthy tissue. Perylene-3,4,9,10-tetracarboxylic tetraesters (PTCEs) are robust highly absorbent dyes. The ester groups at the peri-position increase the solubility of these dyes with no effect on their spectroscopic properties. However, substitution at the bay positions (1,6,7,12) modulate the absorption range and can enhance population of the triplet state. This study sought to understand efficiency of $^1\Delta g$ generation by bay substituted PTCEs. The presence of $^1\Delta g$ was confirmed by utilizing 1,3-diphenylisobenzofuran (DPBF) as it has specific reactivity with $^1\Delta g$ decomposing to 1,2-dibenzoylbenzene. Observance of its absorptive decay at 410 nm provided direct evidence for $^1\Delta g$ generation and dye efficiency. Samples (O.D.0.2) were irradiated at time intervals of 5, 10, 15, 25, 35, and 45 minutes with a Cary fluorescence spectrometer under a kinetic experiment mode with an irradiation wavelength at the maximum absorption of the PTCEs. The mixtures were then monitored on a JASCO UV-Vis after each irradiation time interval. The dyes showed efficiency ranges from 11 to 32% as calculated from DPBF concentrations. The tetrachloro derivative (TCD) had the highest overall efficiency of dyes explored.

Poster Board No. 25 - OVERESTIMATION OF SPECIES CAUSED BY THE MORPHOLOGICAL SPECIES CONCEPT: A CASE STUDY IN PLASMODIUM. Maya Watercutter, watercutterm@findlay.edu, University of Findlay, Emma Holm, holme@findlay.edu, University of Findlay, Abby Kalkstein, kalkstein@findlay.edu, University of Findlay, Justin Rheubert, rheubert@findlay.edu, University of Findlay, Robert Charvat, charvat@findlay.edu, University of Findlay.

Poster Board No. 26 - Withdrawn.

Poster Board No. 27 - A COMPARISON OF *LUMBRICUS TERRESTRIS* AND *AMYNTHAS AGRESTRIS* ON THE GROWTH AND PRODUCTION OF RADISH PLANTS. Lyndi Bickford, lbickford001@defiance.edu, Defiance College, Deleita Powell, dpowell002@defiance.edu, Defiance College, Linda Tucker Serniak, ltuckerserniak@defiance.edu, Defiance College.

Little is known of the invasive Asian jumping worm (*Amythas agrestis*), including its possible effects on agriculture. Invasion of agricultural fields by *A. agrestis* is likely to occur and it is important for farmers to understand how this invader might impact their crops and how these effects compare to the earthworms already present, such as *Lumbricus terrestis*, which has had positive impacts on crop growth and production. Therefore, this study aimed to determine the effects of *A. agrestis* on radish (*Raphanus sativus*) growth and compare these effects to *L. terrestris*. In a small-scale experiment, single *R. sativus* seeds were planted and grown in half-liter pots in a growth chamber for 17 days, with either *A. agrestis*, *L. terrestris*, or no worms added to the soil (n = 4 per treatment). At the conclusion of the experiment, each plant was harvested and weighed and means were compared using ANOVA. The mean mass of the radishes was highest in the *L. terrestis* treatment and lowest in the control. However, these differences were not significant ($p = 0.45$). Additional larger-scale studies are needed to confirm these preliminary findings.

Poster Board No. 28 - DETERMINING THE PREVALENCE OF THREE AMPHIBIAN PATHOGENS IN HANCOCK COUNTY, OHIO, USA. Elizabeth Adkins, adkinse1@findlay.edu, University of Findlay, Casey Urbanski, urbanskic@findlay.edu, University of Findlay, Justin Rheubert, rheubert@findlay.edu, University of Findlay, Robert Charvat, charvat@findlay.edu, University of Findlay, Abby Kalkstein, abby.kalkstein@findlay.edu, University of Findlay.

Poster Board No. 29 - PERSISTENCE OF MICROCYSTIN IN LAKE ERIE FORESHORE SANDS. Garrett Moots, Garrett.freymuthmoots@rockets.utoledo.edu, University of Toledo, Von Sigler, von.sigler@utoledo.edu, University of Toledo.

During algal bloom events, human exposure to cyanotoxins can occur during recreational beach activity through ingestion or inhalation of contaminated water or water droplets. *Microcystis* spp. is a common member of bloom communities and produces the cyanotoxin microcystin-LR. While beach sands are a potential reservoir for toxic concentrations of microcystin, the persistence of microcystin in foreshore sands remains unknown. To understand the ability of foreshore sand to serve as a reservoir for microcystin, microcosms of unsterile and sterile sand collected from Maumee Bay State Park Recreational Beach were spiked with microcystin and incubated at 10% moisture and 30 °C to promote accelerated microcystin degradation. Samples were sacrificed over a 9-day period and subjected to indirect competitive ELISA analysis to determine the degradation rate (microcystin standards ranged from 0 ng ml^{-1} to 5 ng ml^{-1}). Microcystin concentrations decreased throughout the incubation period by 4.5% in the sterile treatment (0.02 ng g^{-1} d^{-1}) and by 32% in the nonsterile treatment (0.18 ng g^{-1} d^{-1}), however, degradation rates were not significantly different ($p = 0.17$). Our results indicate that beach sand can serve as a persistent reservoir for microcystin and should be considered a vehicle for human exposure.

