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FUTURE ACADEMY MEETINGS

2015 April 11 Capital University, Columbus, Ohio

2016 April 15-16 at Ohio University, Athens, Ohio

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The Ohio Academy *of* Science

Theme: ***Local Impacts on the Global Environment***

Hosted by
Capital University
April 11, 2015

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Cover photo of Capital University Reflections Fountain - Provided by Capital University

The Ohio Academy of Science 124th Annual Meeting

Hosted by
Capital University
1 College Avenue
Bexley, OH 43209
April 11, 2015

Theme: ***Local Impacts on the Global Environment***

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 and teachers, and pre-college, undergraduate, and graduate students, and interested lay citizens in the Ohio region.

Welcome!

Capital University welcomes you to the 124th 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.

REGISTRATION

Registration is required for all meeting presenters and attendees. Register online at: ***https://oas.memberclicks.net/index.php?option=com_mc&view=mc&mcid=form_173744***.
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Saturday, April 11: Registration in the lobby of The Capital Center.

7:30 AM-2:00 PM. On-site registration at a higher rate by check, VISA, or MasterCard. We discourage cash.

PARKING ON CAMPUS: Watch for signs and see map in program. Please park in lots on the westside of Pleasant Ridge Ave in lots S1 and S2. See map on page 50.

SMOKING POLICY: Smoking is not permitted in any building.

HOTELS: See options: ***http://www.tripadvisor.com/Hotels-g50094-Bexley_Ohio-Hotels.html***

MEALS: Saturday, April 11 - Box lunches may be pre-ordered with registration for $10.00 and will be available for pick-up prior to the key note address at 11:15 am. The box lunches will be the only opportunity for food.

GENERAL SCHEDULE

Saturday, April 11, 2015

7:30 AM-2:00 PM	Meeting Registration Capital Center
8:00 AM - 8 :45AM	State of the Academy Bridge Learning Room Ruff Learning Center
9:00 AM-11:00 AM	Morning Symposium Research on Cyanobacterium in Ohio water supply Bridge Learning Room Ruff Learning Center
9:00 AM-11:00 AM	Pre-college Poster Sessions Capital Center
9:00 AM-11:00 AM	Morning Podium Sessions First Floor - Battelle Building
11:15 AM	Box lunch pick up outside of the Bridge Room

11:30 AM **All-Academy Lecture**
The Bridge of Learning Room
Ruff Memorial Learning Center

Drug Trafficking, Development, and Deforestation in Central America

Kendra McSweeney completed her underggraduate and PhD degrees in geography at McGill University in Montreal. She accepted a position as Assistant Professor at The Ohio State University in 2001, and became an Associate Professor in 2007. Dr. McSweeney's research focuses on human-environment interactions, and publishes in the fields of conservation and development, political ecology, and land use change. She has over 20 years of experience on research with indigenous peoples in Central America, and also studies human-forest interactions in Appalachian Ohio (for complete bio see https:// geography.osu.edu/people/mcsweeney.14).

Dr. McSweeney's recent work has focused on the role of drug-trafficking on deforestation in Central America. Her work examining the link between U.S. drug policies and conservation efforts around the world was published in Science (January 31, 2014).

12:45-3:00 PM Afternoon College and Professional Poster Session in the Capital Center

1:00 - 3:00 PM Algae Panel Discussion

Chair: Julie Weatherington-Rice, PhD
Panelists:
Doug Kane, PhD - Defiance College
Larry Antosch, PhD - Senior Director, Policy Development and Environmental Policy, OFBF
Justin Chaffin, PhD, The Ohio State University, Ohio Sea Grant & Stone Lab
Roderick Dunn Water Quality Assurance Lab Manager, City of Columbus
Linda Merchant Masonbrink, Ohio EPA

Our Institutional Host

At Capital University, students find themselves in a close-knit community of learners who expect academic rigor, experiential learning, intellectual energy and critical inquiry. For more than 180 years, we have embraced our mission of transforming lives by providing a quality, values-based educational experience grounded in the university's Lutheran tradition.

Regardless of a student's major, we want them to study what they love and love what they study. We want them to make a difference. As Capital students, they fulfill their passion and make an impact on the greater good – each tiny ripple of influence becoming a wave of positive change that all started right here, with their decision to attend Capital.

The oldest university in Central Ohio, Capital prepares a diverse student body of 3,600 students for life and work through undergraduate and graduate curricula that balance the principles of liberal and professional education. Built on a solid foundation of academic skills, students learn to think critically, reason logically, and communicate clearly. As independent, lifelong learners, Capital University students discover their capacity for leadership and service to their community and world.

Our undergraduate students choose from more than 60 majors, 50 minors, and a variety of pre-professional programs that prepare students for a variety of careers and graduate study in the health professions, law, seminary, business, public administration, and international affairs. Capital is committed to hands-on learning and primary research at the undergraduate level and the opportunity for students of all majors to study abroad.

Faculty Host and Local Arrangements Chair

Dr. Kerry Cheesman, Geist Professor of Biological and Environmental Sciences, will host the meeting.

Brief Schedule of Abstracts

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and **Fields of Interest index** on page 49

Podium Sessions 9:00 - 11:00 AM

Cyanobacteria Symposium Research Presentations

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Animal Behavior and Environmental Science

Room TBD
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Aquatic Ecology

Room TBD
See page 8

Biology

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Microbiology and Medical Science

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Molecular and Cellular Biology/ Genetics

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Cell Bio/Physiology/ Physics

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Afternoon - College and Professional

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See page 29

Cyanobacteria Symposium Panel Discussion

The Bridge of Learning Room
1:00 – 3:00 PM

Our Panel of:

- **Julie Weatherington-Rice**, **PhD** - Bennett & Williams Environmental Consultants Inc. and The Ohio State University
- **Doug Kane, PhD** - Defiance College
- **Justin Chaffin, PhD** - The Ohio State University, Ohio Sea Grant & Stone Lab
- **Linda Merchant Masonbrink** - Ohio EPA
- **Roderick Dunn** - Water Quality Assurance Lab Manager, City of Columbus
- **Larry Antosch, PhD** - Senior Director, Policy Development and Environmental Policy, OFBF

will dicuss their work on cyanobacteria in Ohio's water supplies and discuss possible step Ohio and its citizen could take to mitigate this problem.

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9:00 – 11:00 AM
Podium Session - Session 01 – Cyanobacterium Symposium
The Bridge of Learning Room

09:00 WATER QUALITY MONITORING ON THE UPPER MAUMEE RIVER. Alison M. Rifenburgh (arifenburgh001@defiance.edu)[1], Douglas D. Kane (dkane@defiance.edu)[1], Stephanie Singer (ssinger@defiancecounty.com)[2], [1]Defiance College, Defiance, OH, 43512, [2]Defiance County Soil and Water Conservation District, Defiance, OH, 43512.

The Maumee River, the largest tributary to the Great Lakes, is a major contributor of non-point source pollution to Lake Erie. Land use in its watershed is greater than 70 percent agricultural and thus nutrient runoff is a large concern and has been shown to contribute to harmful algal blooms in Lake Erie. In 2013 from spring to fall, four sites were sampled on the Upper Maumee River, which stretches from Fort Wayne, IN to Defiance, OH. The sites were selected to be in a diverse range of land use types, with one each in an urban, suburban, rural town, and agricultural area. Once a month at each site, Secchi depth was measured and a YSI multiprobe was used to measure temperature, dissolved oxygen, and pH. Water samples were also taken, and the concentrations of nitrate, phosphate, and ammonia were measured using Hach colorimetry nutrient tests. Chlorophyll a and blue green algae cell count were estimated using a handheld fluorometer. We found that mean nitrate and phosphate concentrations, ranging from 2.16-4.17 mg/L for nitrate and 0.08-0.29 mg/L for phosphate, were well above the target levels set by the Upper Maumee Watershed Partnership (1.6 mg/L and 0.05 mg/L, respectively). Future monitoring would provide a better understanding of the nutrient dynamics of the river and help evaluate the efficacy of current programs to reduce nonpoint source pollution in the watershed.

09:15 A STUDY OF DIFFERENT WATER SAMPLING METHODS ON LAKE ERIE. Victoria E. Simons (simons.81@osu.edu), Justin D. Chaffin (chaffin.46@osu.edu), F.T. Stone Laboratory, Ohio State University P.O. Box 119, Put-in-Bay, Ohio 43456.

Several organizations collect water samples in Lake Erie to determine chlorophyll a (chla) and total phosphorus (TP) concentrations to monitor water quality. However, these organizations collect samples by using one of four different methods: surface-to-near-sediment (WC), surface-to-2 meter depth (0–2 m), surface-to-twice the Secchi depth (2xSD), and the Ohio EPA method (OEPA) of pooling subsamples from three depths. Hence, measured concentrations may not be comparable among datasets. During summer 2013 and 2014 we sampled Lake Erie weekly at 27 sites (n=352 total samples) ranging from Maumee Bay to Avon Point. At each site lake water was collected with all methods to determine if TP and chla data from the methods are comparable. Chla and TP concentration were determined using standard EPA methods. Data was analyzed by linear regression using WC data as the independent variable and the other methods as dependent variable in order to find equations to convert one data set to another. For WC samples, chla ranged from 1.456 to 122.84 µg/L, while TP ranged from 0.118 to 6.239 µmol P/L. Both chla and TP from the comparisons methods showed a strong one-to-one linear relationship with the WC sample. Linear regression slopes for 0–2 m, 2 x SD, and OEPA chla against WC chla were 0.9913, 0.9636, and 1.0027, respectively, while slopes for TP were 0.9694, 1.0465, and 1.0081, respectively. The r^2 values for all regressions were greater than 0.98 for both chla and TP. This study indicates that the TP and chla data collected by different organizations are comparable.

09:30 ECOSYSTEM NITROGEN BALANCE: APPLICABILITY OF MEMBRANE INLET MASS SPECTROMETRY FOR MEASURING NITROGEN DYNAMICS IN LAKE ERIE. Laura E. Smith (smith.7431@osu.edu)[1,2], Darren L. Bade (dbade@kent.edu)[1,3], [1]F.T. Stone Laboratory, Put-in-Bay OH 43449, [2]The Ohio State University, Columbus OH 43210, [3]Kent State University, Kent OH 44240.

Previous research has implicated nitrogen (N) as a factor affecting the toxicity and growth of photoautotrophic cyanobacteria that comprise Lake Erie's harmful algal blooms. This study sought to measure photic zone N-fixation because this process allows organisms to make biologically unavailable dissolved N_2 gas bioavailable. N_2 equilibrates across the air-water interface, so N-fixation can be measured by comparing the atmospheric and aqueous N concentrations using Membrane Inlet Mass Spectrometry (MIMS). MIMS utilizes a semi-permeable membrane to draw analytes from the sample fluid into a mass spectrometer's vacuum chamber, allowing for direct analysis of those molecules. The hypotheses were: 1) N-fixation will occur when bioavailable N (nitrate) is low and 2) N-fixation or denitrification will be detected as N_2 undersaturation or supersaturation, respectively, in water samples analyzed using MIMS. For the first hypothesis, two sites in Lake Erie's western basin with different nitrate levels were sampled. The 12 mL samples were incubated in three treatment groups consisting of a light-permeable bottle allowing all N-fixation, light-impervious bottle allowing only light-independent N-fixation, and a control kept on ice to halt biologic activity. Significant rates of 3.0, 1.4, and 1.6 µmol N_2/L/hr were found using MIMS for total, light-dependent, and light-independent N-fixation respectively at the nitrate-deficient site (ANOVA, $p<0.0001$). For the second hypothesis, samples from six sites along a trophic-gradient transect in the western basin were analyzed with MIMS. Four were significantly undersaturated (t-test, $p<0.05$), indicating N-fixation, while one was supersaturated (t-test, $p<0.05$), signifying denitrification. Using MIMS to understand N dynamics could lead to more effective management of harmful algal blooms.

09:45 NUTRIENT LIMITATION IN THE CENTRAL BASIN OF LAKE ERIE. Kathryn E. Stierwalt (stierwalt.5@osu.edu)[1,2], Douglas D. Kane (dkane@defiance.edu)[1,3], Justin D. Chaffin (chaffin.46@osu.edu)[1], [1]Franz Theodore Stone Laboratory, [2]The Ohio State University, [3]Defiance College.

Sporadic summer blooms of the diazotrophic cyanobacterium *Dolichospermum* (formally Anabaena) occur in Lake Erie's central basin but the cyanobacterium lack heterocysts. High concentrations of nitrate make the presence of a diazotrophic cyanobacterium rather anomalous. Phosphorus (P) is generally considered the limiting nutrient for algae growth but low concentrations of iron (Fe) and molybdenum (Mo) can constrain nitrate uptake whereas boron (B) is required for heterocyst formation. Thus, low concentrations of trace metals may lead to nitrogen (N) limitation even in the presence of measurable nitrate. During summer 2014, we conducted nutrient enrichment bioassays to test the hypothesis that enrichment of P and trace metal would result in additional algal growth than P-only enrichment. We conducted (between June 24 and September 3) four bioassays with central basin water, enriched with the above nutrients and then used changes in chlorophyll a concentration (chla) as a surrogate for algal biomass changes. In all experiments P-alone enrichment resulted in higher chla than control (control means ranged between 1.59 to 2.19 µg/L, P-alone means ranged between 3.36 to 4.30 µg/L, $p < 0.001$), indicating P was the primary growth limiting nutrient, but P with B resulted in higher chla than P alone in 3 of 4 experiments ($p < 0.001$). Enrichments with P, N, Fe, Mo, and B resulted in the highest chla in 2 of 4 experiments, indicating multiple nutrient limitation ($p < 0.001$). These results suggest that trace metal limitation may play a role in the *Dolichospermum* blooms in the central basin.

10:00 DIFFERENTIATION BETWEEN INTERNAL AND EXTERNAL PHOSPHORUS LOADING IN WESTERN LAKE ERIE USING HIGH-RESOLUTION PHOSPHORUS DATA. Joseph V. Turner (joseph.turner@rockets.utoledo.edu), Phoenix C. Golnick (phoenix.golnick@utoledo.edu), Thomas B. Bridgeman, (Thomas.bridgeman@utoledo.edu), Department of Environmental Sciences, University of Toledo, Toledo OH 43606.

Dissolved reactive phosphorus inputs from major tributaries to Lake Erie have increased six-fold since the mid-1990s causing dense *Microcystis spp*. blooms that produce harmful toxins. Tributaries also deliver phosphorus-rich sediments to the lake bottom. These deposited sediments may play an important role as an additional, internal source of phosphorus. When the lake is agitated by wind and waves, sediments become re-suspended and sediment-bound phosphorus is released into the water column. This newly available phosphorus has the potential to cause or exacerbate harmful algal blooms. The goal of this study is to determine if high resolution in situ phosphorus concentration measurements can be used along with weather data to distinguish between short-term increases lake phosphorus concentration due to lake sediment resuspension events or to tributary inputs (Maumee River). A high-resolution (2 hour interval) CycleP phosphate sensor was deployed at the City of Toledo's low-service pump station from June 13 to August 20, 2014. Wind speed and river flow data recorded by the National Oceanic and Atmospheric Administration and the United States Geological Survey during this period were used to determine whether internal or external loading conditions were likely. Results suggest that sustained wind speeds greater than 2 m/s agitated the lake sediments enough to cause a ten-fold spike in phosphorus concentration. No such spikes were observed with an increase in the flow of the Maumee River. Future research will include additional variables to further investigate the factors contributing to pulsed increases in phosphorus concentration that may contribute to harmful algal blooms.

10:15 RESPONSES OF NITROGEN-LIMITED CYANOBACTERIAL BLOOMS TO NITROGEN FORM AND LOADING RATE. Briana C. Zellner (Zellner.34@osu.edu)[1], Karen L. Ortega (klo49@cornell.edu)[1,2], Justin D. Chaffin (chaffin.46@osu.edu)[1], [1]F. T. Stone Laboratory Ohio State University, PO Box 119, Put-in-Bay, OH 43456, [2]Cornell University.

Nitrogen constrains cyanobacterial bloom biomass accumulation in Lake Erie and these cyanobacteria assimilate many nitrogen forms. We contrasted the growth response and microcystin production by blooms following a single large pulse of nitrate, ammonium, or urea (simulating concentrations following a rainstorm) with low continuous pulses of each form (simulating internal nitrogen recycling). Because of ammonium's reduced state, we hypothesized that ammonium would result in higher chlorophyll and microcystin concentration. *Planktothrix*-laden Sandusky Bay water was collected July 2, 2014 and *Microcystis*-laden Maumee Bay water was collected August 6, 2014. In the laboratory, the water was subject to nutrient enrichment treatments and incubated for 48 hours: 100 µmol/L nitrate, ammonium, and urea added at beginning of experiment, 8.3 µmol/L every 4 hours nitrate, ammonium, and urea, 1.0 µmol/L phosphate, and a control without enrichment (all treatments n = 3). In both experiments, final chlorophyll and microcystin concentrations in the control and phosphate enrichment did not differ ($p > 0.05$) and collectively averaged 128.8 µg/L and 8.5 µg/L (respectively) for *Planktothrix*, and 56.5 µg/L and 24.9 µg/L for *Microcystis* (respectively). Nitrogen enrichment increased chlorophyll by 21-35% and microcystin by 40-52% ($p < 0.001$). Chlorophyll did not differ among form or pulse rate for *Planktothrix* ($P > 0.05$), whereas ammonium resulted in highest chlorophyll for *Microcystis* ($p < 0.001$). Microcystin in both experiments was greater in the nitrate and urea treatments than ammonium treatments ($p < 0.01$). Cyanobacteria growth and microcystin responses to nitrogen differ among nitrogen forms and cyanobacteria, but not loading rate.

9:00 - 11:00 AM
Session 02 - Animal Behavior and Environmental Science
The Battelle Building - Room TBD

09:00 ANALYSIS OF REMAINS OF A CERVALCES SCOTTI (ELK-MOOSE) FROM MEDINA COUNTY, OHIO. Robert C. Glotzhober (rcglotzhober@wowway.com), Curator Emeritus of Natural History, Ohio History Connection, 3942 Millstone Road, Columbus, Ohio 43207 and H. Gregory McDonald (greg_mcdonald@nps.gov), Senior Curator of Natural History, Museum Management Program, National Park Service, 1201 Oakridge Drive, Fort Collins, Colorado, 80525.

First described in 1898, the extinct *Cervalces scotti* (elk-moose) has been found in eight counties in Ohio since 1901. Most of the previous finds have been isolated bones although two partial skeletons were also recovered. In 2008, staff from Ohio History Connection recovered a partial skeleton comprised of 44 bones of a male *Cervalces* near Chippewa Lake, Medina County buried at a depth of 5 m. Analysis of the bones and accompanying sediments reveals important information about this rare Pleistocene mammal and its environment in Ohio. Comparison of the stages of tooth eruption and epiphyseal fusion of the long bones with modern relatives indicate the age of the Cervalces at death to have been between 4.5 to 5.5 years and the season of death as mid-winter. A sample of bone was radiocarbon-dated at 11,695 ± 35 years which is similar in age to other dated specimens from the state. Pollen, seeds and snail shells recovered with the bones indicate the local environment at the time was a northern spruce forest with a mixture of pines and hardwoods. Several long bones display spiral fractures, canine groove marks and puncture marks indicating the animal was probably consumed by a very large carnivore.

09:15 A COMPARISON OF GRASSLAND BIRD POINT-COUNT DATA ON TWO REGIONS OF A RECLAIMED SURFACE MINE (THE WILDS) IN SOUTHEASTERN OHIO. Connor Hann (chann@muskingum.edu), Jennifer Hastings (hastings@muskingum.edu), Allie Leggett (aleggett@muskingum.edu), Sarah Landuyt (slanduyt@muskingum.edu), Morgenna Zuby (mzuby@muskingum.edu), Devin Perry (dperry@muskingum.edu), and Jonothan Raugh (jrraugh@muskingum.edu); Biology Dept., Muskingum University, 163 Stormont St., New Concord, OH 43762.

Although reclaimed surface mines provide suitable nesting habitat for several obligate grassland bird species, there have been management concerns in recent years regarding changes in plant species composition and the encroachment of woody vegetation on such mines. During May-July 2014 we conducted point-count surveys of grassland birds on two areas of a former surface mine that were reclaimed during different time periods (Zion Ridge – ZR – 1950s through early 1970s and southern sector – SS – early 1980s). Our goal was to look for differences in the abundance of several grassland bird species on the two sites and to make a broad comparison in the plant species composition between the areas. Counts at 23 point sites on the SS revealed significantly more Henslow's Sparrows (*Ammodramus henslowii*) in June and July compared to 17 sites on ZR during the same months ($t = 2.07$, $df = 38$, $p < 0.04$, June; $t = 3.23$, $df = 38$, $p < 0.002$, July). Significantly more Bobolinks (*Dolichonyx oryzivorus*) were detected in May, during the peak of their breeding, on the SS ($t = 3.15$, $df = 38$, $p < 0.003$) versus ZR. Conversely significantly more Grasshopper Sparrows (*A. savannarum*) were detected in May and June on ZR versus the SS region ($t = 5.73$, $df = 38$, $p < 0.0001$, May; $t = 5.47$, $df = 38$, $p < 0.0001$, June). Structural vegetative differences in the two regions associated with different reclamation efforts likely explain

differences in grassland bird species diversity between the two regions.

09:30 A COMPARISON OF TWO TYPES OF YELLOW STICKY TRAPS FOR MONITORING WESTERN CORN ROOTWORM ADULT POPULATIONS IN FIRST-YEAR AND CONTINUOUS CORN PRODUCTION SYSTEMS. Curtis E. Young (young.2@osu.edu), Ohio State University Extension, Van Wert County, 1055 South Washington Street, Van Wert OH 45891.