Poster Board No. 30 - DIATOM- AND MACRO-INVERTEBRATE-INFERRED WATER QUALITY OF THE MAUMEE RIVER WATERSHED IN DEFIANCE COUNTY, OHIO, USA. Sabrina Brown, sabrown@defiance.edu, Defiance College, Nat Shingler, nshingler001@defiance.edu, Defiance College, Katelyn Smith, ksmith011@defiance.edu, Defiance College, Hallie Webb, hwebb001@defiance.edu, Defiance College.

The purpose of this research project is to assess water quality of rivers in and around Defiance, Ohio, USA, using bioassessment of golden-brown algae (diatoms) and macroinvertebrates. Aquatic bioassessments utilize knowledge about species-specific sensitivities to environmental conditions (temperature, nutrients, water clarity, water velocity). The goal of this research is to rank and analyze water quality patterns in the region. A 6-week field collection of 3 sites (2 on the Maumee River and 1 on its tributary, the Tiffin River) was conducted. Field methods included collecting diatom samples from the water column using plankton tows, periphyton (attached to bottom) diatom samples, and kick-net macroinvertebrate samples. Diatom and macroinvertebrate samples were enumerated under the microscope. The diatom assemblages were dominated by *Fragilaria*, *Aulacoseira*, and *Navicula*. Results indicate that the Tiffin River (upstream of Defiance, Ohio) site had the highest diversity in diatom and macroinvertebrate communities and the lowest Hilsenhoff Family-level Biotic Index (HFBI) of 3.70. The Tiffin River is indicative of high nutrient availability. The site on the Maumee River in Defiance had the lowest diversity and highest HBFI score (7.34). This site was generally shallow and turbid. The downstream site on the Maumee River was

also turbid and had an HBFI score of 6.11. Impacts of a large flooding event were seen at all 3 sites. The results indicate that the amount of organic pollution is likely higher on the Maumee River.

Poster Board No. 31 - CYTOTOXIC EFFECTS OF FUNGAL EXTRACTS. Elizabeth Csukker, csukkere@findlay.edu, University of Findlay, Madeline Nartker, nartkerm@findlay.edu, University of Findlay, Michael Edelbrock, edelbrock@findlay.edu, University of Findlay.

Poster Board No. 32 - FINE-SCALE DIFFERENCES IN WATER QUALITY AS ASSESSED BY AQUATIC MACROINVERTEBRATE COMMUNITIES IN ROCK CREEK, TIFFIN, OHIO, USA. Kaiden Murphy, kmurphy5@heidelberg.edu, Heidelberg University, Douglas Kane, dkane@heidelberg.edu, Heidelberg University.

The purpose of this research was to determine water quality of 2 sites in Rock Creek at Heidelberg University, located in Tiffin, Ohio. Stream Quality Monitoring (SQM) protocols were used to measure the macroinvertebrate communities at these 2 sites. It was hypothesized that there would be a significant difference in the Cumulative Index Value (CIV) scores between an upstream site located by an outflow pipe and a downstream site away from the outflow pipe. Samples were taken in 3 locations at each site once a month during August, September, and October of 2021. When running statistical tests such as a 2-way ANOVA with replication it was observed that there was a difference in the CIV scores between the 2 sites for all samples that were taken. The F values were significant ($\alpha = 0.05$) for site ($F = 5.34$, $P = 0.04$), month ($F = 7.8$, $P = 0.01$), and interaction of site and week ($F = 5.37$, $P = 0.02$), with the site near the outflow pipe having a lower mean CIV (11.3) than the downstream site (13.9) across months (both rated as Fair). Thus, even at short distances (< 20 meters) and short time frames (3 months) there can be significant differences in SQM scores between riffles.

Poster Board No. 33 - THE EFFECTS OF METAL CATIONS AND ORGANIC CARBON AND NITROGEN IN WORKING WOODS FOREST SOIL AND FOREST GROWTH IMPACT. Rachel Ward, rward@lec.edu, Lake Erie College, Katie Stuble, kstuble@holdenfg.org, Holden Arboretum, Emma Dawson-Glass, edawson-glass@holdenfg.org, Holden Arboretum, Allen Fazenbaker, afazenbaker@lec.edu, Lake Erie College, Kevin Muller, k.mueller89@csuohio.edu, Cleveland State University/Holden Arboretum, Carla Rosenfeld, RosenfeldC@carnegiemnh.org, Carnegie Museum of Natural History, Johnathan Tedesco, jtedesco@lec.edu, Lake Erie College.

Poster Board No. 34 - GOLDENSEAL PLANT AND MULTIDRUG RESISTANCE. Cassandra Tieman, Morefieldc@findlay.edu, University of Findlay, Dana Emmert, Emmert@findlay.edu, University of Findlay.

Poster Board No. 35 - AN INITIAL INVESTIGATION OF THE ROLE OF WETLAND AGE, HYDROLOGY, AND PHYSICOCHEMICAL FACTORS ON NITROGEN-FIXING MICROBIA. Heather Fair, fair.10@osu.edu, Univ of Minnesota, USDA ARS, Chinese Academy of Sciences, Matthew Schultze, matthew.schultze@comcast.net, University of New Mexico - Albuquerque, William Mitsch, wmitsch@fgcu.edu, Florida Gulf Coast University.

Wetlaculture is a method of rotating land use between row crops and wetlands to reduce nutrient runoff into rivers and lessen the extent of harmful algal blooms. Wetlaculture could reduce the reliance on excess fertilizer use by recycling nitrogen back into the soil through microbial nutrient processing during inundation/drying cycles. Under ideal conditions, diazotrophic cyanobacteria (e.g., *Anabaena* and *Nostoc*) and the diatom genera *Epithemia* and *Rhopalodia* with nitrogen-fixing cyanobacterial endosymbionts form heterocyst cells that convert nitrogen into ammonia which is an important source of food for macrophytes. It is hypothesized that reset wetland mesocosms planted with corn in 2020 will experience a greater rate of heterocyst formation and nitrogen fixation than mature wetlands. Microscopy was used to count heterocysts of free-living cyanobacteria and *Epithemia* and *Rhopalodia* diatoms from 8 wetland mesocosms during the summer of 2021. This analysis did not detect a significant difference in heterocyst counts (mean ± SE) between reset (42 ± 12) and third year consecutive wetland mesocosms (40 ± 11). However, ball-shaped *Nostoc* communities were detected in some mesocosms as they were drying out in August 2021, which indicates that diazotrophic cyanobacteria could be playing a role in fixing nitrogen in the mesocosms. Therefore shotgun sequencing is being performed to quantify which cyanobacteria, bacteria, and diatoms may be participating in the nitrogen cycle in the experimental mesocosms. These novel results will increase the understanding of how nitrogen retention may be influenced by hydrologic treatment and developmental age of wetlaculture mesocosms through the functional differences of nitrogen-cycling microbial communities.

Poster Board No. 36 - NINHYDRIN LATENT FINGERPRINT DETECTION COMPARISON OF DIFFERENT BASE SOLUTIONS. Elizabeth Zatalava, zatalavae@findlay.edu, University of Findlay, Nathan Tice, tice@findlay.edu, University of Findlay.

According to Locard's Exchange Principle, every human contact with a surface will create an exchange of material. Latent fingerprints presented on porous surfaces are often developed using the ninhydrin method, as ninhydrin reacts with the amino acids of human sweat/oils to create a color result of Ruhemann's purple. Ninhydrin crystals dissolved with acetone, hexanes, or petroleum ether can be applied to a porous surface by dripping, soaking, or spraying the ninhydrin working solution onto the surface. This research compared the application of different bases to control fingerprints developed from ink. Fingerprints were compared based on the arches, loops, and whorls, along with various bifurcation and ridge characteristics, known as comparison points. The control fingerprints demonstrated 100% of the identification points with a total of 66 characteristics. Using a pipette and dropping the ninhydrin solution containing acetone onto the fingerprinted envelope presented the most fingerprint characteristics, as it recorded 41 total characteristics (62.12%). By comparison, when the acetone solution was sprayed onto the fingerprinted envelope, there were no identifiable characteristics. Overall, the dripping technique showed the highest percentage of characteristics in 2 of the 3 solution situations. While there is no standard for the number of comparison points when conducting fingerprint examinations in the United States, the results obtained from this research provide great insight into how to strategically develop a fingerprint that provides the highest number of decipherable comparison points.

Poster Board No. 37 - MICROCYSTIN GENE ABUNDANCE AND TOXIN CONCENTRATIONS IN GRAND LAKE ST. MARYS. Callie Owens, owens.180@wright.edu, Wright State University, Stephen Jacquemin, stephen.jacquemin@wright.edu, Wright State University - Lake Campus, Joseph Davidson, davidson.109@wright.edu, Wright State University, John Hughes, hughes.190@wright.edu, Wright State University, Justin Myers, justin.myers@wright.edu, Wright State Univ, Silvia Newell, silvia.newell@wright.edu, Wright State University.

Grand Lake St. Marys (GLSM), the largest inland lake in Ohio (52 km^2), is very shallow (mean depth 2 m) and is hypereutrophic as a result of over a century of nutrient-rich runoff from the surrounding agricultural watershed. These conditions have created an optimal environment for cyanobacterial *Planktothrix* blooms. *Planktothrix* are capable of producing the hepatotoxin microcystin, and contact advisories at GLSM beaches have been issued due to unsafe microcystin concentrations (mean summer values approximately 45 µg/L) every year since 2009. GLSM is the second most toxic lake in the United States that is used as a drinking water source, behind only Lake Apopka (Florida). In GLSM, 2020 was a typical bloom year, with high biomass (55 to 356 µg/L) and total microcystin concentrations (25 to 65 µg/L). Interestingly, the first half of 2021 exhibited lower biomass (18 to 65 µg/L chlorophyll *a*) and toxin concentrations (0.4 to 2.0 µg/L) in comparison. Water samples for DNA extraction were collected weekly from April 2020 through September 2021, and were analyzed using qPCR, with microcystin gene abundances quantified by targeting the *mcyD* functional gene. Although microcystin concentrations were lower in 2021, they were correlated with chlorophyll *a* and phycocyanin concentrations (Spearman's *rho* 0.41 and 0.57, respectively; $p < 0.004$), but this was not the case in 2020. These results can help resource managers assess drivers of toxic vs. non-toxic cyanobacterial strains and develop effective nutrient reduction strategies.