Western corn rootworm (WCR), *Diabrotica virgifera virgifera*, is an important pest of corn (*Zea mays*) in the Corn Belt. Corn is a primary crop produced by farmers in Ohio, annually planted on 3.5-4.0 million acres. The harvested corn is used for livestock feed, and ethanol, corn oil and high fructose syrup production. Corn rootworm has become increasingly more difficult to control through adaptations to various pest management strategies including crop rotation. Thus, it is imperative to regularly monitor its development and distribution. The objective of this study was to compare the effectiveness of yellow Pherocon AM/NB and yellow Scentry Multigard sticky traps for monitoring corn rootworm beetles (adults). From July to September of 2014, four fields in Van Wert County, Ohio were monitored for corn rootworm beetle activity by using the two sticky trap types. Overall, the yellow Scentry Multigard sticky traps were found to be better for monitoring corn rootworm adults in this experiment, as they captured significantly more beetles than the yellow Pherocon AM/NB sticky traps (mean=1.5 times more beetles in first-year corn production and mean=1.7 times more beetles in continuous corn production) (t-test, $p<0.05$). The maximum number of beetles captured in one week's time on a Multigard trap and a Pherocon trap was 560 and 260 respectively. Both traps exhibited some flaws in their production or storability. However, the effectiveness of the Scentry Multigard sticky trap to capture corn rootworm adults in both high and low density populations makes it a value tool for monitoring the western corn rootworm.

09:45 CHANGING TIMES: BUILDING MODELS FOR HYDROLOGICAL AND ECOLOGICAL RISK ASSESSMENT FOR MARCELLUS SHALE EXPLORATION IN EASTERN OHIO. Hayley C. Buzulencia (buzulencia.hc@gmail.com), C. McClaugherty (mcclauca@mountunion.edu), Environmental Science Program, University of Mount Union, Alliance, OH 44601.

The increased demand for energy resources has caused a surge of natural gas exploration. In eastern Ohio, the current focus is on the extraction of natural gas from the Marcellus and Utica shale formations. This region may have the potential to produce 53 billion cubic meters of natural gas. Through hydraulic fracturing, successful extractions have been done through horizontal drilling; this is providing economic stimulus to the region. The extent and scale of the oil and gas development requires an extensive network of pipelines, road, well, pads and other infrastructure to be constructed. The objective of this research is to locate and determine the extent and potential risk for ecological and hydrological disturbance related to the new infrastructure. The specific area of interest for this project extends from Salem, Ohio (40.900833 N, 80.856667 W) to Scio, Ohio (40.395833 N, 81.084722 W), spanning 58 km latitudinally and 32 km longitudinally. High resolution aerial imagery (20 cm) was captured by LightHawk, a non-profit provider of aerial services in October 2014. Well location and related data along with wetland locations and floodplain data were obtained from the Ohio Department of Natural Resources (ODNR. Digitization of areas of interest for this study was done using ArcGIS® 10.2 software. These areas and features included pipelines, well pads, and service roads. Initial observations indicated that out of the 2.394 km of trenched pipelines and 15.725 km of bored pipelines currently digitized, there have been approximately 20 wetland crossings.

10:00 GROUNDWATER POLLUTION POTENTIAL FROM SURFACE SPILLS OF HYDRAULIC FRACTURING FLOWBACK AROUND CLASS II DISPOSAL WELLS IN NORTHEAST OHIO. Seokyeong Yee (yees@mountunion.edu), Charles A. McClaugherty (mcclauca@mountunion.edu), Dept. of Biology, Univ. of Mount Union, 1972 Clark Ave., Alliance, OH 44601.

Hydraulic fracturing is responsible for 43% of oil and 67% of natural gas production in the United States. Flowback from the fracturing process includes high levels of salts, carcinogenic chemicals, and sometimes radioactivity. Class II injection wells are currently considered the safest and most viable means of disposal of flowback water. Accordingly, injection well disposal for fracking wastewater is rapidly growing in Ohio. However, groundwater in shallow aquifers in the area around class II injection wells may not be safe from contamination due to significant risks for spills. The purpose of this study is to categorize the potential for groundwater resources to be contaminated by spills of flowback water (brine) around class II wells in Carroll, Portage, and Stark counties. Groundwater vulnerability to contamination is defined by factors including hydrogeology, well location, and volume and frequency of injections. First, all class II locations were digitized and the amount of fluid managed on each well site was identified. To analyze groundwater vulnerability to the surface spills, the map of the locations of the 24 class II wells in the study area was combined with the hydrogeological data by using ArcGIS®. The data, obtained from the Ohio Department of Natural Resources, includes geological strata types and their porosity and the US EPA DRASTIC index. This index includes data on depth to water, net recharge, aquifer media, soil media, topography, vadose zone media, and hydraulic conductivity of the aquifer. This approach identified, ranked, and mapped the wells and their potential to pollute groundwater due to brine spills.

10:15 HYDROLOGY AND GROUND WATER / SURFACE WATER INTERACTIONS OF COLD HEADWATER STREAMS IN NORTHEAST OHIO SUPPORTING BROOK TROUT (*SALVELINUS FONTINALIS*) Katherine S. Amey (kamey@kent.edu), Kent State University, 3300 Lake Road West, Ashtabula, Ohio 44004.

A 15-month hydrology field study, ending in May 2010, was conducted on a set of eight of sixteen cold-water streams, where native Ohio threatened brook trout (*Salvelinus fontinalis*) were introduced from 1996-2004, and monitored for reproductive success, by the Ohio Department of Natural Resources (ODNR). Fifty percent of the streams failed to support brook trout reproduction. The purpose of this study was to identify the source of the cold water to these streams and determine if there was a correlation between brook trout survival and the source of cold water to the streams. The source of cold water in cold-water streams is hypothesized to be from groundwater upwelling in the tail end of the riffle zones, due to stream morphology of the hyporheic zone, or at the groundwater/surface water interface. Tracing the source of the cold water was conducted by continuous temperature monitoring in the surface, springs, and hyporheic water with HOBO® samplers and ibuttons®, the effect and speed of interaction of precipitation on stream temperatures with lagged correlation, stable isotope signatures ($\delta 18O$, δD) water source tracers, and nested piezometers in the banks, riffle head and tail to determine the vertical and horizontal hydraulic gradient in the hyporheic zone confirming the input or absence of groundwater. The hydraulic gradient indicated upwelling of groundwater was found to be dependent on season, subsurface lithology, and location in the streambed. Stream temperature positively and rapidly correlated with precipitation due to swift cold water mixing in the surface/subsurface system, supported by stable isotope fingerprinting. The source of the cold water in the successful streams originated mainly in the headwater system, from joint and fracture flow of the highly conductive shallow bedrock aquifer and hillside springs.

9:00 – 11:00 AM
Session 03 -
Aquatic Ecology
The Battelle Building – Room TBD

09:00 COEXISTENCE OR COMPETITIVE DISPLACEMENT? ENDEMIC AND INVASIVE FRESHWATER SNAILS IN THE GREATER YELLOWSTONE ECOSYSTEM. Nicole L. Berry (n-berry@onu.edu), Jonathan I. Stechschulte, (j-stechschulte@onu.edu), Lance Alley (l-alley@onu.edu), Leslie A. Riley (l-riley.1@onu.edu), Department of Biological and Allied Health Sciences, Ada, OH 45810.

Invasive species are one of the leading threats to freshwater ecosystems in the United States and may be the most detrimental stressor to native freshwater species west of the continental divide. The invasive New Zealand mud snail (*Potamopyrgus antipodarum*) first appeared in the Greater Yellowstone Ecosystem in 1994 and has since spread rapidly, becoming the dominant macroinvertebrate in many streams. In two streams, *Potamopyrgus* overlaps with the endemic Jackson Lake spring snail (*Pyrgulopsis robusta*). *Pyrgulopsis* is at risk for local extinction because the invasive *Potamopyrgus* is a superior competitor and overlaps the entire known range of this snail. Based on previous studies, we hypothesized that the two species were coexisting in some locations but that *Pyrgulopsis* was being displaced at other sites. The objective of this project was to compare current snail densities (2014) to past densities (2001–2007) in these same locations. Benthic macroinvertebrates were collected at six sites in July 2014 following established protocols. At each site, four Surber samples were collected in riffles and three stovepipe samples were collected in depositional areas for a total of 42 density estimates across two habitat types. Comparisons of *Pyrgulopsis* and *Potamopyrgus* densities among sites and years using analysis of variance will provide crucial information regarding long-term population dynamics of these two snail species. Outcomes of this study will also extend beyond this system by contributing to the growing body of knowledge regarding the effects of invasive species in lotic environments.

09:15 SPATIAL VARIATION AND CONNECTIVITY OF SPRING COMMUNITIES IN JOHN BRYAN STATE PARK. Jamie Bonino (j-bonino@onu.edu), Mira Lukkarila (m-lukkarila@onu.edu), Schelby Rosebrook (s-rosebrook@onu.edu), Robert G. Verb (r-verb@onu.edu), Leslie A. Riley (l-riley.1@onu.edu) Department of Biological and Allied Health Sciences, Ohio Northern University, 525 S. Main St., Ada, Ohio 45810.

Freshwater springs provide a unique, stable environment for many different organisms. Despite their prevalence in the landscape, little attention has been paid to the spatial variations between the smaller spring systems and the larger lotic systems with which they merge. The objective of this study was to test for variation between river and spring community structure. We hypothesized that some groups of organisms would be restricted to springs, while other generalist taxa and those with mobile life history stages would have a more widespread distribution. The study was conducted within a limestone gorge at John Bryan State Park (Yellow Springs, Ohio, USA). Two spring systems were sampled for selected physical and chemical parameters, periphyton, macroinvertebrates, amphibians and reptiles. In addition, three sets of riffle samples were collected from the Little Miami River above, below and in between the spring and river points of confluence. Initial MANOVA analysis demonstrated that the springs had significantly lower algal taxa richness (p<0.001) and diversity (H', p<0.02) than the sites on the Little Miami River. Further analysis with nonmetric multidimensional scaling will be used to examine community similarity among sites and individual taxa distributions will be used to determine the level of connectivity among sites for different groups of organisms.

09:30 STREAM COMMUNITY COMPARISONS BETWEEN GLACIATED AND UNGLACIATED REGIONS OF OHIO. Wade Boys (s-boys@onu.edu), Kyle Timbrook (k-timbrook@onu.edu), Tyler Thomas (t-thomas@onu.edu), Samuel Schroeder (s-schroeder@onu.edu), Leslie A. Riley (l-riley.1@onu.edu), Robert G. Verb (r-verb@onu.edu), Stephen Jacquemin (stephen.jacquemin@wright.edu), Terry Keiser (t-keiser@onu.edu). Department of Biological and Allied Health Sciences, Ohio Northern University, Ada, OH 45810.

Geology and land use are among the most important factors influencing aquatic community structure and distribution of taxa in surface waters. In Ohio, there are well-defined regions that have been directly impacted by glaciers and areas without direct glaciation. The primary objective of this investigation was to examine differences in aquatic community structure in streams with different physiographic histories. In fall 2013, three streams from the Glaciated Till Plains (Hog Creek, South Fork of the Great Miami River & Macochee Creek) and three streams from the Unglaciated Allegheny Plateau (Kokosing River, Wolf Creek & White Eyes Creek) were sampled for epipelic and epilithic algae, macroalgae, macroinvertebrates, fish, and selected environmental parameters. Results show that epipelic algae and macroinvertebrates were more diverse in depositional habitats of the Till Plains (H', p<0.001), compared to depositional habitats in the Unglaciated Allegheny Plateau. Riffle algal and macroinvertebrate community diversities were not significantly different between regions (p=0.34). However, both of these taxonomic groups were negatively correlated (r = -0.88 and -0.90) with fish richness. To further elucidate the comparison between these disparate taxonomic assemblages, canonical correspondence analysis of diatoms, and macroinvertebrate and fish functional feeding groups will be used to more closely examine differences in trophic relationships between glaciated and unglaciated lotic stream systems.

09:45 COMPARISON OF AGE, GROWTH, AND CONDITION OF THE ROUND GOBY *NEOGOBIUS MELANOSTOMUS* IN THE WESTERN BASIN OF LAKE ERIE. Scott M. DesRosiers (smd15@albion.edu)[1,2], Thomas P. Simon (tsimon@indiana.edu)[1,3], [1]F.T. Stone Laboratory, Put-in-Bay OH 43449, [2]4282 Albion College, Albion MI 49224, [3]Indiana University.

The round goby, *Neogobius melanostomus*, is an invasive benthic fish species in the Great Lakes that has had ecological effects on native benthic taxa, sport fish eggs, invasive mussels, and the Lake Erie watersnake (*Nerodia sipedon insularum*). Following two decades of colonization, the population may be reaching carrying capacity resulting in lower condition and phenotypic changes in life history traits. The demographic analysis of the population used 459 individuals collected by seining and bottom-trawling within the Western basin of Lake Erie surrounding the Bass Islands during 2006, 2008, and 2014. To assess how this highly influential population has altered its life history though the course of its invasion we evaluated age, growth, and Fulton Condition Index. Calculations for length-weight distributions for each year revealed positive allometric growth for both males and females in 2006, but negative allometric growth in 2008 and 2014, representing condition factors of 3.33, 2.69, and 2.77 respectively. Total lengths from 2006 ranged from 68.0 to 143.4 mm, 2008 individuals ranged from 36.1 to 75.5 mm, and 2014 individuals ranged from 30.7 to 93.1 mm. Weights of individuals from 2006 ranged from 4.091 to 47.263 g, 2008 individuals ranged from 0.533 to 5.908 g, and 2014 individuals ranged from 0.286 to 9.387 g. The ratio of females to males for 2006, 2008, and 2014 was 1:1.21 (54 females: 48 males), 1:1.81 (136F: 75M), and 1:0.92 (70F: 76M), respectively. Understanding the population structure and life history of this highly influential species is necessary to formulating effective management strategies for Lake Erie.

10:00 BENTHIC COMMUNITIES OF TIP-UP POOLS FROM A SOUTHEASTERN INDIANA FLATWOODS. Paige M. Kleindl (p-kleindl@onu.edu)[1], Christopher P. Bowers (c-bowers@onu.edu)[2], Leslie A. Riley (l-riley.1@onu.edu)[1], Darrin L. Rubino (rubino@hanover.edu)[3], Robert G. Verb (r-verb@onu.edu)[1], [1]Department of Biological and Allied Health Sciences, Ada, OH 45810, [2]Department of Chemistry and Biochemistry, Ada, OH 45810, [3]Department of Biology, Hanover College, Hanover, Indiana 47243.

The forests of the Illinoian tillplain in southeastern Indiana are characterized by unique hydrology, soil features, and woody species composition. These hydro-mesophytic forests are typified by their poor drainage and lack of topography, topographic variation is limited to pit-and-mound topography resulting from tree falls. The tree fall pit represents a unique microhabitat in the forest matrix. Although much attention has been given to the woody species composition of these unique forests, almost nothing is known about the biota of these pits. In June 2010, nine tip-up pools from Tribbetts Woods, an old-growth remnant forest in Jennings County, Indiana, USA were visited to determine their diatom and macroinvertebrate community composition and their corresponding physiochemical conditions. Preliminary canonical correspondence analysis depicted that the distribution of diatom and macroinvertebrate taxa along the first four significant (Monte Carlo permutation, $p<0.05$) multivariate axes was influenced by pool age (Axis I; $r=0.09$) and various geomorphological measurements of the pool (e.g., depth, canopy cover). Further multivariate analyses will be employed to examine interactions between the algal and macroinvertebrate communities.

10:15 CHARACTERIZATION OF THE ALGAL AND MACROINVERTEBRATE COMMUNITIES OF TWO VERNAL POOLS AT TIDD-OAKES FARM, HARDIN COUNTY, OHIO. Kelsey T. R. Weidner (k-weidner@onu.edu), Nicole L. Berry (n-berry@onu.edu), Jamie L. Bonino (j-bonino@onu.edu), Schelby K. Rosebrook (s-rosebrook@onu.edu), Leslie A. Riley (l-riley.1@onu.edu), Robert G. Verb (r-verb@onu.edu), Department of Biological and Allied Health Sciences, Ada, OH 45810.

Limited research has been conducted on lower trophic levels in vernal pools despite their significant contributions in these systems. In May 2013, two vernal pools were sampled at the Ohio Northern University Tidd-Oakes Farm in Hardin County, Ohio, USA, to determine the vascular plant, algal, macroinvertebrate and amphibian community composition and their corresponding physicochemical conditions. At each pool, basic environmental parameters were recorded and pool morphometric characteristics were measured. In addition, the vascular plant community was surveyed, periphyton residing on leaf litter and loose sediments was sampled using cores, benthic macroinvertebrates were sampled using dip nets and amphibians were surveyed using funnel traps. In the lab, algae were identified to genus and invertebrates to family. Preliminary analyses indicate that each pool was dominated by different vascular plants – herbaceous species at one pool (*Eleocharis erythropoda* and *Leersia oryzoides*) and woody species (*Acer saccharum*) at the other. Community composition was quite distinct between the two pools, with the prairie pool characterized by different dominant taxa and higher taxa richness for a variety of organismal groups (macroalgae, macroinvertebrates and amphibians). Preliminary results suggest that a combination of high light levels, greater macrophyte density and increased spatial heterogeneity in the prairie pool could be contributing to higher taxa richness in this habitat. Current analysis of periphyton communities will be used to characterize an additional trophic level, expanding the contribution this study makes to our understanding of food webs in vernal pools.

10:30 SPATIAL AND TEMPORAL ALGAL COMMUNITY VARIATION IN A DROUGHT-RESISTANT SPRING SYSTEM IN THE SANDIA MOUNTAINS, NEW MEXICO. Schelby K. Rosebrook (s-rosebrook@onu.edu)[1], Lance D. Alley, (l-alley@onu.edu)[1], Leslie A. Riley (l-riley.1@onu.edu)[1], Robert G. Verb (r-verb@onu.edu)[1], Rebecca J. Bixby (bbixby@unm.edu)[2], [1]Department of Biological and Allied Health Sciences, Ohio Northern University, Ada, OH 45810, [2]Department of Biology, University of New Mexico, Albuquerque, NM 87131.

In xeric habitats, springs are geographically isolated systems which provide perennial water sources for aquatic organisms. Because drought events cause changing hydrologic conditions and water quality, they can potentially impact springs. This project sought to establish baseline information regarding temporal and spatial patterns of algal communities at a perennial spring/travertine waterfall/stream complex in the Sandia Mountains, New Mexico. Periphyton and macroalgae was sampled from seven sites; two in the spring above a waterfall, two within the waterfall, and three downstream from the waterfall. Collections were made during the pre-monsoon (June 2013) and post-monsoon (October 2013) season. Preliminary analyses indicate that diatoms dominated the spring section above the falls, while filamentous chlorophytes, xanthophytes, and cyanobacteria had greater abundances in the waterfall. Increased light levels and habitat heterogeneity likely led to increased filamentous algae along the waterfall face. Due to the importance of springs in arid-land ecosystems, these baseline data are critical as drought is predicted to become more severe and frequent in the southwestern USA.

10:45 PRELIMINARY ANALYSIS OF AQUATIC COMMUNITY STRUCTURE NEAR A LOWHEAD DAM. Rody Seballos (r-seballos@onu.edu), Robert G. Verb (r-verb@onu.edu), Leslie A. Riley (l-riley.1@onu.edu), Department of Biological and Allied Health Sciences, Ohio Northern University, 525 S. Main St., Ada, Ohio 45810.

Lowhead dams have been historically installed along the Ottawa River to maintain higher water levels during dry periods of the year. However, lowhead dams disrupt the natural flow of lotic systems, cause fragmentation and create an environment favoring taxa indicative of lentic habitats rather than those of rivers and streams. The Jackson Street lowhead dam on the Ottawa River (Lima, Ohio) was sampled on August 29, 2014. This lowhead dam is a candidate for removal and one of the baffles has already been extracted from the northern portion of the dam. The primary objective of this investigation was to survey the aquatic life above and below the dam to create a baseline dataset of the community structure prior to dam removal. Two riffle habitats (five samples each) were sampled downstream of the dam and one riffle (five samples) was sampled upstream. At each site, the physical and chemical parameters (e.g., depth, current velocity, specific conductance) were measured; fish, periphyton, macroalgae and macroinvertebrates were collected. Preliminary MANOVA analysis indicated that the site immediately downstream from the dam had the highest current velocity ($p<0.05$) and macroalgal community coverage (large bloom of *Pamellopsis*) ($p<0.001$). Future multivariate analyses will attempt to determine if there are unique differences in the other sampled aquatic communities and abiotic parameters above and below the dam structure.

9:00 – 11:00 AM
Podium Session - Session 04 - Biology
The Battelle Building - Room TBD

09:00 THE EFFECT OF RELIGIOUS AND EDUCATIONAL BACKGROUND ON ACCEPTANCE OF GLOBAL CLIMATE CHANGE. Sara Almalki (salmalki1285@capital.edu), Naima Adan Ilmi (nilmi@capital.edu) (Dr Kimberly Heym, Dr Kerry Cheesman), 1 College and Main, Columbus, OH 43209.

Global climate change and the data that show it is occurring is supported by most scientists working in the field, and the data that points to human involvement is quite strong. Over the past decade data have been debated publicly by scientists and politicians alike, and the results have indicated that a segment of the US population that does not believe that humans have anything to do with climate change. In addition to political bias, religious affiliation also appears to be related to this phenomenon of denial, according to the Intergovernmental Panel on Climate Change. IRB approval was obtained to develop and administer a fifteen question survey to individuals of diverse religious backgrounds (N>500) asking about their reactions toward and understanding of climate change, as well as their attitudes toward science as a way of knowing to determine whether or not such a link to religious/tradition background exists. Three separate one way analysis of variance tests will be used to correlate test scores with educational background as well as religious affiliation (Protestant, Catholic, Muslim, Jewish, or other), and with exposure to media and print as a source of information. It is hypothesized that people with strong religious affiliation and/or less education will be less likely to associate human activity with climate change. In addition, other factors such as culture and source of information may play a role in how people understand climate change.

09:15 HERPETOLOGICAL SURVEY OF OAKWOODS PRESERVE IN FINDLAY, OHIO. Kristin N. Brooks (brooksk1@findlay.edu), Natalie N. Brock (brockn@findlay.edu), and Justin Rheubert (rheubert@findlay.edu), 1000 N Main St. Findlay, OH 45840.

Herpetological surveys are of great importance to species conservation, as well as serving as a method to gauge the overall health of the ecosystems in which these species are found. In order to assess the diversity and abundance of amphibians and reptiles at Oakwoods Nature Preserve in Findlay Ohio, four drift fences containing pitfall traps were placed within the preserve, and checked daily from January 1 through December 31. Furthermore, coverboards were placed throughout the preserve, and checked on a bi-weekly basis during an active search which included transect surveys, flipping logs, and checking leaf litter. These survey techniques will target all species of amphibians and reptiles. Animals collected are marked using a toe clip or scale clip and returned to the wild. This herpetological survey of Oakwoods Preserve, in Findlay, Ohio is the first time that the reptile and amphibian species and population numbers in this park will have been studied. This is significant especially in light of the many roles served by the preserve, which opened in 1984. The preserve land was previously used as a stone quarry, rail yard, and farmland. Data concerning what species are present will be collected using the Powell et al. dichotomous key. Population size will be utilized using the Lincoln-Peterson method and species diversity indices will be calculated for each species collected using the Simpson Diversity Index.