Poster Board No. 38 - COMPARISON BETWEEN BENTHIC AND PLANKTONIC DIATOM RESPONSE TO A 225 KA COLD EVENT FROM LAKE EL'GYGYTGYN, NORTHEAST RUSSIA. Madisyn Rex, mrex@bgsu.edu, Bowling Green State University, Melina Luethje, mluethje7@gmail.com, University of Nebraska, Jeffery Snyder, jasnyd@bgsu.edu, Bowling Green State University.

Diatom assemblages in lake sediment are often used as a proxy for past environments. Diatoms are sensitive to climate-related conditions, including nutrient availability, temperature, lake level, and ice cover. Lake El'gygytgyn is a 13 km diameter impact-crater lake located in the northeastern Russian Arctic. Its sediment record reflects the regional climate history spanning 3.6 million years. Ancient lakes, like El'gygytgyn, often have endemic species of diatoms, and the sediment record provides insight into their evolution in response to climate. A recent study of the dominant planktonic genus *Pantocsekiella* over the last 1.2 million years documents abrupt changes in the morphology of these diatoms during cold climate events. These changes are inferred to have occurred due to the effects of extended ice cover on planktonic populations. One of the most significant of these events occurred during an insolation low corresponding to MIS 7d (approximately 225 ka), following an approximately 300 kyr interval of relative stability in the diatoms. Several endemic species of the large benthic genus *Surirella* also occur in the lake record. Preliminary observations of these species spanning this event (250 to 200 ka), indicate that they return with less diversity of forms, smaller size, and different ornamentation. Observations of these and other benthic diatoms in this interval may provide a greater understanding of the nature of these events and their impact on diatom evolution.

Poster Board No. 39 - PRIMMER OUTDOOR LEARNING CENTER: A GUIDE FOR ENGAGING THE COMMUNITY THROUGH TREES. Kaela Folatko, kfolatko@capital.edu, Capital University, Christine Anderson, canders2@capital.edu, Capital University.

Poster Board No. 40 - TRACE METAL FLUXES ACROSS THE SEDIMENT-WATER INTERFACE IN GRAND LAKE ST. MARYS: INTERNAL RELEASE OF DISSOLVED IRON MAY HELP DRIVE HARMFUL ALGAL BLOOMS. John Hughes, hughes.190@wright.edu, Wright State University, Silvia Newell, silvia.newell@wright.edu, Wright State University, Lindsay Starr, Starr.25@wright.edu, Wright State University, Mark McCarthy, mark.mccarthy@wright.edu, Wright State University, Justin Myers, justin.myers@wright.edu, Wright State University, Joseph Davidson, Davidson.109@wright.edu, Wright State University, Stephen Jacquemin, stephen.jacquemin@wright.edu, Wright State University - Lake Campus.

Grand Lake Saint Marys is a hypereutrophic lake in western Ohio that experiences extensive algal blooms, negatively impacting drinking water supplies, tourism, ecosystem dynamics, and the economy. These blooms are fueled by agricultural runoff from the watershed, thus most studies have focused on reducing nutrient runoff. Comparatively little work has studied trace metals or the impacts of aluminum sulfate (alum) treatments used to mitigate blooms. Trace metal concentrations in the water column and fluxes from sediments were evaluated from within the lake proper and within a semi-enclosed swimming area. Samples were collected monthly from April 2020 through May 2021, except for December and January. Samples were analyzed for metal concentrations and fluxes using ICP-MS. Dissolved iron effluxes from sediments were up to 2.7 mg/L/hr in summer. Iron fluxes were positively correlated ($p < 0.05$) with total chlorophyll *a* (Spearman's rho = 0.60), phycocyanin (Spearman's rho = 0.62), and total microcystin (Spearman's rho = 0.56) concentrations. Dissolved manganese effluxes also peaked (2.5 mg/L/hr) in summer, but dissolved aluminum fluxes were generally negative, and a positive aluminum efflux >1 mg/L/hr was only observed 2 weeks after alum treatment in June 2020 (128 μg/L/hr) and under ice in February 2021 (180 μg/L/hr). Manganese fluxes were not correlated, and aluminum fluxes were negatively correlated (Spearman's rho = −0.42), with chlorophyll *a*. Positive relationships between iron effluxes and total and cyanobacterial biomass and toxins in summer suggest that sediment iron release may facilitate nitrate assimilation, thus helping maintain cyanobacterial blooms during N–depletion in summer.

Poster Board No. 41 - COMPARATIVE ANALYSIS OF DIRECT TO CONSUMER GENETIC TESTING KITS AMONG IDENTICAL TWINS. Jiavonni Campbell, jcampbell@capital.edu, Capital University, Nathan Gibbs, ngibbs@capital.edu, Capital University, Christina Mickelson, cmichelson@capital.edu, Capital University, Ben Smith, bsmith402@capital.edu, Capital University, Kerry Cheesman, kcheesma@capital.edu, Capital University.

The purpose of this study was to evaluate Direct to Consumer (DTC) genetic testing kits to determine inter-test reliability with identical twins. Based on prior research in this lab, which suggests that data between test providers can be highly variable, it was hypothesized that twin data would follow this inter-test trend, but exact ancestry percentages within a set of twins would be nearly identical. The DTC companies of interest included Ancestry.com®, 23andMe®, and MyHeritage®. A total of 10 participants, 6 females and 4 males representing different ethnic groups, took the 3 independent DTC tests for ancestry lineage. Collection procedures specified by each company were used. Results for each participant are being compared across companies, with similarities

and discrepancies in related categories being noted. Preliminary data supports the hypothesis, with large discrepancies between companies but exact percentages between twins. Should variations in data within a set of twins be found, these would cast further doubt on the reliability of DTC testing methods for use in identifying ancestry.

Poster Board No. 42 - INVASIVE FLOWERING TREE POSITIVELY INFLUENCES POLLINATOR DIVERSITY. **Paige Chernisky, cherniskyp@findlay.edu, University of Findlay, Ashlie Hicks, hicksa2@findlay.edu, University of Findlay, Reegan Kehres, kehresr@findlay.edu, University of Findlay, Dolly Miller, millerm19@findlay.edu, University of Findlay, Alivia Niese, niesea2@findlay.edu, University of Findlay, Johnathon Terry, terryj@findlay.edu, University of Findlay, Benjamin Dolan, dolan@findlay.edu, University of Findlay.**

Pyrus calleryana trees were intentionally introduced to landscaped areas of North America in the early and mid 1900s. Since then, the species has escaped and is now invasive. This invasive tree has profuse flowering in spring and has the potential to influence plant-pollinator interactions by altering pollinator species abundance and community diversity. The goal of this project is to understand whether pollinator species found on *P. calleryana* match those expected in Hancock County, Ohio, United States, and to quantify the abundance of these pollinators to determine whether the overall community differs from expected county communities. Initial data were collected in April 2018 and 2020. Pollinators were collected by hand and vacuum sampling on planted and escaped *P. calleryana* trees. Eleven trees were sampled once per season for 15 minutes with 1 collector between noon and four o'clock in the afternoon. Compared with expected species lists derived from the Ohio Bee Atlas, an iNaturalist citizen science project, out of the 13 expected genera to be found in the county, 6 were collected from *P. calleryana* along with 1 unexpected genus. The expected genera were *Apostemon*, *Apis*, *Bombus*, *Hallictus*, *Lasioglossum*, *Megachile*, and *Xyloclopa*, and the unexpected pollinator was *Osmia*. *Andrena* and *Dialictus* were expected but not collected from *P. calleryana*.

Poster Board No. 43 - Withdrawn.

Poster Board No. 44 - 4-STAGE CONE STEPOVER METHOD© (4-SCSM©) FOR BALANCE AND GAIT IN AN ELDERLY FEMALE. **Lauranne Gordon, lklycegordon@gmail.com, University of Findlay, Sharon Walsh, walsh@findlay.edu, University of Findlay.**

Poster Board No. 45 - IMPACTS OF AQUASHADE® AND ROUNDUP® ON *HYLA VERSICOLOR* TADPOLES. **Kaitlyn McGee, mcgeek21@wittenberg.edu, Wittenberg University, Amber Burgett, burgetta@wittenberg.edu, Wittenberg University.**

Two common methods of management for nuisance plants in ponds are the use of Aquashade® dye and Roundup®, both of which have potential impacts on the ecosystem. Although the lethal and sub-lethal effects of Roundup are known in amphibians, it is less clear how Roundup interacts with other stressors (Aquashade). To determine the impacts of these management methods, both were applied to *Hyla versicolor* tadpoles in sub-lethal doses (7,600 mg/L dye, 44,400 mg/L Roundup per 4 L water). Tadpoles were exposed to 1 of 4 treatments in a laboratory microcosm experiment: control, dye, Roundup, and dye and Roundup. There were 12 replicates for each treatment, and 3 *H. versicolor* tadpoles per replicate. The growth, development, activity, and morphology were monitored over 12 weeks. The data was analyzed with ANOVA tests ($\alpha = 0.05$). Tadpoles treated with Roundup showed higher average activity rates than the other treatments, but from the ANOVA test, the interaction between Roundup and dye was more significant (p-value = 0.0014) than Roundup or dye separately. A significant difference in snout-vent length was not determined among the treatments. Roundup yielded a significant result on tail width by length (p-value = 0.0087). Color did not significantly vary between Roundup and dye, but the interaction yielded the darkest tadpoles ($p = 0.0151$). Activity levels in tadpoles could indicate greater levels of foraging. Even though low levels of contaminants may not impact the survival rate of tadpoles, other developmental and behavioral changes could impact the ecosystem (i.e., predation, vegetation loss).