09:30 RELATIONSHIP OF CANINE INTESTINAL MICROFLORA AND CANCER USING NEXT GEN SEQUENCING. Cassandra N. DiCioccio (diciocciоc@findlay.edu), Ashley N. Mauer (mauera@findlay.edu), Brittany M. Conkey (conkeyb@findlay.edu), Donald Walker (walkerd@findlay.edu), Linda Peck (peck@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

The microflora within animals have been associated with their phenotypes. In the past, cost and technical restraints prevented the analysis and correlation of the presence of the diversity of microbes contained within a niche environment. With next-generation sequencing and metagenomics it is now possible to analyze many DNA sequences and correlate those sequences with the characteristic of their host environment. This study will use a metagenomic approach to determine whether a relationship exists between microbes within the intestinal lining of canines and the presence of cancer. Our hypothesis is that the composition of microbes may vary in relation to the presence of cancer. In coordination with local veterinary clinics, the intestinal tracts of forty canines will be collected using a long stem sterile swab inserted into the rectum of the canines. Upon IACUC approval, twenty canines known to have lipoma or sarcoma, and twenty without a cancer diagnosis will be used. Demographics from each dog will be collected (age, breed, diet, sex, weight, castrated, health status). DNA will be extracted from fecal matter and PCR performed using primers targeted to the 16S rRNA gene and sequenced on the Illumina MiSeq platform. Results will yield the microbial species composition of the intestinal microflora present within each canine. Comparative analysis of microbial communities will be made between cancerous and noncancerous canines. Any correlations between demographic information and disease state will also be analyzed through multi-factor ANOVA.

09:45 TOXICITY OF LEAF EXTRACT OF ACER SPP. ON EQUINE ERYTHROCYTES. Bailey K Dye (bailey.dye@otterbein.edu), Jeffrey S Lehman (jlehman@otterbein.edu), SMC 10252, Otterbein University, 1 South Grove Street, Westerville OH, 43081.

Red maple toxicosis is a phenomenon that occurs in equines after the consumption of dried or wilted red maple (*Acer rubrum*) leaves. Within the erythrocytes, it causes hemolysis, methemoglobinemia, and Heinz body development. The toxic agent of red maple leaves has not yet been identified; however, the development of hemolytic anemia and methemoglobinemia in equines after ingestion of the leaves, suggests that the toxin is acting as a strong oxidant. Some studies have noted that not only are wilted red maples leaves toxic to equines, but that wilted leaves of other maple species may also be toxic. Therefore, the objective of this research was to evaluate the toxic effects of dried samples of *A. rubrum*, as well as thirteen other species within the genus *Acer*, on the hemolysis of equine erythrocytes. Two-year old saplings were evaluated in greenhouse and field experiments of 5 and 3 replicates, respectively. Leaves were harvested and dried throughout two growing seasons. The leaf material was suspended in water (0.05 g material/500 µl water) and incubated with equine blood taken from the horses housed at the Austin E. Knowlton Equine Center for two hours in 1.5 ml microfuge tubes. Relative toxicities of species were indicated by percent hemolysis of erythrocytes, which was determined spectrophotometrically. Data exhibited a difference in percent hemolysis across the Acer species. Red (*A. rubrum*) and silver (*A. saccharinum*) maple were among species that caused the greatest hemolysis (83 % and 74%, respectively). In contrast, bigtooth (*A. grandidentatum*) and Norway maple (*A. platanoides*) were among those causing the least hemolysis (16% and 19%, respectively). The results of this study indicate toxicity to equine erythrocytes may occur in multiple species throughout the *Acer* genus.

10:00 KNOWLEDGE OF EBOLA VIRUS AMONG COLLEGE STUDENTS. Enas Hassan (ehassan@capital.edu), Kaleb Perez (kperez@capital.edu), Evan Winters (ewinters@capital.edu), (Dr Kimberly Heym, Dr Kerry Cheesman), Capital University, 1 College and Main, Columbus, OH 43209.

Now that Ebola has moved from a disease confined to Africa, to a disease detected in the United States, American health care workers and the general public are concerned about transmission of the virus via public transportation as well as hospital settings. This project is designed to effectively compare the accuracy of current knowledge about Ebola and Ebola transmission among college students at a liberal arts university. IRB approval was obtained to develop and administer a thirteen question fact based test on Ebola and Ebola transmission to science, nursing, humanities, and music students (N>300). Three separate one way analysis of variance tests will be used to correlate test scores with choices of major (science, nursing, humanities or music), with class level (freshman, sophomore, junior, senior), as well as religious affiliation (Protestant, Catholic, Muslim, Jewish, or other). It is hypothesized that science and nursing majors will score higher on the test while students with a humanities or music affiliation will not score as highly. It is also hypothesized that students with a higher class standing will score higher than underclassmen. It is predicted that religious affiliation will have no significant influence on test score. Results of this survey will be used to produce educational material for campus use.

10:15 A NOVEL PROTOCOL FOR REMOVING ENVIRONMENTAL CONTAMINANTS FROM SALAMANDER SKIN FOR STUDIES ON THE AMPHIBIAN MICROBIOME. Brandy R. Lawrence (lawrenceb@findlay.edu)[1], Dakota Esterline (esterlined@findlay.edu)[2], Crystal Kelehear (crystal.kelehear@hotmail.com)[3], Sean P. Graham (sean.graham@sulross.edu)[4], Donald M. Walker (walkerd@findlay.edu)[2], [1]College of Pharmacy, The University of Findlay, 1000 N. Main St., Findlay, OH 45840, [2]Department of Natural Sciences, The University of Findlay, [3]Smithsonian Tropical Research Institute, [4]Department of Biology, Geology, and Physical Sciences, Sul Ross State University.

The skin of amphibians is a living interface between the organism and a diverse microbial community, and evidence suggests that this community is an important factor determining susceptibility of amphibians to emerging infectious diseases. To date, studies on the skin microbiota of amphibians have been relatively scattered and protocols have differed greatly among studies, therefore, a standardized protocol was developed to remove environmental contaminants from amphibian skin. Red-backed Salamanders (*Plethodon cinereus*; n=23) were collected at Litzenberg Memorial Forest, which is an upland deciduous forest in Northwest Ohio (USA). Salamanders were washed for 15 seconds (25 ml sterile water) with a squirt bottle followed by three sequential washes (30 sec/wash) in Petri plates filled with 25 ml of sterile water. Wash water (150 µl) was spread onto tryptic soy agar plates and colony forming units (CFUs) counted after 48 hours of incubation at 32°C. To evaluate whether the washing protocol reduced the quantity of environmental bacteria on the skin of the salamander we performed a repeated measures ANOVA on ln-transformed CFUs using JMP Pro 9.0.0. There was a significant reduction in the amount of cutaneous bacteria (CFUs) with washing ($F_{1,45}$=34.89; p<0.0001). The presence of resident salamander microbiota was confirmed after the wash protocol by DNA extraction, PCR, and gel electrophoresis to visualize PCR amplicons from 10 salamander skin swabs. This procedure provides a standardized method to remove environmental microbes for studies on the amphibian microbiome. The University of Findlay's institutional research policies and guidelines for the ethical treatment of animals were followed during this study.

10:30 ASSESSING INTER AND INTRA SPECIFIC VARIATION IN SPERM MORPOLOGY BETWENN POPULATIONS OF SCELOPORUS CONSOBRINUS AND SCELOPORUS UNDULATUS. Jeanine A. Messak (Messakj@findlay.edu), Justin L. Rheubert (Rheubert@findlay.edu), Dustin S. Siegel (Dsiegel@gmail.com), Kevin M. Gribbins (kevingribbins@gmail.com), 1000 North Main St. Findlay, OH 45840.

Although the number of sperm morphology studies in reptiles is increasing, these studies have operated under an assumption that sperm morphology does not differ intraspecifically. Testing this assumption will allow better assessment of the diversity in sperm morphology and how impactful it may be in future phylogenetic/evolutionary analyses. For example, intraspecific variation in sperm morphology may lead to polymorphic character coating and alter the results of such analyses. These studies may also aid in our overall understanding of reproductive biology in reptiles by gathering insights into variation, providing information on multiple aspects of reproductive biology (i.e. sperm competition, geographic variation), and lead to new hypotheses. Therefore, in order to test the assumption that sperm morphology does not differ intraspecifically but does differ interspecifically a total of 100 individuals from five populations of Sceloporus consobrinus and Sceloporus undulatus were collected. (In equals 20 per population) Specimens were euthanized (approved by The Institute of Animal Care and Use Committee at St. Lewis University where euthanasia was performed) and reproductive tracts were removed in order to study the sperm histologically. Sperm were analyzed via electron microscopy and measured using imageJ software. Measurements recorded were head length, tail length and total length, and were analyzed by using a nested ANAOVA. The results suggest that sperm do not vary in terms of morphology but may vary in their morphometrics. However, analyses are still being conducted.

9:00 - 11:00 AM
Session 05 - Microbiology and Medical Science
The Battelle Building - Room TBD

09:00 TRENDS IN OHIO'S TOP TEN REPORTABLE INFECTIOUS DISEASES. Sarah Bousfiha (sarah.bousfiha@otterbein.edu), Sarah Holbrook (sarah.holbrook@otterbein.edu), Jennifer Bennett (jbennett@otterbein.edu), and Jeff Vasiloff (jvasiloff@otterbein.edu), Dept. of Biology, Otterbein University, 1 South Grove St. Westerville, OH 43081.

Introduction: Ohio public health law mandates which diseases are reportable in Ohio. Many of these diseases are communicable. It is important for both the medical community and citizens of Ohio to be made aware of these diseases, including how common they are, how they are transmitted, and what measures can be taken to prevent and control them. Thus, the purpose of this study is to: 1) determine the most frequently reportable infectious diseases in Ohio; 2) determine trends in incidence over recent years; 3) elucidate case characteristics and risk factors; and 4) examine trends in microbiological characteristics of causative organisms. Methods and Materials: Reportable diseases are identified by medical practitioners, as well as testing laboratories. Case data is reported to local health agencies and transmitted to the Ohio Department of Health (ODH). Recent data from ODH was analyzed. It was possible to rank all reportable infectious diseases by number of cases from most cases per year to least cases per year. In-depth analysis of the 10 most frequently reported diseases is ongoing. Initial Observations: Analysis of 2012 data revealed that the top ten reportable infectious diseases were: 1) Chlamydia (53,310 cases); 2) Gonorrhea (16,551); 3) Shigellosis (1812); 4) Salmonellosis (1270); 5) Invasive Streptococcus pneumoniae (1188); 6) Campylobacteriosis (1129); 7) Human Immunodeficiency Virus (HIV) (1101); 8) Pertussis (905); 9) Varicella (811); and 10) Aseptic meningitis (701).

09:15 SYPHILIS: TALE OF TWO CITIES IN OHIO. Amanda Drake (amada.drake@otterbein.edu), Jennifer Bennett (jbennett@otterbein.edu), and Jeff Vasiloff (jvasiloff@otterbein.edu), Dept. of Biology, Otterbein University, 1 South Grove St.

Westerville, OH 43081.

Syphilis is a sexually-transmitted infection that is endemic in Ohio. Previous work (JV) revealed that most cases were reported in large metropolitan areas. However, the demographics and risk factor profiles of cases in Franklin County (Columbus) and Hamilton County (Cincinnati) were distinct through 2012. In the former, most cases occurred in men who had sex with men, while in Hamilton County many cases were in women and heterosexual men. The purpose of this study is to: 1) determine the incidence of primary and secondary (P&S) syphilis in Ohio in 2013 and the first half of 2014; 2) determine the demographics and risk factor profiles of cases in Hamilton and Franklin counties, and compare them to each other; 3) compare 2013 and 2014 to past data; and 4) generate hypotheses to explain any persistent inter-city differences. Reportable diseases like syphilis are identified by medical practitioners, as well as laboratories that conduct testing for infectious agents. Case data is reported to local health agencies and transmitted to the Ohio Department of Health (ODH). Recent data containing the incidence, demographics, and risk factor profiles of cases of P&S syphilis was acquired from ODH. In-depth analysis of statewide and county-specific data is ongoing. Initial Observations: Analysis of 2013 and 2014 data revealed 649 cases of P&S in Ohio in 2014 and 369 cases in the first half of 2014.

09:30 DETERMINATION OF EFFECTS OF SOIL COMPOSITION ON MULLEIN ANTIBIOSIS. Renee Chen (r-chen@onu.edu), [Advisors Vicki A. Motz (v-motz@onu.edu), Linda M. Young (l-young@onu.edu) and Christopher P. Bowers].

Native Americans, in some regions but not others, used mullein to treat ear infections. Many recent studies have linked abiotic factors to plant gene expression such that soil difference might logically yield antimicrobial variation. Initial site analysis of mullein growing areas in OH, PA and NJ yielded regional differences in pH, phosphates, chloride and phosphate content of the soils. In July 2014, soil samples from roadside areas in which mullein was growing were collected from New Hampshire, Connecticut, New Jersey, Pennsylvania, Ohio, Oregon, and Washington following NCR 13 guidelines. Samples were dried in a dehumidifier at 40°C and then screened through a 2 mm sieve. 5.00 grams of each soil sample was placed into test tubes with 5 mL of dH20 and vortexed for 30 seconds, then centrifuged for 10 minutes at 5,000 RPM. The pH of the supernatant was measured with a Seven Easy Mettler Toledo pH Meter. pH of Midwest soils (7.35 +/- 0.38) was significantly higher than east coast (6.57 +/- 0.99) or west coast (6.53 +/- 0.37) soils. These findings are consistent with pH of 2013 samples. Solis will be further analyzed for nitrates, phosphate, potassium, chloride and organic composition. Influence of rainfall will be considered using USGS longitude and latitude climate data. These results will be correlated with the work of others in this lab investigating flower oil antibiosis and genetic variation to evaluate likely abiotic influences on mullein physiology.

09:45 INVESTIGATNG POSSIBLE SYNERGISTIC ACTIVITY OF PHENOLS AND FLAVONOIDS IN THYME, THYMUS VULGARIS. Emily Hall (e-hall.2@onu.edu) and Karenna Langhals. [Advisors: Vicki Abrams Motz (v-motz@onu.edu) and Linda Young (l-young@onu.edu)].

Thymol, the major constituent of *Thymus vulgaris*, is an antibiotic, but less effective than whole thyme extract. Two thyme flavonoids, luteolin and quercetin, exhibit antibiosis. Possible synergy was examined. Thyme was harvested, dried and extracted in 95% ethanol. Extracts were filtered, dried, reconstituted and analyzed. Equivalent ethanolic solutions of luteolin and quercetin (0.135 mg/mL, 0.092 mg/mL, measured by HPLC) and thymol (2.23 mg/mL determined by GC/MS) alone and in combination were applied to 6 mm disks used in Kirby Bauer testing against *Staphylococcus aureus*, *Staphylococcus epidermidis*, MRSA, *Streptococcus pneumoniae*, *Bacillis subtilis*, *Klebsiella pneumoniae*, *Escherichia coli* and *Candida albicans*. Zones of inhibition were measured after 24 hour incubation at 37°C, 5% CO_2. Zones of reduced growth on Candida cultures indicated that whole thyme (20.7 +/- 1.1 mm) was significantly (p<0.05) more effective than thymol (14 +/- 1), luteolin (11+/-1) or thymol + luteolin (13.7 +/- 1.1). Quercetin was ineffective. Gram positive *B. subtilis*, *S. pneumonia* and *Staphylococcus* species exhibited significantly (p<0.05) greater antibiosis to whole thyme (13.75 +/- 3.28) than to thymol (7.9 +/- 0.76) or luteolin (7.67 +/- 0.58). Thymol + luteolin had a small significant (p<0.05) synergy (8.47 +/- 0.74), insufficient to account for thyme antimicrobial action. In gram negative species, *K. pneumonia* and *E. coli*, whole thyme had no antibiotic effect but thymol alone or with flavonoids exhibited some antibiosis (9.5 +/- 0.5) and (9.5 +/- 0.76) respectively; implying some constituent of thyme inhibiting antibiosis of gram negative species by thymol. Luteolin and quercetin alone exhibited no antibiosis and did not act synergistically with thymol to enhance antibiosis.

10:00 THE ANTIBIOTIC EFFECTS OF MULLEIN FLOWER EXTRACTS VARIES WITH GEOGRAPHIC DISTRIBUTION. Lauren E. Frame (l-frame.1@onu.edu) and Katherine Miltner (k-miltner@onu.edu), [Advisors Vicki A. Motz (v-motz@onu.edu) and Linda M. Young (l-young@onu.edu)], 402 W. College Ave. Unit 1756 Ada, OH 45810.

Although common mullein, *Verbascum Thapsus L.,* can be found across the US, tribal medicinals disagree on their usage. Geographic genetic variations have been noted in *Verbascum* species and geographic differences have been observed in chemical constituents of mullein flowers. The Cherokee used flower oils to treat ear infections. Mullein constituents have been shown to alter gene expression in *S. pneumoniae* and plants harvested in OH demonstrate antibiosis against *S. pneumoniae*. In July 2014, mullein flowers harvested from Ohio, Pennsylvania, Connecticut, New Hampshire, New Jersey, Oregon, and Washington were extracted in 91% isopropanol, filtered, evaporated, and reconstituted in nutrient broth to a 2X extract concentration. Minimum inhibitory/bactericidal concentration studies were performed using extract concentrations: 100%, 50%, 25%, and 12.5%. Reconstituted extracts were inoculated with bacterial specimens (*Staphylococcus aureus*, *Streptococcus pneumoniae*, and *Klebsiella pneumoniae*) at a concentration of 500,000 cells/ml and incubated for 18 hours at 37° C in 5% CO_2. After centrifugation, absence of a pellet indicated bacteriostatic activity. To determine if the extract was bactericidal, a 10 µl aliquot of the sample was pipetted onto a Petri plate containing TSA with 5% sheep red blood cells and incubated for 24 hours at 37° C in 5% CO_2. Initial screenings indicate some samples were bacteriostatic against *Klebsiella pneumoniae* at full strength; other samples were bacteriostatic against *Staphylococcus aureus* at full and 50% strength; and all samples were bactericidal against *Streptococcus pneumoniae* even at 12.5% strength. The antibiotic efficacy of samples are currently being correlated with their geographic distribution.

10:15 EFFECTS OF SILVER CARBENE ANTIMICROBIALS AND OTHER SELECT ANTIBIOTICS ON PSEUDOMONAS AERUGINOSA BIOFILMS GROWN IN A SYNTHETIC CYSTIC FIBROSIS MEDIUM. Catherine T. Kurian (ctk20@zips.uakron.edu), Justin S. Brantner (justin3@zips.uakron.edu), Amy Milsted (milsted@uakron.edu), Department of Biology, The University of Akron, 302 Buchtel Common, Akron, OH 44325-3908.

Viscous sputum accumulation in lungs of cystic fibrosis (CF) patients often results in colonization by the opportunistic bacterium *Pseudomonas aeruginosa*. This bacterium is known to form biofilms, which are complex microbial communities encased in self-produced polymeric matrices that are notoriously resilient to antimicrobial therapies. N-heterocyclic silver carbene complexes (SCCs) represent promising antimicrobials against CF associated infections.

We hypothesized that SCC compounds used against P. aeruginosa biofilms are as effective as other currently available antibiotics, and that mucin (a key component of CF sputum) impairs antimicrobial efficacy. To form biofilms, one lab and two clinically relevant *P. aeruginosa* strains (PAO1, PDO300, 7119 respectively) were grown in Synthetic Cystic Fibrosis Medium (SCFM) with and without mucin (1% wt/vol) for 24 hours. Biofilms were challenged with either SCC-1 or SCC-22, or one of three antibiotics used clinically (Tobramycin, Ciprofloxacin, or Meropenem). SCC-1 and SCC-22 completely eliminated biofilms of the P. aeruginiosa strains grown without mucin beginning at 64 µg/mL, whereas biofilm was still present at 128 µg/mL for Tobramycin, Ciprofloxacin, and Meropenem. In the presence of mucin however, SCC-1 and SCC-22 resulted in a maximum of 3-log (1000-fold) reduction in bacteria compared to control groups and no mucin groups at 128 µg/mL. SCC-1 and SCC-22 were most effective at eradicating biofilms of *P. aeruginosa* grown in SCFM without mucin. For all antibiotics tested, mucin greatly reduced antimicrobial effectiveness against *P. aeruginosa* biofilms. These data suggest that SCC compounds could be promising antimicrobial agents in combating *P. aeruginosa* biofilms in the CF lung.

10:30 DETERMINING BEST PRACTICE CLEANING FOR PREVENTING TRANSMISSION OF INFECTIONS VIA WRESTLING MATS. Suzy Young (s-young.3@onu.edu), 417 North Gilbert St., Ada, OH. 45810. [Advisors Linda M Young (l-young@onu.edu) and Vicki A. Motz (v-motz@onu.edu)].

Numerous disinfectants claim to effectively kill microbes that contaminate wrestling mats and spread infection to athletes. Although effective, exposure to harsh chemical constituents of some cleaners may cause skin and respiratory irritation in athletes. To determine optimal mat disinfection practices, this study compared the antibacterial capabilities of 10% bleach, OxiTitan, Benefect, eWater, and KenKlean, five common products with different mechanisms of action. In a biosafety cabinet, unused 6" x 6" wrestling mat squares were disinfected with one of five agents, tested and found not to have bacterial growth. Each was then inoculated with 0.5 McFarland standard of Staphylococcus epidermidis, the most common skin bacterial species, and allowed to dry. 1" x 6" strips of these mats were sampled (N=4) by rubbing all sides of a rayon swab moistened with Stuart's medium on the area for 30 sec at t=0, 1, 2, 6, and 24 hours. Swabs were extracted in 2 ml of Mueller-Hinton broth using a thermoagitator at 1000 rpm for 5 minutes at 37°C. A 10 µl aliquot was spread on TSA with 5% sheep red blood cells and incubated at 37°C in 5% CO_2 for 24 hours. Mean colony counts rose the first hour for all treatments, however products claiming residual activity (OxiTitan and KenKlean) reduced bacterial load 98-fold compared to non-residual disinfectants (10% bleach and eWater). Over 24 hours, the pattern of bacterial growth was inconsistent, however residual products had a 63% reduction in bacterial load over non-residual agents. Benefect, an all-natural, thymol-based cleaner, decreased bacterial load 38%, also demonstrating residual antibacterial activity. After 24 hours, mats were retreated with their original product, resulting in complete disinfection, validating the killing effectiveness of each cleaner, and supporting claims of residual activity for OxiTitan and KenKlean.