Poster Board No. 46 - PRIME THE PUMP: CAN A PRE-COLLEGE PREPARATORY CAMP HELP PREPARE STUDENTS FOR COLLEGE CHEMISTRY COURSES? **Dana Emmert, emmert@findlay.edu, University of Findlay, Joanna Beres, beres@findlay.edu, University of Findlay.**

Poster Board No. 47 - UNDERSTANDING NUTRIENT REMOVAL POTENTIAL OF RESTORED WETLANDS: LESSONS FROM THE GRAND LAKE ST. MARYS WATERSHED, OHIO, UNITED STATES. **Stephen Jacquemin, stephen.jacquemin@wright.edu, Wright State University - Lake Campus, Marie Zehringer, zehringer.7@wright.edu, Wright State University - Lake Campus, Kenneth Kline, kline.54@wright.edu, Wright State University - Lake Campus.**

Over the centuries many wetlands across the Midwest have been destroyed through drainage and channelization for field-crop agriculture. However, recent water quality conservation initiatives such as H2Ohio, have begun to slowly reverse this trend. Consequently, there is a need for information related to nutrient reduction potential, including source-sink dynamics, as well as optimal design frameworks (residence time, configuration, and relative watershed footprint). Therefore, the objective of this study was to use the long-term Coldwater Creek Wetland (Grand Lake St. Marys Watershed, Ohio, United States) dataset to parse out these parameters. This dataset is unique as it contains 5 years of complete weekly records of nutrient and sediment concentrations, hydrology, and design schematics. Moreover, it is situated on a creek with high concentrations (mean mg/L) of nitrate (5.3), dissolved phosphorus (0.13), total phosphorus (0.38), and suspended solids (46.8) that vary throughout the year. Additionally, flow into the wetland is actively controlled via a pump, providing an opportunity to assess how important active management is to wetlands. Overall, 1 to 5 million gallons of water flow through the wetland per day when active (approximately 55% of the year) leading to average residence times of 4 days. Nutrient and sediment reduction efficiencies average (highest spring-summer) between 50 and 75%. Situated on 30 acres (0.3% subwatershed area), this wetland processes about 10% of annual streamflow and sequesters 1.5%, 4.5%, 3.5%, and 5% of total annual load of NOx, TP, SRP, and TSS, respectively, making this kind of wetland design and management a prime candidate for expansion across the Midwest.

Poster Board No. 48 - CARING FOR PREGNANT AND POSTPARTUM ATHLETES: ATHLETIC TRAINERS, STRENGTH COACHES, AND ATHLETIC COACHES. Aly Matejka, alyssa.matejka@findlay.edu, University of Findlay, Stephanie Born, stephanie.born@findlay.edu, University of Findlay.

A survey was created to assess the experience, education, and self-perceived competence of treating and/or training pregnant and postpartum athletes among athletic trainers, strength coaches, and coaches. The survey also asked participants (N = 1,137) if they had an interest in learning more about treating/training this population and whether or not they were aware of any of the Title IX rights granted to pregnant athletes. The results demonstrated that despite working with females of childbearing age, the vast majority of these professionals have little to no education in how to treat or train pregnant or postpartum athletes (N = 967) and few of the professionals expressed a high level of confidence in modifying their sessions for pregnant or postpartum athletes (N = 23). The results demonstrate that there is quite a large portion of ATs, SCs, and coaches who are not familiar with any rights of pregnant and postpartum athletes (N = 613) despite their responsibility in providing resources and support should an athlete become pregnant or give birth. It does appear, however, that a majority of the participants feel that pregnancy and postpartum education should be encompassed into their profession (N = 909) and that these professionals are willing to learn and possess positive attitudes towards expanding their knowledge in regards to treating and training pregnant and postpartum athletes.

Poster Board No. 49 - PREGNANCY RATES AMONG COLLEGE FEMALE ATHLETES & THEIR PERCEPTION OF COMPETENCE OF ATHLETIC AND HEALTHCARE PROFESSIONALS. Aly Matejka, alyssa.matejka@findlay.edu, University of Findlay, Stephanie Born, stephanie.born@findlay.edu, University of Findlay.

A survey was created to assess the instance of pregnancy, as well as gather information on student-athletes' perception of competence and compassion of their athletic trainers (ATs), strength and conditioning coaches (SCC), and athletic coaches (furthermore referred to as, "coaches"). The first aim of this study was to determine a rate of pregnancy among collegiate female athletes which was found to be 1.76% in this sample. Results indicated that 18.2% of the participants who had experienced a pregnancy sought care or advice from their SCC, 21.2% sought care or advice from their AT, and 30.3% sought care or advice from their coach. A majority of all participants felt that their SCC, AT, and coach would be willing to help them should they become pregnant, with only a small percentage feeling that these professionals would not be willing to assist them. Overall impressions were that athletes felt that their AT had the most prenatal/postpartum education, but a majority of the participants were unsure if any of the professionals had the education or knowledge to assist them should they become pregnant.

Poster Board No. 50 - Withdrawn.

Poster Board No. 51 - EVALUATION OF *WITHANIA SOMNIFERA* APOPTOTIC CAPABILITIES AND GENE ACTIVATION AGAINST HUMAN MELANOMA CELL LINE. Ashonti Wright, Wrighta@hiram.edu, Hiram College, Julie Maxson, Maxsonjm@hiram.edu, Hiram College.