9:00 - 11:00 AM
Session 06 - Molecular and Cellular Biology/ Genetics
The Battelle Building - Room TBD

09:00 A STRATEGIC APPROACH TO DETERMINING THE FUNCTION OF THE UNSTUDIED *DROSOPHILA MELANOGASTER* GENE CG4496. Vladimir Bokun (vbokun12@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu), Notre Dame College, 4545 College Road, South Euclid, OH 44121.

The ability of an organism to turn on and off genes in response to environmental and developmental signals is maintained using a myriad of proteins with various motifs. One common motif is found in the family of C2H2 zinc-finger regulatory proteins, which is one of the largest of all protein families. CG4496 encodes a C2H2 zinc-finger regulatory protein in Drosophila melanogaster, but its exact role in Drosophila is unknown at this point. In an effort to determine its role, two experimental strategies will be used, the first one being in vivo and the second in vitro. To uncover the potential in vivo relevance of CG4496 to the Drosophila, a mating schematic to obtain a knockout has been devised using FLP-FRT recombination system. This system incorporates the forced expression of a FLP-recombinase enzyme to cause recombination between two FRT DNA sequences that flank either the 5'or 3' end of CG4496. The resulting recombinants will generate a chromosome that lacks CG4496 and thereby produce a null-mutant. By examining physical changes that may result in the knockout a phenotype of the null-mutant can be ascertained. The second strategy is based on the use of yeast-two-hybrid screens, which will be performed using a library of both adult and larvae cDNA in order to identify possible proteins with which CG4496 interacts. For this purpose a full length cDNA coding region of CG4496 was subcloned into yeast-two-hybrid vectors. Further analysis of the exact protein region responsible for interactions can also be pinpointed following yeast-two-hybrid screens. Using the two aforementioned approaches, CG4496 regulatory roles should be elucidated.

09:15 A FLP-FRT RECOMBINATION AND YEAST TWO HYBRID SYSTEM APPROACH TO ELICIDATING THE FUNCTION OF THE DROSOPHILA MELANOGASTER GENE CG12744. Brian J. Burleson (bburleson12@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu) Notre Dame College, 4545 College Road, South Euclid, OH 44121.

Gene regulation is an essential mechanism for the functioning of all biological systems. Central to gene regulation is the control at the level of transcription. One of the largest regulatory protein families in nature is the C2H2 zinc finger protein (znf), a molecule consisting of a two ß sheets and an α helix surrounding a Zn ion held in place by two cysteine and two histidine amino acids. C2H2 znf form a verity of cellular interactions that regulate gene expression with their most well known being through DNA interactions. The *Drosophila melanogaster* gene CG12744 encodes a C2H2 znf that previous high throughput studies have predicted to function in gene regulation and have associations with immune-defensive response to fungal infections. In order to better determine the role of CG12744, two methods of experimentation have been devised to explore CG12744 both in vivo and in vitro. The in vivo method is employing two available FRT recombination sites to be used in an FLP-FRT recombination strategy to specifically knockout CG12744. Through the removal of CG12744 this reverse genetic approach should reveal any phenotypic effects on the organism in the absence of the gene. The in vitro method will employ a yeast two hybrid system to uncover potential protein-protein interactions. Full length cDNA CG12744 has been subcloned and placed in yeast two hybrid vectors which will be used against *Drosophila* cDNA libraries to screen for potential protein-protein interactions. This two pronged approach should begin to further elucidate the function of this little known gene.

09:30 ABIOTIC FACTORS MAY INFLUENCE GENETIC EXPRESSION IN VERBASCUM THAPSUS. Elizabeth Lendrum (e-lendrum@onu.edu) and Alexander R. Kneubehl (a-kneubehl@onu.edu), Ohio Northern University, 402 West College Ave. Unit 2278, Ada, OH, 45810 [Advisors: Vicki A Motz (v-motz@onu.edu), Christopher P Bowers (c-bowers@onu.edu), Linda M Young (l-young@onu.edu), David H Kinder (d-kinder@

onu.edu) and Stephen Kolomyjec (s-kolomyjec@onu.edu)].

Verbascum species have been shown to exhibit genetic variability partially attributed to geographic distribution and to vagaries of biennial plants. Common mullein, *Verbascum thapsus*, is widely distributed across North America. It was used by some Native Americans to treat ear infections but not by others. Samples taken from different regions display varying efficacy in antibiosis against organisms causing ear aches. The goal of this study is to determine whether this physiological phenomenon is due to genetic diversity or whether the effect can be attributed to the role of abiotic factors either acting directly or acting to regulate gene expression. Leaf samples were collected from 25 roadside mullein patches ranging from New Hampshire across Connecticut, New Jersey, Pennsylvania, Ohio, to Oregon, and Washington. Total genomic DNA was extracted from dried leaves using either Qiagen DNAeasy Plant Mini Kit or a CTAB extraction method. PCR reactions were carried out using primers for a conserved ribulose bisphosphate carboxylase oxygenase large subunit A (rbcLa) region. Initial gel electrophoresis showed no variation in size of amplicons; however, sequencing techniques and cladistics will be utilized to delineate any genetic variation within the rbcLa region of the samples.

09:45 CG15436/HNDC GOVERNS CHROMATIN STRUCTURE MECHANISMS THAT CONTROL THE INTEGRITY AND FATE OF STEM CELLS IN THE DROSOPHILA MELANOGASTER OVARY. Marcia F. Leon (mleon11@students.ndc.edu), Brittany N. Stawicki (bstawicki11@students.ndc.edu), Lauren R. Sandrock (lsandrock12@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu), Notre Dame College, 4545 College Road, South Euclid, OH 44121.

Regulation of cell identity is indispensable in coordinating the various cell types present in multicellular organisms. In the *Drosophila melanogaster* ovary, this process is particularly evident in the behavior of stem cells, which simultaneously maintain themselves while undergoing differentiation that is critical to proper egg production for reproduction. Central to this process are molecular mechanisms that regulate chromatin structure and gene expression. This study describes the role of CG15436, also known as HNDC (Hunchback of Notre Dame College), a C2H2 Zn finger protein whose null phenotype is linked to abdominal malformations and loss of egg production. Analysis of the 0.06% of the genome with which HNDC is most highly associated reveals correlation with central stem cell differentiation regulators of the ovary such as BAM, PUM, NOS and AGO_3 among other stem cell regulatory genes. These associations and the null phenotype of HNDC suggest a likely role in stem cell differentiation in the *Drosophila* ovary. Furthermore, others have reported an interaction between CG15436 and a known chromatin regulating protein, SuUR (Suppressor of Under-Replication). In an effort to further characterize this interaction and investigate the molecular function of HNDC, the full transcripts of HNDC and SuUR have been subcloned and placed in yeast two hybrid constructs to better characterize these protein associations. Altogether this study demonstrates a link between the phenotype of HNDC mutants and begins to reveal the molecular interactions that regulate chromatin structure and are critical in controlling genes involved in regulating differentiation within the ovary.

10:00 MACROPHAGE-DERIVED MYD88 ACTS AS A NEGATIVE REGULATOR OF TLR3 SIGNALING. Haley M. Spaner (hspaner11@students.ndc.edu), Angela C. Johnson (acjohnson@ndc.edu) Notre Dame College, 4545 College Road, South Euclid, OH 44121.

Innate immune recognition is governed by a variety of pattern recognition receptors, including Toll-like receptors (TLRs). These receptors, which are expressed in macrophages, dendritic cells, and epithelial cells, are a critical point in the recognition of invading microorganisms. Recent studies have suggested that MyD88, a common adaptor molecule utilized by most TLR signaling pathways, plays a negative regulatory role in the signaling of TLR3, as a genetic knock-out of MyD88 results in increased TLR3 activity. Therefore, it is endeavored to extend these findings by studying the effects of combined triggering of TLR2, which utilizes MyD88, and TLR3. As TLRs are highly expressed and regulated on macrophages, the macrophage cell line J774 will be utilized. Macrophages will be treated with Pam3Cys (TLR2 agonist) alone, Poly(I:C) (TLR3 agonist) alone, and a combination of Pam3Cys and Poly(I:C). At the conclusion of the experiment, cell activation will be assessed by nuclear translocation of NF-κB and cellular production of CCL5/RANTES. In agreement with previous MyD88 gene knock-out studies, it is expected that both NF-κB nuclear translocation and cellular production of CCL5/RANTES will be increased in the group receiving both Pam3Cys and Poly(I:C). Presumably, as MyD88 is utilized for signaling via TLR2, its negative impact on TLR3 signaling will be relieved and; therefore, TLR3 activation can proceed with more intensity. As the specific details of these pathogen recognition pathways are elucidated, the impact of bacterial infections (TLR2) upon viral infection (TLR3) will be better understood.

10:15 ANNOTATION OF DROSOPHILA BIARMIPES CONTIG 37 FROM THE HETEROCHROMATIC DROSOPHILA DOT CHROMOSOME AND CONTIG 62 FROM EUCHROMATIC CHROMOSOME 3. Rachel Boody (r-boody@onu.edu), Kathryn Kuchefski (k-kuchefski@onu.edu), and Jamie L. Sanford (j-sanford@onu.edu) (Advisor), 525 N. Main Street, Ada, OH 45810.

The advent of next-generation sequencing technologies has resulted in an almost exponential increase in the number of fully sequenced genomes, including many *Drosophila* species. This has resulted in a corresponding need for increased manpower to manually annotate these genomes. The Genomics Education Partnership (GEP), at Washington University, was developed to utilize undergraduates to annotate newly sequenced *Drosophila* genomes. Their research goal is to understand the evolutionary mechanisms that underlie gene transcription on the highly heterochromatic 4th (dot) chromosome in *Drosophila*. Interestingly, the proportion of transcribed genes on the dot chromosome is similar to that of euchromatic chromosomes 1-3. The GEP is utilizing a comparative genomics approach to relate gene features of the Dot chromosome to those of chromosome 3. The current study focuses on annotation of contigs from the D. biarmipes genome. Data from annotation of contig 37 from the Dot chromosome of *D. Biarmipes* revealed the presence of orthologues to the *D. melanogaster* Oct-TyR and CG7139 genes. Annotation of contig 62, located on chromosome 3 in *D. biarmipes*, revealed the presence of several genes: Rpn10, Mkrn-1, ppk5, CG11109, Cdk12, CG7611, SAK, and M6. Annotation results were obtained using standard bioinformatics approaches, including NCBI Blast, and involved determination of gene models for all of the identified orthologues. These gene models include exon and intron coordinates for all isoforms of each gene. Future investigations will expand upon these gene models by conducting motif hunting to find conserved regulatory regions that may contribute to transcription of genes from the dot chromosome.

10:30 USING REVERSE GENETIC APPROACHES IN UNCOVERING THE CELLULAR FUNCTION OF *DROSOPHILA MELANOGASTER* CG12054, A GENE ESSENTIAL FOR VIABILITY AND THE HOMOLOG TO HUMAN JAZF1. Brittany N. Stawicki (bstawicki11@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu), Notre Dame College, 4545 College Road, South Euclid, OH 44121.

Delicate balance of gene expression is crucial in coordinating proper cellular function while avoiding chaotic breakdown of cellular mechanisms. An example of the need for proper regulation is seen in JAZF1, a C2H2 Zinc finger

protein associated with prostate and endometrial cancers in humans and a reported transcriptional repressor. This study will examine the Drosophila melanogaster homologue to JAZF1, CG12054. Previously, CG12054 has been unstudied and this report examines it using in vivo and in vitro methods. Two in vitro methods are focused on the generation of a CG12054 mutant. The first of these methods uses a FLP-FRT system to generate a null mutant based on heat shocked driven enzyme, FLP, which causes recombination between FRT DNA sequences that flank the 5' and 3' ends of CG12054. The second method employs an ethyl methanesulfonate (EMS) mutagenesis to induce point mutations within CG12054, followed by a complementation test. Mutants are then crossed producing a stable line and screened over a CG12054 allele that has been found to be a homozygote lethal. To date 262 chromosomes have been stably crossed to test in the complementation assays. To determine the molecular partners of CG12054, a yeast two-hybrid analysis against an embryonic Drosophila cDNA library is being conducted. Full-length cDNA of CG12054 has been subcloned for use in the yeast two-hybrid systems. An embryonic cDNA library has been selected because expression of CG12054 peaks during embryonic stages 1-16. Together these investigations are helping to further reveal the function of CG12054 in proper cellular regulation.

9:00 - 11:00 AM
Session 07 -
Cell Bio/Physiology/ Physics
The Battelle Building - Room TBD

09:00 THE ANTI-CANCER EFFECTS OF FUNGAL METABOLITES SUPPLEMENTED WITH BITTER MELON EXTRACT. Alison Cash (casha@findlay.edu), Kunjal Patel (patelk13@findlay.edu), Maddie Simmons (simmonsm@findlay.edu), Laura Richards (richardsl@findlay.edu), Savannah Ferkins (ferkinss@findlay.edu), Shannon Matthews (matthewss@findlay.edu), Donald Walker (walkerd@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

Fungi are important in the production of food and drugs. As an example, fungal metabolites from *Phoma* sp., *Penicilliium crysogenum*, and *Aspergillus terreus* are used as anti-cholesterol statins, penicillin antibiotics, and even immunosuppressants, respectively. Fungal bioprospecting is ideal for discovering new molecules useful in modern medicine. The metabolites and their bio-activity may be able to be altered by controlling the carbon source in the growth media. Bitter melon extract shows inherent anti-cancer properties. This study will investigate the effect on cancer cell viability when bitter melon extract has been added as a carbon source for fungal metabolism. Pure culture fungi will be grown in the presence and absence of bitter melon extract. Fungal metabolites will be collected in ethyl acetate as crude extracts. HCT 116 (colon cancer) cell lines will be cultured in IMDM medium enriched with 10% fetal bovine serum at 37°C and 5% CO_2. Cells will be plated in triplicate at equal seeding densities (500 cells/plate) and dosed with 1, 2, 5, 10 µL of crude extract. After treatment, cells will be fixed with methanol and stained with crystal violet. Colonies of greater than 100 cells will be counted and totaled. Student's t-test will be employed to see if there is a statistical difference between extracts containing bitter melon metabolites and those that do not. Preliminary results have identified several fungal extracts with anticancer properties. These fungi will be cultured in the presence of bitter melon and comparative analysis will be conducted using extracts collected in the presence and absence of bitter melon as a carbon source for fungal growth.

09:15 THE EFFECT OF FUNGAL METABOLITES ON THE CELL CYCLE OF CANCER CELLS. Graham Rossi (rossig@findlay.edu), Meredith Evans (evansm@findlay.edu), Emily Green (greene@findlay.edu), Donald Walker (walkerd@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

During the cell cycle, the DNA damage and repair pathways that correct DNA alterations are activated. This leads to a delay in the cell cycle, thus allowing time for a repair response. This time delay should be detectable and may provide a measurement of DNA damage. The greater DNA damage to the cancer cells causes a longer repair pathway. Previous work in our lab has demonstrated that fungal metabolites are mutagenic. Cancer cells treated with fungal extracts cause mutations which signal the cell to initiate apoptosis due to genotoxic effects. This study investigates the effect that sub-lethal amounts of these extracts have on the cell cycle of cancer cells. A thymidine block will be used to synchronize cultures of human cancer cells. Addition of thymidine arrests cells in the G1/S boundary by preventing DNA synthesis. Cells will be treated with 1, 2, 5, and 10 uL of fungal extract and released from the thymidine block. Cells will be recovered at 8, 12, 16, 24 hours after treatment. Cells will be fixed in ethanol, stained with propidium iodide, and then analyzed by flow cytometry for DNA content. The amount of cells in each phase of the cell cycle will correlate to their DNA content. A comparative analysis between treated and untreated cells will be conducted and a Students t-test used to determine whether there is a statistical difference. A slower progression of cells through the cell cycle is anticipated for treated cells.

09:30 A COMPARISON OF CHEMICAL ENHANCEMENTS FOR THE DETECTION OF LATENT BLOOD WITH HEMASCEIN USING EDTA. Peter Brown (pbrown001@defiance.edu), Somnath Dutta (sdutta@defiance.edu), Defiance College, 701 North Clinton Street, Defiance, OH 43512.

Blood is often found at crime scenes and collected in EDTA (ethylenediaminetetraacetic acid) vacuum tubes to prevent coagulation. Latent blood can be detected by several enhancement methods, including the use of luminol, and commercially produced, stable fluorescein reagents, such as Bluestar^R reagent, and the Hemascein^R reagent. In this study, the hemascein fluorescent reaction is going to be studied to see how ethylenediaminetetraacetic acid (EDTA), the material used to store blood, affects latent blood detection. Using Potassium ferricyanide as a blood substitute at lower concentrations of EDTA (5×10^{-5} to 5×10^{-3} M) chemiluminescence of luminol was enhanced, whereas at higher concentrations of EDTA (5×10^{-2} to 5×10^{-1} M) luminol chemiluminescence was unamplified. Above results differed from the results obtained by Seashols et al. because in their work they found that the blood that was not treated with EDTA gave similar or slightly more sensitive results than the blood that was treated with EDTA (Seashols et al. 2013). Stock solutions of the potassium ferricyanide (7.59×10^{-5} M), 0.5 M EDTA, and (and 5.64 E^{-5} M) hemascein will be prepared. Serial dilutions (5.0 E^{-2} M, 5.0 E^{-3} M, 5.0 E^{-4} M, and 5.0 E^{-5} M) of the EDTA will then prepared. Chemiluminescence will be studied in 96 well plates using a Synergy HT Microplate.

09:45 PHOTOLITHOGRAPHY FOR THE INVESTIGATION OF NANOSTRUCTURES. Helen M. Cothrel (hc261409@ohio.edu), 6141 Lancaster-Kirkersville Rd., Baltimore, OH, 43105.

Developing a rapid, iterative, and limited-resource method of microfabrication with which devices with large localized electric fields can be generated will expand research capabilities for those interested in nanostructures. Photolithography is a common method of microfabrication, and it can be conducted within the confines of a small laboratory. The parameters for photolithographic methods,

such as baking temperature, exposure, and development time, were optimized to yield interdigitated-finger devices with features on the order of 2 μm capable of creating electric fields up to 10 kV/cm. One such device has been used to examine quantum dots (QDs) in toluene. QDs are semiconductor nanoparticles, with sizes in the range of 1-50 nm, which are often called "artificial atoms" due to their discrete energy levels arising from atomic-like quantum confinement. Many potentially useful properties of QDs depend on their behavior in external fields. Using devices created with photolithography, two trials have been conducted with QDs. In the first, QDs suspended in toluene were applied to conducting interdigitated fingers which had no bias applied; luminescence of the QDs showed that they did not preferentially align or cluster on the fingers. However, in a second trial, QDs in the presence of an applied electric bias clustered on fingers with lower potential. This indicates that the QDs are accumulating charge during handling, possibly from interaction with the toluene solution in which the QDs are stored. This could provide a method for preferential deposition and/or localization of QDs using electric fields. Future experiments will work to isolate the charging mechanism and explore the potential for nanoscale manipulation of QDs using external fields.

10:00 HUMAN SRY INCREASES BLOOD PRESSURE OF SD RATS AND ALTERS RENIN-ANGIOTENSIN SYSTEM GENE EXPRESSION. **Fabiana Alves (alves.bio@gmail.com)[1,2], Francisco de Oliveira Vieira (chicobrant@gmail.com)[1], Antônio Augusto Bastos Peluso (augustopeluso@gmail.com)[2], Amy Milsted (milsted@uakron.edu)[2], Jeremy W. Prokop (jwp7@zips.uakron.edu)[3], Monte E. Turner (meturner@uakron.edu)[2], Maristela de Oliveira Poletini (marispoletini@icb.ufmg.br)[4], Nariele Araújo Fernandes Ferreira (narydiow@hotmail.com)[2], Deborah Ribeiro Nascimento (deborahrn19@gmail.com)[1], Sarah Fonseca Martins (sarahebreia@yahoo.com.br)[1], Luiz Orlando Ladeira (ladeira@fisica.ufmg.br)[5], Robson Augusto Souza Santos (robsonsant@gmail.com)[2], Almir Sousa Martins (alisbetermster@gmail.com)[1], Rua Júlio Diniz, 604 apt 201 Bairro Santa Branca, CEP.: 31565-180, BH, MG, Brasil. [1]Núcleo de Fisiologia Geral e Genômica Funcional-ICB, [2]Laboratório de Hipertensão-ICB, [3]Department of Biology-UAkron-OH/USA, [4]Laboratório de Metabolismo-UFMG; [5]Departamento de Física-UFMG.**

The Sry gene on the Y chromosome is responsible for male sexual differentiation. It also participates in blood pressure (BP) control in rats. The aim of this study was to evaluate the influence of human Sry gene (hSry) on blood pressure of Sprague Dawley rats (SD) through the renin angiotensin system (RAS). Human Sry DNA was delivered to kidneys of adult male SD rats (n=3) by electroporation; 3 (control) rats were electroporated with non-specific DNA. In a second experiment the same DNAs were delivered together with 100 μg/ml of multi-walled carbon nantotubes (MWCN) via the external carotid artery. To evaluate hSRY effects on RAS gene expression, SD neonatal cardiomyocytes were transfected with 50 ng of hSRY (n = 5) complexed to 25 μg/ml of MWCN. Expression of renin, angiotensinogen, ACE, ACE2 and receptors Mas, AT1 and AT2 were evaluated by quantitative RT-PCR. Telemetry data showed significant increases in SD BP after delivery of gene by either route (p<0.01). After transfection into cardiomyocytes of SD rats with hSry, there was a significant increase in the expression of the renin (p=0.0059), ACE (p=0.0380) and AT2 (p=0.0440); without significant changes of AT1, ACE2 and MAS. These results demonstrate for the first time that the human Sry gene increases BP in SD rats, and significantly modulates RAS gene expression in rat cardiomyocyte cultures.

10:15 IMPACT OF VARIOUS CAFFEINE VEHICLES ON MOOD AND COGNITIVE, NEUROLOGICAL AND PHYSIOLOGICAL FUNCTIONS OVER FIVE HOURS. **Ryan Paulus (r-paulus@onu.edu), Alex Roth (a-roth@onu.edu), Lauren Titus (l-titus@onu.edu), Renee Chen (r-chen@onu.edu), Michael Chad Bridges (m-bridges@onu.edu), and Shyla Woodyard (swoodyard@onu.edu), [Advisors Vicki A. Motz (v-motz@onu.edu), Nancy Woodley (nwoodley@onu.edu) and Rema G. Suniga (r-suniga@onu.edu)], 7865 Fleetfoot Rd. Celina, OH. 45822.**

Although caffeine consumption of college students has increased over the last decade, neither the time frame in which caffeine exerts its effects, nor the impact of the vehicle by which caffeine is consumed have been thoroughly studied. Sixty college students were randomly and unknowingly placed into one placebo (flour) or three caffeine treatment groups: (5-Hour Energy ® (5HE), Starbucks DoubleShot ® (SDS), or caffeine powder (CP)); all dosed at 3 mg caffeine/kg of body weight. A battery of tests was performed prior to dosing and repeated 2.5 and 5 hours post treatment. Mood was self-reported on a scale of 1-100 for happiness, alertness and focus. Cognitive function was assessed by Stroop and memory tests. Heart rate, and blood glucose were determined, and electroencephalogram and reaction time were recorded. Initial measurements across groups and group baselines vs 2.5 and 5 hour results were analyzed by ANOVA followed, when indicated, by post hoc t-tests at 95% confidence levels. All caffeine groups had elevated mood and faster reaction times at all time periods. At 2.5 hours, those consuming CP reported to be the happiest; and both CP and 5HE group had improved Stroop test accuracy. The SDS group demonstrated decreased performance in memory and no change in alertness. The 5HE group rated alertness higher than the other caffeine treatments, and was the only group having decreased brain wave amplitude (indicating increased attention) and memory improvements; indicating that addition of the B vitamins and an energy blend effectively increased both the degree and duration of caffeine effects across test parameters.

1:00 – 3:00 PM
Cyanobacterium Panel Discussion
The Bridge of Learning Room

Doug Kane, PhD - Defiance College - Dr. Kane's teaching at Defiance includes environmental science, introductory biology, botany, ecology and restoration ecology. His research interests lie in plankton and benthic invertebrate ecology, as well as effects of invasive species on communities and ecosystems, causes and consequences of cultural eutrophication, and ecosystem integrity of Lake Erie, and his recent research has focused on effects of the Sandusky River system on dissolved oxygen and phytoplankton dynamics in Lake Erie and the potential effect of the Emerald Ash Borer on Lake Erie Island forest tree communities.

Justin Chaffin, PhD - The Ohio State University, Ohio Sea Grant & Stone Lab - Dr. Chaffin is the research coordinator of the Ohio State University's Stone Laboratory. He completed his doctoral degree at the University of Toledo where he studied algae and Lake Erie. Dr. Chaffin also has been a key player in coordinating water quality monitoring practices between state regulators, researchers and charter boat captains in an effort understand and compare data collection practices occurring across the Lake Erie's Western Basin.

Linda Merchant Masonbrink - Ohio EPA - Linda Merchant-Masonbrink is the Inland Lakes Program coordinator at the Ohio EPA Central Office in Columbus, Ohio. She holds a BS with a major in Microbiology, which included classes at Stone Laboratory, and a Masters in Landscape Architecture. Both degrees are from The Ohio State University. She took post-graduate classes in wetland ecology and ecological engineering.Linda assisted the Inland Lakes Team in the development of a new sampling program which officially began in 2008, and she is also Ohio EPA's Harmful Algal Bloom (HAB) coordinator for recreational waters. This year, Linda is participating in her second Ohio Academy of Science symposium.

Roderick Dunn - Water Quality Assurance Lab Manager, City of Columbus - Rod Dunn currently manages the Water Quality Assurance Laboratory for the Columbus Division of Water. In addition to maintaining compliance with all aspects of the Safe Drinking Water Act, the labs current research focus includes: source water quality impacts on drinking water treatment and finished water quality, algae and cyanotoxins, biological filtration monitoring and optimization, distribution system water quality, and remote water quality monitoring. He has a B.S. from Ohio State University and an M.B.A. from Franklin University; as well as an Ohio Class III Water Treatment License and 23 years of experience in the drinking water industry. He first became involved with cyanobacteria in 1995 as the Division of Water's phycologist. Initiating cyanotoxin testing in 2001, then later participating in a project jointly sponsored by the Water Research Foundation and Australian Cooperative Research Centre for Water Quality and Treatment, on Determination and Significance of Emerging Algal Toxins (Cyanotoxins).

Julie Weatherington-Rice, PhD, CPG, CPSS is the Sr. Scientist at the engineering firm of Bennett & Williams Environmental Consultants Inc. in Westerville, Ohio and an Adjunct Professor at The Ohio State University in the Department of Food, Agricultural and Biological Engineering (FABE). She is also a Fellow of The Ohio Academy of Science. She holds a BS in Earth Science Education, an MS in Geology and Mineralogy and a PhD in Soil Science, all from The Ohio State University. She has been involved in the research of cyanobacteria since the fall of 2006. She has served on the two State of Ohio Lake Erie Phosphorus Task Forces, representing the Ohio Academy of Science and FABE. Dr. Rice has coordinated previous symposium as a public outreach and educational effort for the Academy.

Larry Antosch, PhD - Senior Director, Policy Development and Environmental Policy, OFBF Dr. Antosch's professional and academic interests are in the area of applied research directed towards water resource management. He holds three multi-disciplinary degrees (BS in Environmental Science from the University of Wisconsin-Green Bay, MS in Environmental Science from the University of Texas at Dallas and a PhD in Water Resources from Iowa State University) and has conducted research on water quality watershed management issues in Pennsylvania while on the faculty at the Pennsylvania State University for 4 years prior to joining Ohio EPA in 1986.

Pre-college Poster Session
9:00 – 11:00 am
Capital Center

Poster Board No. 001 PACKING PREDICAMENT: WHAT IS THE BEST PACKAGING MATERIAL TO SHIP A FRAGILE OBJECT? Timothy M. Fornadel, St. Rita School, 33200 Baldwin Rd, Solon, OH 44139.

Discrepancies exist as to the best way to ship a fragile package. The purpose of this study was to determine which packing material is the best shock absorber for a fragile object, namely, a falling egg. The hypothesis stated that packing peanuts result in the most damage when an object drops because the peanuts will displace and let the egg fall through, thus allowing the eggs to be damaged. This experiment was conducted by dropping eggs (N=90 total) from 3', 5' and 7' heights from a quick release, 8' wooden tower. Ten eggs were dropped at each level for each material. Packing peanuts, bubble wrap, and fitted Styrofoam were materials tested in prevention of damage to the eggs. Data were collected and recorded by the same person. Using packing peanuts, at the 3' marker, 6 of the 10 eggs were damaged. At the 5' and 7' markers, all eggs (n=10) in packing peanuts were damaged. Using bubble wrap, every egg was damaged at every level. Using Styrofoam, all but one egg (n=29) remained intact. Limitations to this study included that the wooden tower had some warping, potentially changing velocity at which the eggs were dropped. There was also no specific grading scale to measure the integrity of the eggshell, and limited quantities of packing material were used. In conclusion, the hypothesis was not supported, and the packing peanuts performed better than the bubble wrap. The best packing material overall was the fitted Styrofoam.

Poster Board No. 002 EFFECT OF MINIMALIST FOOTWEAR ON RUNNING EFFICIENCY. Stephen M. Gillinov (SGillinov@gmail.com), University School, 2875 SOM Center Road, Ohio, 44022.

Although minimalist footwear is increasingly popular among runners, claims that minimalist footwear enhances running efficiency are controversial. The objective of this study was to test the hypothesis that minimalist and barefoot conditions improve running efficiency when compared to traditional running shoes. In this experiment, experienced runners (n=15) completed three, 90-second running trials on a treadmill, each with a different type of footwear: traditional shoes with a heavily cushioned heel, minimalist shoes with minimal heel cushioning, and barefoot. High-speed photography was used to determine foot strike, ground contact time, knee angle, and stride cadence. Runners had more rearfoot strikes in traditional shoes (87%), compared to minimalist shoes (67%) and barefoot (40%) (p=0.03). Ground contact time was longest in traditional shoes (265.9 ± 10.9 ms) when compared to minimalist shoes (253.4 ± 11.2 ms) and barefoot (250.6 ± 16.2 ms) (p=0.005). There was no difference between groups with respect to knee angle (p=0.37) or stride cadence (p=0.20). When compared to traditional shoes, both the barefoot condition and minimalist shoes produce greater running efficiency, as shown by a greater tendency toward a midfoot or forefoot strike and a shorter ground contact time. Additionally, minimalist shoes closely approximate the barefoot condition in the four measurements performed. Therefore, with regard to running biomechanics and efficiency, minimalist footwear is preferable to traditional shoes.

Poster Board No. 003 HOW TO TRAIN YOUR CRICKET: TESTING THE MEMORY OF T-MAZE TRAINING IN ACHETA DOMESTICUS. Adriane E. Thompson (aet.dance@gmail.com), 6327 Andrews Dr. W., Westerville, OH 43082. (Genoa Middle School).

This experiment was done to see if crickets, after being trained to go in a specific direction in a T-maze, could remember which side they were trained to go, as was predicted. This was tested by letting a total of 10 crickets run through a T-maze for about a minute, twice each day, with three pieces of apple and sugar in one side of the maze to train the cricket to go in a specific direction. Each day, training was repeated with one fewer piece of apple. After three days of training, crickets were tested in the T-maze without food, and recorded to see how many times the cricket would go to the side it was trained to. A total of 6 crickets were able to participate in this. It was found that, on the left-trained group, two crickets had no preference to either side, while one cricket favored the left. On the right-trained group, one cricket did not favor either side, while the other two favored the right. The conclusions for this experiment are that not all crickets can be trained; however no crickets remembered to to the side that they weren't trained to go; they were only either un-trained or trained to go to their side. The only limitations to this experiment is the small number of crickets used in the experiment (there were six in the end) because this experiment was a pilot test. In the future, it would be done with a larger quantity of crickets.

Poster Board No. 004 THE EFFECTS OF ADDED SODIUM CHLORIDE ON A MICROBIAL FUEL CELL. Martha J. Blatt (17mblatt@beaumontschool.org), 615 Jefferson Drive Highland Hts., OH 44143.

Microbial fuel cells provide clean renewable energy. Microbes release electrons when they metabolize nutrients found in the soil. Microbial fuel cells harness the electrons to produce energy. A microbial fuel cell consists of an anode and cathode with soil in between. The electrons are transferred to the anode and then travel to the cathode creating an electrical current. The difference in the oxygen concentration of the dirt surrounding the anode versus the cathode creates the voltage. The current and the voltage combined create the power. The problem investigated was the following: Will adding sodium chloride to a microbial fuel cell increase power output? The hypothesis was that adding sodium chloride to a microbial fuel cell increases the power output. The materials needed were a KeegoTech Mudwatt™ microbial fuel cell, topsoil, 100 mL graduated cylinder, mixing bowl, stopwatch, voltmeter/multimeter, and sodium chloride. The microbial fuel cell was assembled according to the manufacturer's instructions. The microbial fuel cell was observed and data was collected daily. When the power level plateaued, 1 g of sodium chloride was added. Before the sodium chloride was added, the microbial fuel cell produced 30.63 microwatts with the 1000 ohms resistor. After adding sodium chloride, 104.98 microwatts was produced with the 1000 ohms resistor. One repeat trial was performed with results that also supported the hypothesis. The conclusion is that the addition of sodium chloride can effectively increase power output. This experiment is important as microbial fuel cells are improved upon for use as an alternative energy source.

Poster Board No. 005 MICROWAVE HEATING VS. STOVE TOP HEATING: EFFECT OF COOKING METHODS ON ANTIOXIDANT LEVELS. Janvie S. Naik (janviesmail@gmail.com), 10055 Archer Lane Dublin, OH 43017.

Antioxidants are vital for the human body; they reduce the effects of free radicals. Free radicals cause cell damage that can lead to cardiovascular diseases and cancer. This investigation compares the effects of microwave and stovetop cooking on antioxidant levels. Because microwave heating takes less time, it is expected that it destroys less antioxidants than stove top heating. The antioxidants vitamin C and glutathione are tested. One sample of each antioxidant is heated in the microwave, and another sample of each antioxidant is heated on the stovetop. After all samples reach 80°C, the heating is stopped. In order

to find the concentration of antioxidants in each sample, two drops of phenolphthalein indicator are added and the samples are titrated one by one with sodium hydroxide. Five trials are repeated. The initial concentration of the samples are 0.803 M for vitamin C and 0.460 M for glutathione. It is found that for vitamin C, heating on the stove destroys less antioxidants. For glutathione, however, heating in the microwave destroys less antioxidants. For vitamin C, the difference between the concentrations of the samples heated using the two different cooking methods is 0.023 M. For glutathione, this difference is 0.006 M. It is a popular belief that microwave heating destroys a considerable amount of antioxidants; however, the results from this experiment show that the cooking method used does not have a profound effect on antioxidant levels. This experiment shows that regarding antioxidants, it is insignificant whether microwave or stovetop heating is used.

Poster Board No. 006 ETHANOL PRODUCTION THROUGH BIOLOGICAL PRETREATMENT OF MISCANTHUS SINENSIS USING PLEUROTUS OSTREATUS. Srinath V Seshadri (sscavsfan99@gmail.com), 7104 Timberview Drive, 43017.

This research is a comparative study between varying pretreatment methods employed in the cellulosic bioethanol production process. The first pretreatment is a process known as biological pretreatment. This pretreatment uses the white-rot fungus, *Pleurotus ostreatus*, to degrade the cellulosic substrate and perennial grass, *Miscanthus sinensis*. The hypothesis of this study was that the biological pretreatment of *M. sinensis* would outperform sulfuric acid pretreatment, which was the comparative process in this study that is often used in the industry. After solid-state fermentation of the *M. sinensis*, the substrate was solubilized, fermented, and distilled. The distillate was analyzed using refractive index. The ethanol concentration was calculated mathematically based on a linear regression equation derived from the refractive indices of known ethanol/water solutions. The final ethanol yield per replication was determined by multiplying the calculated ethanol concentration times the total distillate volume. Four replications of this process were done. These values were compared to the ethanol yield of a sulfuric acid pretreatment. Previously, only one replication of the pretreatment using sulfuric acid was done. The cellulosic substrate *M. sinensis* was degraded by heating the substrate with 70% sulfuric acid for 30 minutes at 40 degrees Celsius. The resulting hydrolysate was fermented, distilled, and analyzed using the refractive index as above. The results showed that the biological pretreatment, on average, produced 288.2 mL of ethanol, while the sulfuric acid pretreatment produced only 5.31 mL of ethanol for an equal amount of substrate. The results obtained from this study indicated the viability of biological pretreatment in the industry as a feasible alternative to sulfuric acid that may even benefit the cellulosic ethanol industry.

Poster Board No. 007 NEURAL CREST CELLS AND THEIR ROLES IN INFLUENCING STRUCTURE AND FUNCTION OF THE DEVELOPING CARDIOVASCULAR SYSTEM. Madeleine A. Ference (mference16@hb.edu), Nitya L. Thakore (nthakore16@hb.edu), Pei Ma (pxm261@case.edu), 6622 Winston Ln, Solon Ohio 44139.

Prenatal ethanol exposure results in Fetal Alcohol Spectrum Disorder (FASD) in 1% of live births in the USA. Of these 28.6% had congenital heart defects (CHDs). The reason for the CHDs is not known. Alcohol exposure might cause damage to a sensitive set of embryonic cells termed cardiac neural crest cells (NCCs). The hypothesis tested in this study was that cardiac NCC ablated embryos would share cardiac defects similar to those of the ethanol-exposed model. Fertilized quail eggs, an animal model with many cardiac similarities to humans, were incubated to neurulation. The experimental group had their cardiac NCCs specifically ablated with an infrared laser. After controls and cardiac NCC ablated groups developed to day 8, they were imaged using Optical Coherence Tomography (OCT) to create three-dimensional models of cardiac valve leaflets. OCT images were analyzed using imaging software (MATLAB and AMIRA) to render volumes of the valve leaflets. Cardiac NCC ablated embryos had a significant reduction in the left atrioventricular septal valve leaflets by 43% (ANOVA) compared to the control. The left AV mural valve leaflet also appeared to be smaller by 38% compared to the control. The results were similar to those previously reported for ethanol-exposed embryos. These valve defects as well as other cardiac defects are consistent with the hypothesis that the alcohol may be acting to alter cardiovascular structure by disturbing cardiac neural crest cells.

Poster Board No. 008 ASSESSMENT OF ANTIBODY RESPONSES AS BIOMARKERS OF EXPOSURE AND IMMUNITY TO MALARIA FOLLOWING CONTROL MEASURES IN THE SOLOMON ISLANDS. Rohan Garg (rgarg17@us.edu), Gabriel Frato (gnf2@case.edu), Christopher King M.D., Ph.D (christopher.king@case.edu), University School, 2785 Som Center Rd. Hunting Valley, Ohio, 44122, Department of Global Diseases at the Case Western Reserve University School of Medicine.

Malaria infections are primarily transmitted by *Plasmodium falciparum* and *Plasmodium vivax*. The King laboratory is part of an international project to eradicate malaria in the Ngella Province in the Solomon Islands. The purpose of the study was to evaluate the effect of malaria control measures taken in the Ngella Province on the levels of malaria transmission as estimated by the levels and breadth of antibody responses to malaria antigens across 19 villages. Plasma samples were collected from 3,500 individuals of varying ages from 19 villages in the Ngella Province to determine malaria infection rates in each village. A subset of 25 samples from each village was randomly selected for assessment of antibody response levels to fifteen *P. falciparum* and nine *P. vivax* antigens. Immunofluorescence assays were performed to quantify antibody response levels in each plasma sample to each antigen. It was hypothesized that antibody response levels would be higher to *P. vivax* antigens than to *P. falciparum* antigens and that antibody response levels would be highest in the villages with the highest malaria infection rates. The results support both hypotheses. Antibody response levels were found to be 20% higher to *P. vivax* antigens than to *P. falciparum* antigens, suggesting that levels of *P. vivax* transmission are higher than those of *P. falciparum*. Additionally, samples from the five villages with the highest rates of infection were found to have the highest antibody response levels. The results of the study may impact future malaria control measures taken in the Ngella Province.

Poster Board No. 009 CAN THE AQUAPONIC PROCESS USED WITH BIOCHAR INCREASE THE GROWTH OF SOYBEAN PLANTS? Bethany G. Cox (BCox2946@yahoo.com), 300 West Bayton Street, Alliance, Ohio, 44601.

The world is concerned about feeding a growing population and using organics. Biochar with aquaponics could help. Biochar is burned organic waste that is used to put carbon in the soil. The combination can eliminate or lessen the need for made-made fertilizers. If soybeans were grown aquaponically with biochar, then the growth of soybean plants would be increased. For this project, soybeans were soaked to begin germination. There were four groups, each containing ten pots. Each pot had one seed. The control group contained generic potting soil. The next group contained a mixture of 20% biochar and 80% generic potting soil. Two groups were lined with clay pebbles to prevent erosion. Ten pots contained generic potting soil and ten pots contained the biochar mixture. Each aquaponic system had a fish tank with ten goldfish and a water pump. The water was pumped through the aquaponic plants for 30 minutes daily. The ammonia, nitrite, nitrate, and

alkalinity levels were tested. The control group totaled 619 cm stem height, 90 leaves, 41.1 cm leaf width, and 52.3 cm leaf length. The biochar group totaled 672 cm stem height, 92 leaves, 49.6 cm leaf width, and 57.9 cm leaf length. The aquaponic control group totaled 699 cm stem height, 107 leaves, 48.2 cm leaf width, and 58.8 cm leaf length. The aquaponic with biochar group totaled 729 cm stem height, 113 leaves, 50.2 cm leaf width, and 60.8 cm leaf length. The aquaponic with biochar combination had the greatest growth. The water's chemical content was an ideal fish environment. Results confirm the hypothesis.

Poster Board No. 010 EXTRACELLULAR ADP AND AMP ARE GENERATED BY INTRACELLULAR METABOLISM OF ATP AND REALEASED VIA PANNEXIN 1. Graham S Lane[4], Andrea Boyd Tressler[1], Caroline El Sanadi[2], Nathan Berger[3], George Dubyak[1,2]. [1]Department of Pharmacology, [2]Department of Physiology and Biophysics, [3]Center for Science, Health, and Society, [4]Case Western Reserve University, School of Medicine, Cleveland, OH, University School, 1385 Echo Glen, Gates Mills, Ohio, 44040, PO box 633.

Some chemotherapies cause the anti-tumor immune response to occur. During this response it is known that ATP (Adenosine triphosphate) is released through the pannexin 1 channel, which is cleaved by apoptotic caspases. It has been shown that ADP (Adenosine diphosphate) and AMP (Adenosine monophosphate) are also released, however it's unclear whether the majority of ADP and AMP in extracellular media is due to intercellular or extracellular metabolism. The goal was to determine whether the presence of ADP and AMP in media is due to intracellular or extracellular metabolism. The hypothesis was that ADP and AMP are being generated intracellular. To test this, Ecto-nucleotidase activity of media was performed on RPMI, RPMI plus 10% calf serum, RPMI plus 10% heat inactivated calf serum, basal salt solution (BSS), BSS plus 10% calf serum or BSS plus heat inactivated calf serum and measuring for ATP levels prior to the addition of 10 uM ATP. Levels of ATP were measured for 30 min. Ecto-nucleotidase activity of the cells was measured by suspending Jurkat human T cell Leukemia in BSS. Basal ATP levels were measured prior to the addition of 10 uM ATP. Regulatory florescent units (RFU), indicative of ATP presence, were then measured. The RFU remain steady throughout the 30 min, after the initial addition of 10 uM ATP, at 1,400,000 RFU/s, indicating that the majority of the ADP and AMP found in the media is being generated through intracellular metabolism. This is significant because when AMP breaks down into adenosine, an anti-inflammatory, it potentially counteracts the anti-tumor immune response.