There are many natural remedies that have been categorized as anti-cancer agents, such as the anti-inflammatory effects of ginger and the blocking of growth pathways with tumeric. In some cases, these natural substances can be found as over-the-counter supplements. The purpose of evaluating these plant substances is to identify the active components that trigger anti-cancer pathways; doing so may lead to drug discovery that can, in turn, be properly formulated to target the cancers. *Withania somnifera* (Ashwagandha) is a recognized herb in Asian culture for its various health benefits and treatments. These include anti-inflammatory properties and prevention of stress-induced ulcers of the gastrointestinal tract. Additionally, the roots of the plant create an inhibitory effect on colony forming efficiency of Chinese Hamster ovary carcinoma cells. The viability effects in Human Melanoma Cell Bowes were assessed with a 2.5, 5, and 10 mg/ml extract over a 24h treatment. After treatment, a viability of 43% was expressed compared to the untreated melanoma cells at 100% viability. After assessing the viability, the induced cells underwent a Human Apoptosis Antibody Array to detect the apoptotic inductive effects and subsequent pathways associated with treatment.

Poster Board No. 52 - BETA ANTAGONISTS AND THEIR UTILIZATION IN THE TREATMENT OF ESSENTIAL TREMORS. Tori Leal, 18tleal@gmail.com, University of Findlay, Nathan Tice, tice@findlay.edu, University of Findlay.

Poster Board No. 53 - COMPARISON OF COVID AND INFLUENZA VACCINE RATES IN OHIO. Addisen Holt, addisen.holt@ursuline.edu, Ursuline College, Lynn Ulatowski, lynn.ulatowski@ursuline.edu, Ursuline College.

Poster Board No. 54 - EQUIPPING PHARMACISTS AND STUDENT PHARMACISTS WITH DIVERSITY, EQUITY, AND INCLUSION TOOLS. Olunife Akinmolayan, akinmolayano@findlay.edu, University of Findlay, Josh Okyere, okyerej@findlay.edu, University of Findlay, Michael Wei, weim@findlay.edu, University of Findlay, Amen Bejoy, bejoya@findlay.edu, University of Findlay, Krishna Desai, desaik1@findlay.edu, University of Findlay, Akesha Edwards, edwardsa@findlay.edu, University of Findlay, Sandra Earle, earle@findlay.edu, University of Findlay.

Poster Board No. 55 - REACTION TIMES TO AUDITORY VERSUS VISUAL STIMULI IN STUDENT POPULATIONS. David Sheridan, dsheridan@otterbein.edu, Otterbein University, Michael Kleman, mkleman@otterbein.edu, Otterbein University, Beryl Dulo, bdulo@otterbein.edu, Otterbein University.

Reaction time (RT) is the interval between delivery of and response to a stimulus. Age, gender, practice, alertness, and stimulus modality can impact RT. Reacting to auditory and visual stimuli allow humans to navigate their world. This study sought to determine which RT was fastest in a controlled laboratory setting among different student populations. Our overall prediction was that visual RT (VRT) would be faster than auditory RT (ART). The experiments were conducted with the BIOPAC® MP36 experimental module and desktop computer. Subjects pressed a thumb switch as quickly as they could in response to 20 presentations of a LED "flash" or an auditory "click." Contrary to our prediction, ART was significantly faster than VRT for both fixed interval and random interval stimulus presentation (data presented as mean ± standard deviation; ART fixed = 186 ± 32 ms vs. VRT fixed = 214 ± 35 ms, paired t-test, $p < 0.001$; ART random = 225 ± 39 ms vs. VRT random = 247 ± 35 ms, paired t-test, $p < 0.001$; N = 83 subjects). Subpopulations of subjects based on gender identification and video game playing habits also showed similar differences between ART and VRT with males reacting faster than females and gamers reacting faster than non-gamers. The approximately 25 ms difference in reaction times

between the stimuli may be attributed to the anatomy of the sensory systems and the time it takes for different types of receptors to transduce stimulus energy into an electrical signal in the central nervous system.

Poster Board No. 56 - INVESTIGATING THE ANTICANCER ACTIVITY OF NOVEL NORETHINDRONE DERIVATIVES IN PC3 PROSTATE CANCER CELLS. Courtney Hollenbacher, hollenbacherc@findlay.edu, University of Findlay, Ryan Schneider, schneiderr@findlay.edu, University of Findlay.

Prostate cancer is the second most commonly diagnosed cancer in men, and although mortality has declined, prostate cancer is estimated to be the second leading cause of cancer-related death among men in the United States in 2022. Effectiveness of current therapies is limited by cancer cell resistance and metastasis, leading to treatment failure and further disease progression, thus warranting development of new therapies. Prostate cancer cell survival and growth is largely androgen dependent. As such, a small collection of norethindrone derivatives with differing substituents attached to the 17-position (Compounds A-D) were synthesized and evaluated for anticancer activity. The hypothesis was that modifications to the 17-position of norethindrone would yield compounds with anticancer activity. Compounds A-D were synthesized using Click chemistry in an Anton Parr® Monowave-50 reactor in a one-pot microwave-assisted reaction at 150 °C for 20 minutes. The XTT viability assay was used to assess anticancer activity of the norethindrone derivatives in PC3 prostate cancer cells. While 2 compounds failed to induce an anticancer response, Compounds B and C demonstrated anticancer activity. Compound B demonstrated weak activity with an IC50 of greater than 100 μM, while Compound C demonstrated low micromolar activity with an IC50 of 19 μM. Compounds B and C show anticancer activity in the PC3 prostate cancer line. Future research involves optimization of the norethindrone scaffold to increase potency of derivatives in PC3 and other prostate cancer cell lines. Additional studies to investigate the mechanism(s) of cell death from compounds B and C are needed.