Poster Board No. 011 THE SHEAR STRENGTH OF A WOOD ADHESIVE ON VARYING SURFACE CONDITIONS. Mica L Brooks (mica.brooks@gmail.com), 2427 Covington Road Akron, Ohio 44313.

The purpose of this experiment was to determine what sanded plywood surface would be the strongest if using a polyvinyl acetate glue on the wood surfaces in a shear strength test. The predicted outcome of the experiment was that the coarsest sandpaper would allow for the strongest bond. Eighteen samples were prepared in three batches using 60 grit sandpaper, 180 grit sandpaper, and control samples that were not sanded. Three samples of each type were cured for three days and three samples for four days. The samples were tested using a tensile testing machine and an extensometer. The strengths recorded ranged from 672 lbs. to 922.33 lbs. of shear load. Samples cured for four days had an average 140 lbs. larger maximum load than those cured for three days. Samples prepared with 180 grit sandpaper and four days of curing time had the highest average maximum shear strength of 922.33 lbs. In both tests the preparation with 180 grit sandpaper provided the strongest adhesive bonds in the shear strength test. This result was counter to the expectation that samples created with coarser 60 grit sandpaper would provide a stronger bond. This suggests that the surface area of contact between two adhered surfaces is more important than creating more overall surface area for glue adhesion to occur. Another rationale for this result was that the glue was too viscous to fill all of the voids created by the coarser sandpaper resulting in less contact area between the adhesive and wood surfaces.

Poster Board No. 012 FOOD TO ENERGY: ENERGY PRODUCTION IN BIO-HYBRID DYE-SENSITIZED SOLAR CELLS. Michaela M. Dean (mdean43015@gmail.com), 282 North Washington Street Delaware, Ohio 43015.

Alternative energy has a long way to go before it can handle the growing energy needs of the world. By using plants as the main component in a solar cell, it might be possible to use what nature has already perfected to increase the efficiency and decrease the cost of solar energy. The goal of this project was to find the best plant dye to use in a dye-sensitized solar cell, featuring raspberry, blueberry, spinach, and soy dyes, and compare their performance to a typical silicon one. Silicon cells were projected to produce the most electricity followed in order by spinach, raspberry, blueberry, and soy because silicon cells have already been commercially perfected; spinach is used by most researchers in bio-hybrid cells; the cell design used was created for anthocyanin dyes; and soy because of the commercial importance of soy products. After the cells were made, they were placed on a flat surface with a multimeter measuring millivolts, and monitored for one minute; this was repeated ten times both indoors and outdoors. Raspberry had an average outdoor reading of 791.315 millivolts with a standard deviation of 103.056; blueberry, 710.912 millivolts and 36.875; soy, 930.080 millivolts and 151.022; spinach, 681.968 millivolts and 76.827; and silicon 79.588 millivolts and 12.288. While the standard deviations between soy and raspberry overlapped, making them statistically equal, Soy only overlapped with raspberry whereas raspberry overlapped with all of the other dye types, and the silicon cells underperformed all of the other cells by over 400 millivolts. From this it can be concluded that soy and raspberry have the potential to produce the most energy in a dye-sensitized solar cell. One possible explanation of this is the difference in the properties of the dyes; other research has shown that darker dyes actually hindered the abilities of dye-sensitized solar cells, and in this case the soy dye was the lightest of all of them.

Poster Board No. 013 ELECTROWETTING FOR VARIABLE FOCUS LIQUID LENSES. Aditya Jog (ajog14@gmail.com), 7592 Hunt Club Drive, Mason OH 45040.

Electrowetting is the process of deforming a conductive liquid droplet placed on a dielectric substrate by applying an electric field. The feasibility of electrowetting for creating variable focus liquid lenses was investigated. It was hypothesized that the change in shape experienced by a droplet due to electrowetting would be sufficient to cover the range of focal lengths typically required for human vision correction (-6.5 to 6.5 diopters). To test the hypothesis, a 1.5-mm water droplet was placed on a glass substrate consisting of an Indium-Tin-Oxide conductive layer with a 300 nm thick Parylene-HT dielectric coating. DC voltage was applied across the droplet and the conductive layer. The droplet was photographed at different applied voltages (0-45 V) using a digital camera and the contact angle was determined by image processing. The experiment was repeated with an added surfactant and then with the droplet immersed in silicone oil. The change in the radius of curvature of the droplet and focal length of the liquid lens was calculated. By changing the applied voltage from 0 to 45 V the contact angle changed from 65 to 48 degrees for water, 35 to 22 degrees with the surfactant, and 109 to 70 degrees with oil. Based on the contact angle measurements, a 25 mm diameter water-oil lens can cover -4.5 to 4.5 diopters with vertical sides. This range can expand to -6.5 to 6.5 diopters by changing side

angles by +/- 20 degrees, indicating that electrowetting can be employed to develop variable focus lenses for human vision correction.

Poster Board No. 014 THE EFFECT OF 1.5 YEARS OF SPACE EXPOSURE ON OPTICAL PROPERTIES OF SPACECRAFT POLYMERS. Halle A. Leneghan (halannlen7@gmail.com), Kim K. de Groh (kim.k.degroh@nasa.gov), Athena Haloua (athenahaloua@gmail.com), Olivia C. Asmar (ocasmar98@gmail.com), 19600 North Park Boulevard Shaker Heights, Ohio 44122 (Hathaway Brown School), Environmental Effects and Coating Branch, NASA Glenn Research Center.

The temperature of the spacecraft is directly related to the ratio of solar absorptance to thermal emittance. Polymers are often used on the exterior of spacecraft for passive thermal control because of their low solar absorptance and high thermal emittance. Therefore, determining the durability of optical properties (solar absorptance, which is determined from reflectance and transmittance) is important when considering spacecraft design. One of the objectives of the Zenith Polymers Experiment was to determine the effect of low Earth orbit (LEO) zenith exposure on the optical properties of various spacecraft polymers. The Zenith Polymers Experiment was flown as part of the Materials International Space Station Experiment 7 (MISSE 7) on the exterior of the International Space Station (ISS) for 1.5 years. The experiment consisted of 25 polymer samples that were flown in a zenith orientation, and exposed to solar radiation (4,300 equivalent sun hours (ESH)), charged particle radiation, thermal cycling, and grazing atomic oxygen (atomic oxygen fluence of 1.58×10^{21} atoms/cm^2). Nineteen of the 25 samples flown were made to be tested for optical property and atomic oxygen durability. Total and diffuse reflectance and transmittance of 18 flight and 18 control (non-exposed) samples were obtained post-flight using a Cary 5000 UV-Vis-NIR Spectrophotometer and compared. The total reflectance and transmittance were used to compute the integrated air mass zero solar absorptance of the flight and control samples. Increases in solar absorptance for the flight samples ranged from 0.001 for fluorinated ethylene propylene (FEP, also known as Teflon) to 0.164 for polyvinyl fluoride (PVF, also known as Tedlar), for which the appearance changed from clear to light brown. The solar absorptance is crucial to controlling the thermal characteristics of the spacecraft. Results show that space exposure increases the solar absorptance of some materials over time. Therefore, those polymers with high increases in solar absorptance, such as polyvinyl fluoride, would not be good for thermal control when designing spacecraft.

Poster Board No. 015 COMPARING ALTITUDE OF DIMPLED NOSECONE ROCKETS WITH DIMPLED AND SMOOTH BODY TUBES. Ian DD Mail (imail@neo.rr.com), 513 Earl Ave., Kent, OH 44240.

This continuation project was conducted to compare the altitude of dimpled nosecone rockets with dimpled and smooth body tubes. It was hypothesized that a rocket with a golf ball-like dimpled nosecone and smooth body tube will fly higher than a fully dimpled body tube rocket because the smooth body tube decreases skin friction drag. Six model rockets were used in the initial experiment in 2012-2013 to determine the altitude achieved with dimpled and smooth rocket surfaces. Three had dimpled clay and three had smooth clay surfaces and each was nearly the same weight. The rockets were launched, data collected, average altitude determined, and compared in fall and spring. Nosecones were switched and drag was tested in a wind tunnel in addition to the launches. Since results indicated higher altitude for dimpled rockets than smooth and less drag for dimpled nosecone with smooth body tubes, launches were conducted in 2013-2014 comparing altitudes given those three surface conditions with the smooth rocket as control. The same procedures for launch were utilized in 2013-2014 and compared to 2012-2013 data. Dimpled nosecone, smooth body tube rockets flew an average 109 meters. Dimpled-surface rockets flew an average 82 meters. Data indicated the dimpled nosecone with smooth body tube rockets reached an average altitude 27 meters (25%) higher than the dimpled rockets and 35 meters (32%) higher than the smooth rockets. These findings could impact drag on projectiles allowing higher altitude or faster speed without using a larger engine or greater thrust.

Poster Board No. 016 FLAME TEMPERATURES IN WOOD BURNING FIRES: HARDWOOD VS. SOFTWOOD. Faith C. Myers (myersfc@embarqmail.com), 4251 N. County Line Rd., Sunbury OH 43074 (Big Walnut Middle School).

The purpose of this experiment was to determine if hardwood (oak) or softwood (poplar and pine) produce more thermal energy by measuring maximum flame temperatures and burn times, and determining relative areas under temperature-time curves. Research and Myers' previous experimentation led to the hypothesis: hardwood will produce the highest amount of thermal energy based on flame temperatures. The hypothesis was tested by evaluating maximum flame temperatures generated. Eight pieces of wood (each 0.6 cm long and 3.2 cm in diameter) were dipped into kerosene and placed onto shredded paper (25 g) in a fireplace. Kerosene (5 ml) was poured onto the wood and the paper was ignited with a match. After burn-off of kerosene and paper (1 minute), maximum flame temperatures (°C) were recorded at 1 s intervals until flame-out for each wood type using an infrared (IR) thermometer - and the maximum temperature for each trial recorded. Ten trials were performed for each wood type and maximum temperatures were averaged and standard deviations calculated. The mean maximum flame temperatures were: pine 504.8°C, poplar 501.2°C, and oak 499.5°C. This result did not support the hypothesis, as the difference in maximum flame temperatures was statistically insignificant. The mean burn time (minutes) was: oak 12.2, pine 7.4, and poplar 7.2, supporting the hypothesis. The mean relative area under the temperature-time curve was: oak 258, pine 182, and poplar 175, supporting the hypothesis. Therefore, the hypothesis that hardwood would produce more thermal energy than softwoods was supported by two of three thermal energy indicators.

Poster Board No. 017 A HOME ENGINEERED CENTRIFUGE CAN PRODUCE HIGH QUALITY GENOMIC DNA FOR ANALYSIS. Zachariah Edward Stone (123zstone@gmail.com), 2009 Verde Ave, Akron, OH 44314, National Inventors Hall of Fame STEM High School.

A previous study showed that a home engineered centrifuge could generate the needed *g*-forces to extract DNA from plant material. As a continuation of that project, it was hypothesized that a home engineered centrifuge would be capable of extracting viable DNA as measured using a NanoDrop Spectrophotometer and Gel Electrophoresis. The project utilized a home engineered centrifuge and DNeasy plant kit for DNA extraction in the lab of Dr. Joel Duff, University of Akron Biology Department. Dr. Duff provided mentoring, lab space and equipment. 120 tubes of 100 ul purified DNA were procured using home engineered centrifuge. Extracted DNA was analyzed for purity and viability using a NanoDrop Spectrophotometer spectral analysis, and Gel Electrophoresis. The spectral analyses exhibited nucleic acid reading of 30 ng/ul thru 1600 ng/ul. The DNA gels were strained with Ethidium bromide, and GelStar ® a safe alternative DNA gel stain. The electrophoresis gel produced distinct and readable DNA-bands patterns under 312 nm UV transillumination. The research yielded viable DNA samples exceeding expectation in quantity and quality for analysis. The NanoDrop data and gel pictures verified the high quality of the DNA extracted by the home engineered centrifuges. Therefore, the home engineered centrifuge was found to

generate the large g-forces required for DNA extraction and DNA analysis.

Poster Board No. 018 INSULATION: WHICH TYPE WOULD YOU RATHER HAVE IN YOUR HOME? Selena M. Turner (Selena_Turner@yahoo.com), National Inventors Hall of Fame Science, Technology, Engineering and Mathematics High School, 1208 Winter Fern Avenue, Springfield Twp., Ohio 44312.

Insulation is the material placed between the interior and exterior walls of a house and in the attic. It helps to keep more heat inside in the winter and cool air inside in the summer. People add it to decrease their expensive heating and cooling bills. There are several types of insulation. The purpose of this experiment is to find out which insulation is best to use and will stand up better in a house fire. The problem is to find out which insulation is the safest. I became interested in insulation when so many different types were used in the building of our new home. Insulations are supposed to be flame retardant, so shouldn't burn. However, when you see a house that has burned, the insulation is not still standing. The hypothesis was between fiberglass batt insulation, rigid foam board insulation, blown in cellulose insulation, blown in natural fibers insulation, and spray-in-place foam insulation, the spray-in-place foam insulation will burn the most. Equal size samples of 12.7 cm width by 12.7 cm length by 2.54 cm depth of the insulations were burned with a propane torch. The data shows that the fiberglass batt insulation had the lowest percentage of burned area at 20% to 25%. Therefore, it burned the least and is the best and safest insulation to use of the samples tested. The next best choices were the two blown in insulations with the cellulose being slightly better than the natural fiber insulation. Then, next was the rigid foam board insulation and the spray-in-place foam insulation was the worst. They both were highly flammable. The spray-in-place foam insulation was by far the most dangerous and burned almost totally at 99% to 100%. The flames were high enough to catch wood, etc. around it on fire. This contributes to the chemical engineering field when building a new home or remodeling an old one. It also affects everyone, as we all are at risk of being in a house fire. This information could give a family the extra few seconds they need to make it out of their house alive and escape death.

Poster Board No. 019 SURFACE TEMPERATUREBETWEEN SHORT-GRASS, ASPHALT, AND DIRT: A STUDY ON THE EFFECTS OF ALBEDO. Mai S. Lor, maiseel21@gmail.com, 929 Triplett Blvd., Akron, Ohio 44306.

The purpose of this project was to see what the albedo effect (the amount of the sun's heat energy as absorbed by different colored surfaces) has on surface temperature. The hypothesis is that asphalt would be warmest because asphalt is low in albedo. The GLOBE Program protocol for collecting surface temperature was followed using a Fluke 63 infrared thermometer (IRT) and Garmin ETrex Venture GPS unit. The IRT was encased in an oven mitt to avoid thermal shock from being stored indoors were it is warm to going outdoors where it is much colder. The data has supported the hypothesis seven out of the eleven days data was collected. The four days data did not support the hypothesis all three surfaces were covered by snow, resulting in all three sites having the same albedo. According to the albedo effect, asphalt should be warmer, which the data supports. Other relevant research can be done in the future, such as monitoring ozone alert days during peak summer months, further understanding the transfer of heat to and from the ground, or the effect asphalt has on surrounding ground.

Poster Board No. 020 AQUATIC OIL SPILL CLEAN-UP IN NON-QUIESCENT CONDITIONS. Abigail L. Myers (myersa13@embarqmail.com), 4251 N. County Line Rd., Sunbury OH 43074 (Big Walnut High School).

Accidental oil spills in non-quiescent aquatic environments require effective clean-up methods. This experiment examined the ability of synthetic (polypropylene, polyurethane, and polyester) and natural organic (cotton, straw, and sawdust) sorbents to remove oil from water in non-quiescent conditions through absorption and/or adsorption. Trials were conducted in two stages, test: hydrophobicity, oleophilicity. Previous experimentation led to the hypothesis: polyester and cotton will sink while polypropylene, polyurethane, straw, and sawdust will float. Trials were conducted to test hydrophobicity, adding 1.5 g of sorbent to a wave tank containing only water. Polyester and sawdust sank completely, rendering them useless. Polypropylene, polyurethane, cotton, and straw remained on the water surface. Experimental work supported the hypothesis for polyester, and disproved it for cotton and sawdust. Additional research led to the hypothesis: Cotton will most effectively remove oil from water, followed by polypropylene, polyurethane, and straw. Polypropylene, polyurethane, cotton and straw were tested in a second set of trials to evaluate effectiveness of oil removal in non-quiescent conditions. One and a half grams of each sorbent was placed in a wave tank containing 22 liters of 20°C water and 20 ml of oil. Each sorbent was retrieved after 5 minutes and masses of each determined. Individual sorbent oil mass ratios (mass of used sorbent containing recovered oil: mass dry sorbent) were calculated for the 40 trials. Cotton, with a mean oil mass ratio of 10.6 (σ =0.5), removed the most oil, followed by polypropylene (9.5, σ =0.4), polyurethane (6.8, σ =0.4), and straw (5.5, σ =0.3), supporting the hypothesis.

Poster Board No. 021 THE EFFECT OF VARIOUS MATERIALS ON SOUND TRANSMISSION. Emily Pallaki, St. Raphael School. Bay Village, Ohio.

By definition, sound pollution occurs when humans are disturbed by noise. Noise prevention is necessary in classrooms, apartments, and houses near busy roads. This study evaluates sound prevention materials to determine which blocks sound best as compared to ceiling tile. Sound is a wave made by vibrating particles that are transported by particle-to-particle interaction. The loudness of sound is measured in decibels. Frequency refers to how many vibrations there are per second. Frequency is measured in hertz. Humans can hear from 20 Hz to 20,000 Hz and from 0 dB to 120 dB. A medium is the substance or material that carries the wave. Sound travels fastest through solids, then liquids, and slowest in gasses. Sound travels in four main ways. Reflection is the bouncing off of an object. Diffraction is the bending of sound around an obstacle. Transmission occurs when sound travels directly through the medium. Lastly, refraction is the change in speed and direction of sound. Four materials (acoustic foam, wood, and particle board) including the control (ceiling tile) were tested to see which blocked the most sound. Twenty-five trials were conducted for each barrier. The sound was produced at 8000 Hz/ 104 dB; on the other side of the barrier a sound meter measured arriving sound in decibels. Acoustic foam was hypothesized to block the most sound and the data supported this. Acoustic foam blocked 5.38% more sound than the control on average. Daily people are disturbed by sound and various barriers can prevent sound pollution.

Poster Board No. 022 PARTICULATE POLLUTION PRODUCED BY AUTOMOBILES. Nitin Y. Pauletti (pantherN@cinci.rr.com), 11604 Stable Watch Ct., Cincinnati, OH 45249.

Most cars on today's roads emit some type of pollution. Pollution is harmful to all living organisms and to the environment. One of the most dangerous pollution emitted is particulate matter (PM). This project tested the hypothesis that fast acceleration results in more PM collected on a filter that is mounted to the exhaust pipe of a regular gasoline car than after slow acceleration. Two different acceleration modes, fast and slow, were tested. Filters were fit into a Personal Environmental Monitor, which sampled

the exhaust 3 inches away from the end of the tailpipe. The weights of each filter before and after experimentation were measured using an ultra-microbalance. Differences in weight represented the emitted PM mass during a test run. In addition, size distribution of water-insoluble particles collected from the filter after sonication in water was determined using dynamic laser light scattering. In contrast to the stated hypothesis, slow acceleration caused emission of more PM than fast acceleration. Particle size distribution measured from both test modes demonstrated the presence of ultrafine particles less than 500 nm, which can interfere with the exchange of O_2 and CO_2 in the lungs. From these results it is concluded that incomplete combustion of gasoline engines during slow acceleration may be more harmful to the environment.

Poster Board No. 023 IS THERE A DIFFERENCE IN THE WATER QUALITY INDEX (WQI) OF AGRICULTURAL RUNOFF, WETLANDS AND MUNICIPAL DISCHARGE? Dominic M. Schroeder (mikelori@tds.net), 16228 Road H13 Continental, OH 45831.

Water quality is an important issue in terms of overall environmental quality. The objective of this research project was to determine the water quality index (WQI) of agricultural runoff versus wetlands versus municipal discharge. The proposed hypothesis was that agricultural runoff would have a lower WQI rating than wetlands and municipal discharge. It was also hypothesized that wetlands would be cleaner than municipal discharge. Water samples from 2 wetlands, 3 agricultural runoff sites, and 3 municipal treatment plants were collected. Equipment and supplies included an Engineer's and Watershed Map of Putnam County, a CHEMets Dissolved Oxygen kit, AquaChek pH and Nitrates test strips, LaMotte TesTabs for Phosphates, the Ohio Sediment Stick, a water thermometer, and a log book. The procedure involved measuring the variables of the Water Quality Index with the respective tools. These steps were repeated on 3 separate days. The data was graphed and analyzed. WQI means were used for comparison. Wetlands had a mean WQI of 82.83, agricultural runoff a mean of 78.78, and municipalities a mean of 79.55. All were rated as Good. The hypothesis was supported.

Poster Board No. 024 ELECTROMAGNETIC RADIATION SAFETY OF COMMON HOUSEHOLD APPLIANCES. Sarvani S. Vemuri (sarvani.vemuri@gmail.com), 4591 Plummer Pl., Mason, Ohio 45040 (The Walnut Hills High School).

Prolonged exposure to Electromagnetic Radiation (EMR) can cause debilitating, even terminal, diseases such as Alzheimer's, Parkinson's and various forms of cancer. Numerous common household appliances ranging from computers to microwave ovens emit EMR. A scientific panel of the National Institute of Environmental Health Sciences said in 1998 that EMR should be regarded as a possible carcinogen. The Environmental Protection Agency (EPA) recommends that the magnetic field exposure should be limited to 0.5 mG – 2.5 mG and the electric field exposure should be limited to 1 Kv/m. The goal of this study was to determine whether common electronic and electrical household appliances are EMR-safe by the EPA-recommended standards. In this study, EMR emissions from a variety of appliances were measured, using an accurate EMF meter, under various operating modes and at varying distances. Appliances studied include representative portable electronic tablets and music players, laptop computers, game systems, cell phones, printers, lamps, television sets and microwave ovens. These measurements were compared with the EPA recommended EMR safety limits. Based on these comparisons, the appliances were classified as safe or unsafe for each operating mode and distance. These results show that several electronic gadgets popular among youth as well as many electrical appliances turned out to be unsafe under normal operating conditions and distances. The results of this study support the conclusion of the BioInitiative Report, prepared by an international scientists panel in 2012, which states that, "the existing standards for public safety are completely inadequate to protect health."

Poster Board No. 025 THE ABSORPTION OF LEAD BY CILANTRO, PARSLEY, AND PHRAGMITES. Lauren J. Zipp (17lzipp@beaumontschool.org), 2227 Tudor Drive Cleveland Heights, Ohio 44106.

Heavy metals such as lead are a major source of drinking water contamination. A common household method of purifying drinking water is to use a Brita water filter. However, recent studies have shown natural materials, such as cilantro, to be less expensive, better for the environment, and possibly more effective in absorbing heavy metals from water, a process known as biosorption. This experiment tests the plant materials cilantro, parsley (flat leaf and curly leaf), and *Phragmites australis*, a common local invasive plant, in their ability to absorb lead from water. The hypothesis is that cilantro will absorb the most lead, followed by the Brita filter, then the two types of parsley, and lastly, *Phragmites australis*. The plant material was oven dried and crushed, and then added to a 1 ppm lead solution for six days. Measurements were made with a graphite furnace atomic absorption spectrometer that analyzed the amount of lead absorbed from each sample after the six days. Cilantro absorbed approximately 0.34 ppm of lead, flat leaf parsley absorbed 0.24 ppm, curly leaf parsley absorbed 0.092 ppm, and neither the Brita filter nor *Phragmites australis* absorbed lead. Approximately half of the lead adhered to the inside of the test tubes, so results were adjusted to account for the error in the measurement. The experiment provides evidence that cilantro, or even parsley, could be a useful material in the purification of water. The experiment also revealed that the Brita filter and *Phragmites australis* are not effective for absorbing lead.

Poster Board No. 026 IDENTIFICATION OF NEW MICROSATELLITES FOR SCHISTOSOMA MANSONI. Kristen N Ferguson (kferguson16@hb.edu), Ronald Blanton (reb6@case.edu), Sandhya Rani (mxr@case.edu), 37110 Broadstone Drive Solon OH 44139.

Schistosomiasis is a parasitic disease caused by worms (*schistosomes*) and is the second most common serious parasitic disease in the world after malaria. The disease, mostly found in developing countries of Africa, South America and Asia, is caused by contact with fresh water contaminated with the infective form of the worm, cercariae. In order to characterize parasite populations, the lab genotypes the parasites from infected people and uses population genetic analyses to determine the effect of treatment on these populations. The genotyping involves the use of genetic markers called microsatellites, which are variable nucleotide repeats, found in DNA. Currently 15 markers are used in the lab and the goal is to reach 30 or more, seeing that more markers will help to further improve the resolution of population differences. Primers were created through search of genomic sequence databases and use of Primer Express. After the primers were designed, they were amplified with both pooled DNA and individual clone samples of DNA through polymerase chain reaction and tested through gel electrophoresis on agarose and acrylamide gels. This determined if the markers were single locus, polymorphic markers. Four of the primers tested showed signs of amplification and polymorphism. These four were then multiplexed with fluorescent tags and analyzed through a capillary electrophoresis automated sequencer. This method gave an accurate count of alleles and confirmed that the markers were polymorphic. The use of these new markers can ultimately help to distinguish parasite populations, which will be useful for developing long-lasting approaches for control and elimination.

Poster Board No. 027 CRISPRs: DELETING MUTATIONS

THAT CAUSE MYELIN-RELATED DISORDERS. Susmita D. Roy (suroy15@hb.edu), 38780 French Creek Road, Avon, OH 44011; Paul Tesar, Case Western Reserve University Department of Genetics (Hathaway Brown School).

Myelin wraps around neurons and when damaged, causes neurons to die. The project aims to correct the genetic mutation that causes Pelizaeus Merzbacher Disease (PMD), a genetic myelin-based disorder, which causes errors during the myelin formation, damaging the nerves. The hypothesis of this experiment is that correcting a disease causing mutation in a patient's cells will allow their myelin to repair itself. This experiment was designed to see if the causative mutation, which occurs in the proteolipid 1 (PLP1) gene, an essential ingredient for oligodendrocytes to differentiate and form myelin, could be deleted. The method was to use targeted CRISPRs or Clustered Regularly Interspaced Short Palindromic Repeats, which attach to and cut specified sequences of DNA to delete the mutation. The mutation deleted was in the PLP gene from stem cells generated from patients with PMD. The deletions were detected using PCR, which used the DNA that had been isolated from the sample five days after the sample had been infected with CRISPRs attached to a simple virus. The conclusion was that some deletion of mutation occurred due to the CRISPRs, which were inserted into IPS cells via a plasmid and allowed for these mutations to be edited. Future work includes further analysis of the editing methods, such as seeing if single base changes in the DNA sequence can occur, and if corrected patient stem cells can be converted into myelinated cells.

Poster Board No. 028 INTEGRAL MEAN VALUE EQUALITIES AND CHARACTERIZATIONS OF QUADRATIC AND CUBIC FUNCTIONS. Richard Huang (huang89@gmail.com), 2593 Thomas Jefferson Drive, Beavercreek OH, 45434, (Beavercreek High School).

A beautiful mathematical theorem asserts that a continuous function f is linear if and only if its integral mean value over any interval [a, b] (denoted by MV(f, [a,b])=$(b\text{-}a)^{-1}$ $(b-a)^{-1}\int_a^b f\,dx$) is equal to either f((a+b)/2) or [f(a)+f(b)]/2. The purpose of this project is to find integral mean value equalities of this type capable of characterizing higher degree polynomial functions. The hypothesis is that the mean value MV(f, [a, b]) should be equal to the weighted average of f at several points in [a, b]. For the cases of quadratic and cubic functions, this problem is solved in two steps. First, two formulas equating the mean value MV(f, [a, b]) to some weighed average of several values of f are developed through computation for quadratic and cubic functions f, respectively. Second, the more challenging converse, which states that any suitably differentiable function satisfying the formulas from the previous step must be accordingly quadratic or cubic, is proved by Taylor expansion. Two results have been obtained: f is a quadratic function if and only if MV(f,[a,b])=(3/4)f((2a+b)/3)+(1/4) f(b); f is a cubic function if and only if MV(f,[a,b])=(1/6) f(a)+(4/6)f((a+b)/2)+(1/6)f(b). These two results confirm the hypothesis for quadratic and cubic polynomials and provide neat criteria for a function to be quadratic or cubic; they also extend the mean value characterization theorem for linear functions.

Poster Board No. 029 STUDIES IN ADVANCED PEDIATRIC CARDIOLOGY EXERCISE PHYSIOLOGY. Lauren A Battle (laurenabattle@gmail.com), Christopher Snyder, (christopher.snyder@uhhospitals.org), Jill Shivapour (jill.shivapour@uhhospitals.org), 16272 Glynn Road Cleveland, Ohio 44112.

Exercise physiology is the study of reactions that stress due to exercise can have on the human heart, and cardiovascular system. The work of exercise physiology primarily analyzes the short term cardiovascular responses due to excess physical activity, and how one's body may change in reaction to this. Patients who suffer from a congenital heart defect, may possibly suffer from a congenital heart defect, or are in need of assistance for a better suited exercise routine, may be asked to be tested in regards to exercise physiology. A stress test is often performed to evaluate stresses that the heart undergoes while one exercises. A stress test is an exercise evaluation that may be used to determine the severity of a congenital heart defect. Pediatric cardiologists use these tests to evaluate a number of things and can vary in many fashions. At Rainbow, a number of cases of defects are often seen and studied in the exercise physiology lab. Of these defects includes, tetralogy of fallot. This infrequent compound disorder is seen in roughly about 5 of every 10,000 births. Research at Rainbow, in the pediatric cardiology department is towards the effort of providing awareness and factual information to the science and medical community in regards to this disorder and other congenital heart defects, and it is hypothesized that these efforts will benefit these patients. This research continues in the hopes of benefitting children with these disorder and becoming aware of what type of care and procedures are needed for them.

Poster Board No. 030 CELL BASED, IN VITRO SCREENING OF COMPOUND LIBRARIES TO IDENTIFY SUBSTANCES THAT POSSESS MYELOID DIFFERENTIATION INDUCING PROPERTIES FOR POTENTIAL AML TREATMENT. Caitlin Coyne (caitcoyne@gmail.com), 2435 Loyola Road, University Heights, Ohio 44118 (Hathaway Brown School); Tammy Stefan, Dr. David Wald MD, PhD, Department of Pathology, Case Western Reserve University.

Acute Myelogenous Leukemia (AML), the most common type of leukemia among adults, consists of premature leukocytes that do not fully differentiate from a stem cell or an immature hematopoetic cell. Efforts are being made to find drugs that free the differentiation block. For instance, retinoic acid is being used as a differentiation agent to successfully treat promyelocytic leukemia, but is not effective in other types of AML. Because treatments are toxic and often fail, and have not improved in over 30 years, there is a need for more effective and less toxic drug treatments. A cell based screening process was developed to identify differentiation-inducing compounds. Twelve plates with 80 different drugs per plate were tested using the HL60 (AML) cell line. It was hypothesized that through this process, candidate drugs to treat AML would be identified. The HL60 cells were diluted to a targeted 70,000 cells/ml, 95 ul was transferred to each well and treated with 5 ul of a compound (pre-diluted 1:100). Treated cells were incubated for 4 days @37°C with 5% CO_2; then a Nitroblue Tetrazolium chloride (NBT) assay was performed. NBT undergoes an oxidation-reduction reaction with granules that form in the cells as a result of differentiation. Results were compared to results of known differentiation compounds included in each plate as controls. The screening identified nine hits (a hit was identified as a well with approximately 50% greater differentiation than an untreated well). Thus, identifying nine potential candidate drugs to treat AML. Future work will be done to determine optimal dilutions.

Poster Board No. 031 THE RELATIONSHIP BETWEEN EVERYDAY ACTIVITIES AND ATRIAL FIBRILATION. Cole T. McGinnis (honoreagle22@gmail.com), 2624 Morrow Place Cincinnati Ohio 45204.

The purpose of this study is to show what actions and eating habits are more likely to induce atrial fibrillation. Which actions can then be performed to help stop the atrial fibrillation once it occurs and can a healthy diet help make A-Fib less frequent. Atrial fibrillation, or A-Fib for short, is a common type of arrhythmia (irregular beating of the heart). It causes the heart's upper chambers, called the atria, to beat extremely fast to the point where it can cause chest pains, fatigue, heart attacks and even strokes. My research was broken up into four sets, each consisting

of five days. The subject was asked to record each of his attacks of A-Fib in a journal throughout the day writing down. The experiment only used a journal, watch and a pen. Half way through the experiment the subject began chelation therapy. This is a combination of all-natural herbal medications combined with a strict, healthy dieting plan. An interesting result was that food high in cholesterol, sugar and fats very frequently induced A-Fib as well as the consumption of alcohol. The chelation therapy reduced the A-Fib frequency to almost nothing. These two observations suggest a strong relation between A-Fib and the materials which the body consumes as nutrients. The actions that reduced A-Fib by the greatest margin were exercise and calming music. If doctors can understand what induces A-Fib patients can be advised of what to avoid and what to do to stop A-Fib short term.

Poster Board No. 032 TAS2R38 GENOTYPE/PTC OR PROP PHENOTYPE: RELATIONSHIP WITH DIETARY FAT PREFERENCE AND BODY MASS INDEX (BMI). Vineet S Prasad (vineetsprasad@yahoo.com), 4513 Riverstone Way, Mason,OH.

The increasing prevalence of obesity in United States has been paralleled by increase in fat intake. TAS2R38 gene encodes a bitter taste receptor controlling sensitivity to bitter chemicals PTC (phenylthiocarbamide) or PROP (6-n-propylthiouracil). The individuals sensitive to PTC/PROP would discriminate fat which helps in regulation of fat intake and in association with normal body mass index (BMI). Objective of this experiment was to investigate if there is a correlation existing between the Sensitivity to PTC (PTC taste strips), dietary fat intake and body mass index (BMI). Experimental research was based on the PTC taste test using dietary questionnaire (N=61 subjects, random sampling) Dietary fat consumption was recorded based on the 21- item measure 7 day food record (>16 score was measured as high fat). Dietary fat scores correlated to the BMI (square of correlation r^2 =0.52) .Results show that higher proportion of tasters who are sensitive to PTC taste were better at fat discrimination and show the consumption of low fat foods (94%) and maintained normal BMI (81.8%). Higher proportion of individuals who were not sensitive to PTC taste (Non-Tasters) show the consumption of high fat foods (67%) and recorded higher BMI and obese. Higher proportion of non-tasters (90.0%) was observed in the obese participants. Ability or inability to taste PTC has been shown to correlate with the Body mass Index (BMI) and dietary preference to high fat foods. Knowledge from the long term research can be used as a preventive screening tool by physicians to identify individuals who may be at risk of excessive weight gain leading to obesity.

Poster Board No. 033 BET BROMODOMAIN INHIBITION WITH JQ1 PREVENTS PATHOLOGICAL CARDIAC REMODELING IN MOUSE HEART FAILURE MODEL. Aarathi J. Sahadevan (asahadevan16@hb.edu), 25000 Fairmount Blvd, Beachwood, OH 44122; Qiming Duan, Priti Anand, Alexander Morrison-Nozik, Saptarsi M. Haldar, Case Western Reserve University Department of Cardiovascular Medicine, (Hathaway Brown School).

Heart Failure (HF), the inability of the ventricle to pump sufficient blood throughout the body, affects 6-8 million people in the U.S. annually and is associated with significant morbidity and mortality. Thus, new therapies are desperately needed. Pathological stress exerted on the ventricle leads to cardinal features of HF like muscle hypertrophy, cavity dilation, fibrosis, and contractile dysfunction. These stress factors converge on the cell's genome, causing the initiation of pathologic gene transcription by a "reader" protein called Bromodomain 4 (Brd4). JQ1 (a novel, potent and selective small molecule inhibitor of Brd4) was hypothesized to prevent the progression of myocardial infarction (MI)-mediated HF by preventing Brd4 from "reading" the chemical change that triggers hypertrophic signaling. To test this hypothesis, 30 adult C57BL male mice were subject to a large MI via surgical ligation of the main coronary artery that supplies blood to the left ventricle (LV) or sham surgery. Five days after MI or sham surgery, mice received JQ1 (50 mg/kg/day, intraperitoneal injection) or vehicle. After four weeks, the 30 mice underwent heart ultrasound followed by euthanasia for structural and molecular analyses of cardiac tissue. Early administration of JQ1 post-MI attenuated the development of cardinal features of HF like heart enlargement, LV contractile dysfunction, LV cavity dilation, cardiomyocyte hypertrophy, and hypertrophic gene expression (*Anf*, *Bnp*, *Acta1*). In conclusion, BET Bromodomain inhibition with JQ1 prevents pathological cardiac remodeling after a large MI in mice. This provides impetus for further development of BET bromodomain inhibition as a novel therapeutic strategy in HF.

Poster Board No. 034 DNA BARCODE DEFINITION FOR BACTERIA: WHICH GENE SEQUENCE IS MORE EFFICIENT IN IDENTIFYING AND CLASSIFYING BACTERIAL PATHOGENS – 16S rRNA, cpn60, or rpoB? Ashwin Veeramani (ashwinveeramani@yahoo.com), 9388 Chesapeake Dr., North Royalton OH44133 (Incarnate Word Academy).

DNA barcoding is a system designed to offer a rapid, accurate, and systematic method of species identification by using short, standardized gene regions as internal species identification tags. This project analyzed three different DNA sequences, namely 16S *rRNA*, *cpn60*, and *rpoB* and assessed their efficiency in identifying and cataloguing bacteria. BSL-2 bacteria available in the lab, namely *Pseudomonas aeruginosa, Pseudomonas fluorescens, Staphylococcus aureus, Salmonella enteritidis, Micrococcus luteus*, Escherichia coli, Serratia marcescens, Bacillus subtilis, Alcaligenes viscolactis and Proteus vulgaris were tested with the three DNA sequences. DNA samples were extracted and purified from bacterial cultures using DNeasy® DNA purification protocol. Purified DNA samples were amplified using PCR protocol. PCR products were set up using each of the three gene primer sets. Magic primers, H1511 and H1261 were used to isolate and amplify cpn60 gene. Primers, Ac696F and Ac1093R and lab designed primers were used for isolating and amplifying rpoB and 16S rRNA genes respectively. Spectrophotometer technique was used to measure the concentration of DNA samples in the PCR products. Negative control PCR assay was set up with distilled water and all three gene primer sets. Gel electrophoresis method was used to isolate DNA for sequencing on the gels. The base pair size of the three genes in each of the ten test bacteria were compared with base pair length of the corresponding predicted bacterial genes and the outcomes recorded as a measure of their effectiveness as potential DNA barcodes. Base pair size of 16S rRNA gene in three bacteria namely, *S. enteridis, A. viscolactis,* and *P. vulgaris* matched with that of standard *16S rRNA* bacterial gene. *Cpn60* gene had six matches in *P. aeruginosa, P. fluorescens, S. aureus, S. enteritidis, M.luteus*, and *E.coli* bacteria and *rpoB* gene sequence matched in *P. aeruginosa, P. fluorescens, S. aureus*, and *B. subtilis*. These results indicate that protein coding *cpn60* gene is the most effective in identifying and cataloguing the bacteria tested and a potential candidate for identifying most species of bacteria.

Poster Board No. 035 A COMPARISON OF HAND CLEANSERS' ABILITIES TO DECREASE TOTAL AND COLIFORM BACTERIAL CONTAMINATION. Wesley R. Wolf (wesleyrwolf@gmail.com), 5095 Shattuc Ave., Cincinnati, OH, 45208.

Recent studies show triclosan, a common ingredient in antibacterial products, can cause hormonal effects and develop resistant bacteria, prompting the FDA to propose that soap manufactures test the safety and effectiveness of their products. This experiment used e-coli contamination to compare liquid hand soap, liquid antibacterial hand soap, hand sanitizer and water's ability to decrease

total and enteric coliform bacteria. From the CDC's recommendations for hand sanitation, it was hypothesized that bacterial contamination from both hand soaps would be similarly reduced, followed by hand sanitizer, then water. 2" x 2" latex squares were contaminated two minutes in a feces and sterile saline solution then dried. Samples were lathered with 2.50 cc of hand soap then rinsed 10 seconds in running tap water. Water samples were manipulated 20 seconds then rinsed 10 seconds. Hand sanitizer samples were manipulated until dry. Control samples were not cleaned. Each square was placed on a blood or MacConkey agar plate for 60 seconds, 100 µl of sterile water applied, and the spread plate method performed. Plates were incubated 48 hours at 38.3°C and CFUs (colony forming units) were recorded. There was no statistical difference. However, hand sanitizer had lower total bacterial contamination with 144 CFUs. Antibacterial hand soap had 238, hand soap 605, and water 1566 CFUs. Hand soap had lower enteric coliform lactose positive growth with 3 CFUs. Water had 44, antibacterial hand soap 54, and hand sanitizer 257 CFUs. This research suggests that antibacterial hand soaps present potential risks without increased bacterial elimination.

Poster Board No. 036 NOVEL APPROACH TO IDENTIFY SKELETAL MUSCLE MITOCHONDRIAL DISORDERS. Dhweeja Dasarathy (ddasarathy@gmail.com), Hawken School, 391 East St. Andrews Drive, Highland Heights, OH 44143.

Mitochondrial respiratory chain disorders result in reduced expression and/or function of electron complex chain components (ETC) with impaired ATP production and skeletal muscle disorders. Diagnosis requires quantifying enzyme activity of different complexes that is both difficult, expensive and not universally available. It was hypothesized that quantifying mitochondrial respiratory chain complex proteins by immunoblots assay is a rapid and precise method to diagnose mitochondrial myopathies but the commercially available antibodies have not been validated. Total protein from ~50 mg vastus lateralis muscle biopsies from 10 patients with muscle weakness due to suspected mitochondrial myopathies was extracted and expression of the ETC components by immunoblots and activity by enzyme assays were determined. The antibody was validated using immunoblots and immunoprecipitation and rat skeletal muscle was used as a positive control. Expression in arbitrary units (AU) of complex IV (5.24±1.) and V (2.73±1.08) were high demonstrating greater expression of these complexes. In contrast, expression of complexes I (1.1±0.54AU) and II (0.42±0.39AU) were low in all 10 subjects and required either higher exposure times (≥ 30 sec.) or a larger (≥10 µg) protein amount loaded. Complex III expression was (2.4±1.3 AU). Simultaneous enzyme activity assays showed a high correlation (r^2=0.59; p<0.000) by densitometric quantification. We demonstrate that evaluation of protein expression by immunoblots and enzyme activity of mitochondrial respiratory chain can be done simultaneously in human tissue, and immunoquantification correlated with the activity of the complexes. This novel and simple approach can help identify specific respiratory chain complex defects and lay the foundation for identifying molecular therapeutic targets.

Poster Board No. 037 THE ROLE OF TREM2 IN ALZHEIMER'S DISEASE. Margaret L. Broihier (mbroihier17@hb.edu), 20776 Sydenham Rd. Shaker Heights OH 44122, Hathaway Brown; Taylor R. Jay, Case Western Reserve University; Bruce T. Lamb, Cleveland Clinic; Gary E. Landreth, Case Western Reserve University.

Alzheimer's disease (AD) is a neurodegenerative disorder characterized pathologically by amyloid beta plaques. Variants in the Trem2 (Triggering Receptor Expressed on Myeloid Cells 2) gene confer increased risk for AD. Previous studies show that Trem2 expression reduces inflammation in cell culture models. It was hypothesized that AD mouse models lacking Trem2 gene function (KO, n=6) would have greater brain inflammation than AD mice expressing Trem2 (WT, n=8). Using quantitative PCR, gene expression of immune cell markers was assessed in brain lysates from 4.5-month old Trem2 KO and WT mice. The markers Cd11b (2-tailed t-test $p < 0.001$), F4/80 (2-tailed t-test $p < 0.01$), and Cd68 (2-tailed t-test $p < 0.01$) were significantly decreased (p<0.05) in the KO as compared to the WT, suggesting a reduction in the number or marker expression of brain immune cells. To assess changes in the activation state of these immune cells, expression levels of pro-inflammatory and anti-inflammatory genes were tested in Trem2 KO and WT mice. The data suggest that the absence of Trem2 reduced levels of the pro-inflammatory genes IL1ß (2-tailed t-test $p < 0.01$), IL6 (2-tailed t-test $p < 0.01$) and TLR4 (2-tailed t-test $p < 0.1$), and increased levels of the anti-inflammatory genes TGFß (2-tailed t-test $p < 0.1$), Arg1 (2-tailed t-test $p < 0.01$) and Ym1 (2-tailed t-test $p < 0.1$). In conclusion these data suggest, contrary to the hypothesis, that Trem2 KOs have reduced inflammation, and these KOs are likely to provide insight into the role of Trem2 in AD.