POSTER BOARD NO. 57 - GENETIC DETECTION OF HUMAN INTESTINAL PINWORM, *ENTEROBIUS VERMICULARIS*, FROM PUBLIC RESTROOMS IN SOUTHWESTERN OHIO. Matthew Eggenspiller, matthew.j.eggenspiller@wilmington.edu, Wilmington College, Amanda Rollins, amanda_rollins@wilmington.edu, Wilmington College.

The human pinworm, *Enterobius vermicularis*, is the most common intestinal helminth to infect people worldwide and is especially prevalent among children. It is a human-specific parasite, and direct contact is necessary for transmission. Previous research identified *E. vermicularis* eggs contaminating public spaces, and this study tested for genetic traces of this parasite in public restrooms in southwestern Ohio by swabbing restroom walls and structures. DNA was extracted from these swabs and amplified for a segment of the mitochondrial *cox1* gene. Not only is the unique sequence of the *cox1* gene of *E. vermicularis* useful for confirmation of infection, but it has also been shown to exhibit enough diversity to analyze haplogroups in population genetics studies. Sequences were analyzed with NCBI® BLAST® in Genbank®. Of 9 cites sampled, 2 were unambiguously positive for *E. vermicularis cox1* DNA. These preliminary results warrant a larger analysis of the prevalence of this infectious parasite in public spaces.

Poster Board No. 58 - ACL INJURIES IN YOUNG FEMALE ATHLETES: SIGNS OF INCREASED RISK AND INJURY PREVENTION STRATEGIES. Tim Rickabaugh, trickabaugh@defiance.edu, Defiance College, Brianna Snider, bsnider001@defiance.edu, Defiance College, Kaylee Dunkle, kdunkle001@defiance.edu, Defiance College, Paige Rohloff, prohloff001@defiance.edu, Defiance College.

Poster Board No. 59 - COVICHAIN: A BLOCKCHAIN ENABLED COVID-19 VACCINE SUPPLY CHAIN. Shraddha Ghotkar, ghotkars@findlay.edu, University of Findlay, Samuel Yates, samuel.yates@findlay.edu, University of Findlay.

Poster Board No. 60 - PREDICTING VIDEO GAME SUCCESS. Javian Martin, martinj1@findlay.edu, University of Findlay, Aaron Blodgett, blodgett@findlay.edu, University of Findlay.

Poster Board No. 61 - EXPLORING DISEASE SIMILARITIES AND DISSIMILARITIES USING STRUCTURAL ATTRIBUTES OF GENES AND PROTEINS. Rami Moussa, ramibmoussa@gmail.com, University of Toledo, Sapuni Chandrasena, sapuni.chandrasena@rockets.utoledo.edu, University of Toledo, Mahmoud Eladawi, mahmoud.eladawi@rockets.utoledo.edu, University of Toledo, X. Zhang, University of Toledo, Robert McCullumsmith, robert.mccullumsmith@utoledo.edu, University of Toledo, Rammohan Shukla, rammohan.shukla@utoledo.edu, University of Toledo.

Similarities and dissimilarities between and among human health disorders are not well understood. High-throughput technologies studying genomics and proteomics have revealed multifactorial associations between different diseases but are limited to exploring a few diseases at a time. Furthermore, disease studies are limited by biased selection of comparable disorders, dataset/cohort availability, and data normalization challenges. This hypothesis-free explorative analysis shows that disease specific gene-sets, known as disease-signatures, can be leveraged to mitigate these issues to determine disease similarities and dissimilarities at functional levels of biological pathways, cell-types, and drug targets. This approach was extended to understand diseases at the structural level of gene (e.g., gene length, GC content, IRES) and protein (e.g., amino acid composition, conserved domains, prosite patterns) features. Disease signatures were obtained from DisGeNET® and structural attributes from Ensembl® BioMart. Different machine learning models (e.g., decision trees, logistic regression, random forest, and lasso methods) were evaluated to reveal associations between diseases and structural attributes, using permutation feature importance and Matthews correlation coefficient bioinformatic techniques. Feature coefficients for each given disease (e.g., liver carcinoma, schizophrenia, hepatitis) were revealed, and the random forest model was most effective, predicting diseases using features with 0% error. For example, tyrosine frequency was shown to have a strong causal relationship with schizophrenia, supported by literature. Selected coefficients (greater than 0.05) may be utilized within a penalty matrix to fine-tune a disease-disease interaction network for further exploration of disease ontologies. This approach provides a promising lead to compare different diseases and to explore novel pharmacological interventions based on structural attributes.

Poster Board No. 62 - Withdrawn.

Index to Fields of Interest

Index to First Authors

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