Poster Board No. 038 QUANTIFICATION OF CENTRAL BREATHING DISORDERS IN A MOUSE MODEL OF RETT SYNDROME. Debolina Ghosh (lghosh17@hb.edu), 5571 High Point Drive, Solon, Ohio 44139 (Hathaway Brown School); Ian Adams, Najam Kazmi, David Katz, Department of Neurosciences, Case Western Reserve University School of Medicine.

Rett syndrome (RTT) is a neurodevelopmental disorder caused almost exclusively by mutations in the *MECP2* gene. Because respiratory abnormalities (apnea, pause in breathing, and hyperpnea, deep or rapid respiration) are a prominent feature of this disorder, the present study investigated whether or not *Mecp2*$^{tm1.1Jae\ heterozygous}$ (Het) female mice, a model of RTT, also exhibit breathing abnormalities. Nine wild-type (WT) mice were compared with eight Het mice. The mice were administered intraperitoneal injections of 0.9% NaCl (10 uL/g) (acting as controls for another experiment), placed in plethysmography chambers (EMMS) to measure breathing, and monitored by video recording. The same procedure was repeated after one week. Apneas/minute and apnea length were determined by observing each subject's breathing activity. Any pause in breathing greater than twice the average expiration time was defined as an apnea. The paired t-test was used to compare mean values of apneas/minute and apnea length in the WT versus Het mice. Fourteen observations were recorded in each group. Mean apneas/minute was 0.66 ± 0.06 in the WT mice and 1.47 ± 0.24 in the Het mice. The difference was statistically significant, t = 3.23 (p = 0.003). Mean apnea length was 1.19 ± 0.45 seconds in WT mice and 2.01 ± 2.61 in Het-mice with no significant difference, t = 1.15 (p = 0.25). Therefore, there was significant increase in apneas/minute in the *Mecp2* Het mice compared to WT subjects, indicating that apneas/minute can be used as a reliable parameter to assess the therapeutic response to various experimental therapies in the RTT mouse model.

Poster Board No. 039 ROLE OF RB/E2F1 IN NEURONAL CELL CYCLE RE-ENTRY IN THE PATHOGENESIS OF ALZHEIMER DISEASE. Maaryah F. Malik (mmalik16@hb.edu), 7538 Stockwood Drive Solon OH 44139 (Hathaway Brown School), Sandra Siedlak (sandra.siedlak@case.edu), Case Western Reserve University. Hyoung-Gon Lee (hyoung-gon.lee@case.edu), Case Western Reserve University.

Alzheimer's disease (AD) causes cognitive dysfunction and memory loss. Neurons do not divide once initially formed, but neuronal cell cycle re-entry is a feature of AD that may contribute to neuronal death; however, the mechanism remains unknown. Transgenic mouse models with altered retinoblastoma protein (Rb) and E2F1 genes have been used to examine how re-activation of cell cycle can lead to neuronal cell death. Rb prevents cell cycle by inhibition of E2F protein family, in the present study E2F1 was completely knocked out in one mouse group (homozygous)

to test whether it is the main factor in driving cell cycle. If true, these neurons would not experience any cell death; i.e. without E2F1, neurons would not re-enter cell cycle and die. Additionally, mice with only one allele knocked out (hemizygous) were tested. Brain sections from hippocampus and cortex of these mice and controls were tested for cell cycle and DNA damage using specific antibodies (PCNA for cell cycle and rH2AX for DNA damage) and quantified for statistical analysis (Student's t-test and ANOVA). In the homozygotes (N=6), there was unexpected hippocampal cell cycle re-entry, and DNA damage, while, in cerebral cortex, DNA damage, but not cell cycle re-entry, was notably reduced. In the hemizygotes (N=5), there was notable hippocampal cell cycle re-entry and DNA damage but only DNA damage in cortical neurons with no substantial cell cycle re-entry. In conclusion, genetic modification of Rb/E2F1 signaling results in different neurodegenerative changes in hippocampal versus cortical neurons, which suggests the differential role of Rb/E2F1 signaling in these two distinct neuronal populations.

Poster Board No. 040 OLIGODENDROCYTE LOSS AND THE EFFECTS ON MYELINATION IN THE DEVELOPING CNS. McKenna D. Ritter (mritter16@hb.edu), 440 Walnut Ridge Trail, Aurora, OH 44202 (Hathaway Brown School). Robert H. Miller (rhm3@case.edu), Rita Romito-Digiacomo (rrr3@case.edu), Department of Neuroscience, Case Western Reserve University.

Multiple sclerosis is a neurological disorder that leads to demyelination, destruction of the myelin sheath surrounding the axons and allowing for proper conduction in the nervous system. Glial cells, such oligodendrocytes in the central nervous system (CNS), produce myelin. The objective of this study was to study the effects on myelination and remyelination following the depopulation of oligodendrocytes in the brain and spinal cord, as well as the retinal ganglion cells in the optic nerve. This was done using the transgenic mouse line, MBP-iCP9-IRES-DsRed. In this line, the Myelin Basic Protein promoter (MBP) initiates transcription of the construct in cells that express MBP, such as oligodendrocytes. The inducible Caspase 9 gene (iCP9) is activated by CID, which is a compound that allows for chemical dimerization of iCP9, which then initiates cell death. The internal ribosome entry site (IRES) allows for translation into protein, and the DsRed portion serves as a marker to visualize what cells express the construct via immune-cytochemistry. In our study, after three trials of injections of CID at P6-8 via craniotomy, or recently by systemic injection of 50 mg/kg, we depleted approximately 30%-50% of the oligodendrocyte population and saw myelin reduction in the spinal cord and optic nerve of the transgenic mice after sacrifice on P9, P15, and P20. Using the results seen in this portion of the CNS, future projects will create new transgenic constructs, utilizing other cell-type specific or constitutive promoters, and analyze the effects on myelination and remyelination.

Poster Board No. 041 WASTE TO WATTS: BUILDING AND TESTING A MICROBIAL FUEL CELL WITH BENTHIC MUD SAMPLES. Abigail E. Ambrose (16AbAm74@gmail.com), 23747 County Road 17, Coshocton, OH 43812.

Energy is used every day in the United States. Most of the energy used in the United States comes from fossil fuels. What if there was a different way to power an average American house? The question tested was can a microbial fuel cell be used to power an average American household efficiently? The hypothesis was if a microbial fuel cell is used, then there would not be enough energy to efficiently power an average American household because a wastewater treatment plant serving 100,000 people could only produce enough energy to power 500 homes. The experiment's procedure included building the anode and cathode containers, creating the electrodes, creating the salt bridge, retrieving benthic mud samples, making fuel cells, and testing fuel cells. The materials were for the assembly and testing of the fuel cell. For testing the fuel cell, alligator cables, resistors, and a digital multimeter were used. The results of the experiment were the microbial fuel cells were able to produce electricity. In fuel cell one, the maximum amount of electricity produced was 7.6 millivolts. In fuel cell two, the maximum amount of electricity produced was 18.8 millivolts. In fuel cell three, the maximum amount of electricity produced was 23.5 millivolts. The amount of electricity produced in the different trials varied. This may have been caused by the varying richness of the benthic mud sample. Another reason for the variation in the electricity produced may have been caused by the life cycle of bacteria. The hypothesis was correct.

Poster Board No. 042 DOES THE DISTANCE BETWEEN AN ENERGY HARVESTER, AND A WIRELESS ELECTRONIC AFFECT THE AMOUNT OF ENERGY COLLECTED BY THE HARVESTER? Hyndavi Anksapuram (hanksapuram@gmail.com), 5759 Ebner Cir, Dublin, OH, 43016.

Ohio State's ElectroScience Laboratory just invented an energy harvester, which collects WiFi and puts the WiFi to good use. In the future, it could be used to improve the power and signal received by a cell phone. In fact, the antennae could be so small that it could be worn on clothing. The question tested was, "Does the distance between the energy harvester and a wireless electronic affect how much energy the harvester would be able to collect?" Based on previous observations, the hypothesis tested was, the greater the distance, the less energy would be harvested. The harvester's distance away from a variety of electronics was tested in three separate trials. During testing, the same 2 min. YouTube video was played on each device. Again, this process was tested multiple times, for accurate results. It was found that the greater the distance the harvester was away from electronics, the less energy the harvester would collect. For example, at one inch away from the iPad Air, the energy harvester collected 140.3 milliVolts. At two inches away from the iPad, the harvester collected 123.1 mV. Finally, at three inches away from the iPad, the harvester collected 77.9 mV. Based on these results, the conclusion was that a difference in distance between the energy harvester and the electronic device does make a difference in how much energy could be collected by the harvester, which supports the hypothesis. This research will benefit OSU and other companies that provide electronics. In future extensions, the energy harvester might be wearable, which improves wifi signals. Another question that could be explored building on this project, would be, "Which kind of clothing material blocks the energy harvester from collecting energy best?"

Poster Board No. 043 CHIRAL MOLECULES AND LIGHT. Claire A. Chaikin (16cchaikin@beaumontschool.org), 1523 Felton Rd South Euclid, OH 44121.

Testing chiral molecules, such as fructose and glucose, to see how much they rotate plane-polarized light can be used to show how chiral molecules are able to rotate plane-polarized light. The hypothesis was that if fructose and glucose have identical concentrations in solution, fructose will rotate plane-polarized light to a greater extent. The purpose of this project was to find out if fructose rotates plane-polarized light to a greater extent than glucose. To start this experiment two solutions of fructose and glucose were made, one solution was 1 molar and the other was 0.5 molar. The purpose of this was to test the properties at different concentrations. The solutions were placed in four cans on the computer screen and were tested by shinning plane-polarized light through them from the screen and observing which solution rotated it furthest away from where the computer screen rotated the light. That measurement was the angle of rotation. These results were used to determine which solution rotated the light to a greater extent. This experiment supported the hypothesis because fructose rotated the light to a greater extent than glucose. While the 1 molar glucose solution rotated the

plane-polarized light an average of 8.91 degrees to the right, the 1 molar solution of fructose rotated the light an average of 11.18 degrees to the left. The experiment showed that fructose was a levorotatory molecule and glucose was a dextrorotatory molecule. This demonstrated that chiral molecules have the ability to rotate plane-polarized light, while achiral molecules cannot.

Poster Board No. 044 INDUCED DRAG COEFFICIENT. Mitchell A. Cowan III (mitchcowan411@gmail.com), Thurgood Marshall.

Induced drag on an aircraft wing can be detrimental to a pilot or fighter pilot. Due to little known testings and knowledge pilots are unaware about the effects of Induced drag. Induced drag slows an aircraft down and increases the risk of stall which causes the aircraft to lose lift, drop airspeed and results in horrific accidents. The objective of the research presented herein was to test swept back, delta, and rectangular wing designs ranging from 5°, 15°, and 25° angles of attack, and wind speeds going 40 mph (full-speed) and 20 mph (half-speed) in a mid-sized wind-tunnel to figure out which wing will produce the least amount of induced drag? From journaled research, induced drag decreases with increased speed and low angles of attack, therefore if the delta wing is tested in a wind-tunnel at 40 mph and 5° angle of attack, then the delta wing will have the least amount of induced drag. The wing measurements was based on area formulas (triangle[Delta], trapezoid[Swept-back], rectangle[Rectangular wing]) to a controlled area of $6in^2$. Lift was calculated through the wind tunnel in trials of 3 for each wing, once the average lift for the wings was recorded the coefficient of lift was calculated using the C_L equation ($C_L = 2L / \rho \times V^2 \times A$). Once the equation was calculated then the Induced drag coefficient C_{Di} was calculated ($C_{Di} = C_L / \pi \times AR \times e$). Once the equations was calculated and compared to different speeds and angles of attack, the wing with the least amount of induced drag was recorded. Results confirmed that the delta wing at 5° angle of attack going 40 mph in a wind tunnel had the least amount of induced drag at 0.542_{Di}.

Poster Board No. 045 OPTICAL COHERANCE TOMOGRAPHY IN CONGENTIAL HEART DISEASE. Olivia N Jackson (ojackson15@hb.edu), 435 DUNDEE DR. CLEVELAND, OH 44108.

This projects reports the results of the use of Optical Coherence Tomography (OCT) in a congenital heart disease for a pediatric patient with Patent Ductus Arteriosus. Patent Ductus Arteriosus (PDA) is a pathway in a fetus that connects the pulmonary artery to the aorta. This pathway closes shortly after birth, but if it remains open it can cause a leakage of blood into the aorta. To assess the severity of a PDA angiography is that standard imaging technique used. Angiography is a medical imaging technique used to obtain images of the insides of pulmonary arteries and heart chambers. To get these images a contrast is injected into the blood vessel being viewed and pictures of the contrast moving through the vessel are taken with a fluoroscope. Optical Coherence Tomography is a new, noninvasive, noncontact transpupillary imaging technology that captures micrometer- resolution three-dimensional images within optical scattering media. The first case was a 5-year-old female with a moderate sized and pressure-restrictive PDA. Using the angiography technique a cone-shaped PDA with a diameter of 2.6 mm was found. However, the OCT system showed an ellipse-shaped ductus measuring 2.2 mm at the narrowest point and 3.1 mm. The 3D images that OCT constructs gives more anatomic information that could improve the selection of the device. Although we cannot make a certain conclusion that OCT is better than angiography we strongly suspect more cases will produce the same results as this one.

Poster Board No. 046 GENDER PREFERENCES OF HARD AND SOFT SCIENCES VS SOCIETAL STEREOTYPES. Mary K Conway (londonandparis97@yahoo.com), 24434 Emmons Road, Columbia Station Ohio 44028.

The purpose of the research was to determine if there is a correlation between hard and soft science preferences and gender stereotypes - and, also to determine feelings about women in the sciences. The premise is that women will be more interested in soft sciences and feminine activities while men will like hard sciences and masculine activities, also, people will have positive feelings towards women. Fifty men and fifty women; all random volunteers (all ages and lifestyles, though not statistically similar to the population); completed a three-page survey. The first page consisted of questions used to rank interest in sciences from 1 to 14; the second page consisted of ranking interest in stereotypical gender related activities from 1 to 14; and the third asked about opinions on women in the sciences. Each participant's seven highest rated sciences were then categorized as hard or soft and the seven highest rated activities were categorized as masculine or feminine. Then, by adding up the number of top seven hard sciences and dividing the number by the total number of hard sciences the men or women could have picked, the average is found. For the third page, the number of times yes was selected was put over all tests, 100. 50.86% of the women preferred hard sciences and 69.14% of the women preferred feminine activities. 52% of the men preferred hard sciences and 62.57% preferred masculine activities. 98% of people approve of women in the sciences and 96% of people approve of women in the hard sciences. The statistics do not show a correlation between preference for hard or soft sciences and gender stereotyped activities. The research was conducted to determine if women still thought it was inappropriate for a women to be involved in the hard sciences due to stereotypical roles.

Poster Board No. 047 CONFORMITY & MANIPULATION: DOES INDEPENDENT THOUGHT STILL EXIST? Caitlyn A. Miller (sassofras97@gmail.com), 13684 Janell Drive, Columbia Station, OH, 44028. Columbia High School.

The hypothesis was, if "confederates" are put in the test groups, then they can influence the other test subjects to conform to their thoughts about a given topic. The study supported the hypothesis by showing that conformity occurred. The participants were given the choice between two logos and asked which they thought was the most appropriate. The two logos were the Raider and the Columbia "C". "Confederates" tried to influence other test subjects to conform to their ideas. The Columbia "C" logo was the optimal choice. The trial groups consisted of ten subjects each. In the first trial there was one "confederate", in the second there were two, and in the third trial there were three. These "confederates" were also given statements to discuss. These statements supported the "C" logo and helped the "confederates" influence the subjects. The "confederates" were planted in the trial groups to try to make the other subjects conform to their thoughts. The results showed that when more subjects agreed initially with the "confederates" thoughts, subjects were more likely to conform. In the first trial, more people chose the Raider as their final response. This showed how more than just the "confederates" influenced other subjects' responses. The experiment showed that test subjects' personality differences appeared to affect the changing of responses from subjects. Test subjects with a more forceful nature appeared to add to the "confederates'" efforts to make other subjects conform. To improve this experiment, the researcher could measure gender's influence on making subjects conform.

Poster Board No. 048 GENOTOXICITY OF CRUDE OIL - MICROENVIRONMENT ANALYSIS AND BIOMARKER DEVELOPMENT USING *ARABIDOPSIS THALIANA*. Kavin S Vedamoorthy, New Albany Middle School, New Albany, Ohio.

Incidences of oil spills are happening very frequently on land as well as underwater. Oil spills under water can

be carried away to far distances and end up on land. As well all land oil spills from drilling rigs/platforms, refineries, pipeline breakage, transportation accidents, obviously pollute the soil around the site, ground water and surface waters, like rivers and lakes. Crude oil or its refined isolates makes the soil conditions unfavorable for plant growth by depleting nutrients and adding toxicity. Long term environmental and health impact of oil spill is not completely explored and reports suggests it can bring larger complications next to radioactive accidents. In spite of various cleanup strategies, 100% decontamination is not being possible. This residual crude oil/hazardous components can stay long term and cause growth and genetic abnormalities. Plant bioassays should be an important and integral part of test batteries to detect growth and genetic abnormalities. The hypothesis was that the seed germination, plant growth impairment serves as direct measure of the level of toxicity and the percentage of micronucleus formation as an indicator of the genotoxicity. A two stage study was performed using *Cicer arietinum* and *Arabidopsis thaliana* seeds, to assess the impacts of crude oil on germination/growth and genotoxicity. *C. arietinum* seeds were soaked in water and placed in crude oil [1 or 5% (v/w), collected from Gulf of Mexico, Texas, and Canada refineries)] mixed top-soil. Crude oil treatment (1 & 5%) decreased the percentage of seed germination, growth (5%, $p<0.01$) and total protein content (1%, $p<0.01$, $p<0.001$). Oxidative stress assessed by measuring reactive oxygen species formation, revealed dose dependent increase. Gulf of Mexico crude oil was used in the second stage of the study. *A. thaliana* seeds planted in crude oil mixed Sunshine LC1 soil, showed impaired germination. Germinated seedlings, grown (21 days) in crude oil mixed soil showed high percentage of micronucleus formation in both concentrations. Result obtained from this study confirms the usefulness of these bio-assays, which can serve as an important tool in assessing the severity of oil spill and possibly in assessing the effectiveness of cleanup.

College student and Professional Poster Session 12:45 – 3:00 PM Capital Center

Poster Board No. 001 DISSOLVED OXYGEN DYNAMICS IN LAKE ERIE'S SANDUSKY SUBBASIN: A TEN-YEAR ANALYSIS. **T.L. Atkinson (atkinson.153@buckeyemail.osu.edu)[1,2], 422 E. 12th Ave. Apt 3, Columbus, Ohio 43201. Douglas D. Kane, (dkane@defiance.edu)[1,3], [1]Franz Theodore Stone Laboratory, [2]The Ohio State University, and [3]Defiance College.**

Since the mid-1990s, Lake Erie has been experiencing increased eutrophication and hypoxia which have compromised the ecological and economic health of the lake. In order to better understand the dynamics of hypoxia in the Sandusky Subbasin, an analysis of ten years (2005-2014) of data for two sites was conducted using a one-dimensional analysis to determine the rate of oxygen consumption during the last week of June and the first two weeks in July. These consumption rates (maximum= 0.351 mg DO/L/day in 2007 and 2008, minimum= -0.072 mg DO/L/day in 2006) were regressed against hypolimnion thickness, hypolimnion depth, and year. The main hypothesis of the study was that with a decrease in the thickness of the hypolimnion, there would be an increase in the rate of oxygen consumption. Dissolved oxygen and temperature measurements were taken at half meter increments in the field using a YSI Sonde 6600 Version 2. Contradictory to the hypothesis, the rate of oxygen consumption appeared to increase as the thickness of the hypolimnion increased ($p = 0.051$, $r^2 = 0.218$), which contrasts with findings in other studies. This could be explained by the small amount of differences in the hypolimnia thicknesses in this study (ranging from 0.5-4.5 meters), because other studies that have been done were on a much larger scale with hypolimnia ranging from 2.5-30 meters. More work still needs to be done to fully understand the dynamics of this complex situation occurring in Lake Erie's Sandusky Subbasin. With average concentrations of 7.581 mg DO/L and 7.720 mg DO/L at the two sites, 2014 still had considerably larger dissolved oxygen concentrations in the hypolimnion in the second week of July than years prior (with the closest being 5.877 mg DO/L in 2009), which could be associated with the late ice off date in 2014.

Poster Board No. 002 SURVEY OF AMPHIBIAN DISTRIBUTION ON A 26-HECTARE PLOT SURROUNDED BY RECLAIMED SURFACE MINE LAND. **Bowen Deng (bdeng@muskingum.edu), Hayley Glaze (hglaze@muskingum.edu), and Danny Ingold (ingold@muskingum.edu); Environmental Science Program, Muskingum University, 163 Stormont St., New Concord, OH 43762.**

North American amphibian populations have been declining during the past 25 years. Their decline in the Appalachian Region of the eastern U.S. is likely linked, in part, to fossil fuel extraction which has contributed to habitat alteration and water pollution. This study was conducted from late May through July 2014 and during September 2014 in Muskingum Co., Ohio. The objectives were to survey the amphibians on an abandoned 26-ha farm surrounded by reclaimed mined land and to examine the water quality of the wetlands on the site. A total of seven anuran species were identified by their calls on the farm (vernal pools, small pond and marsh area). The most common species in May through July based on chorus size and frequency of detection were green frogs (*Rana clamitans*; about 15 individuals per chorus and 100% detection rate) and gray tree frogs (*Hyla versicolor*; 5-10 individuals per chorus and 89% detection rate). Red-spotted newts (*Notophthalmus viridescens*) were the only salamander species captured in minnow traps (n = 5 individuals), while northern ravine salamanders (*Plethodon electromorphus*) were the most abundant land species (n = 8 individuals). Call surveys conducted in September revealed choruses of gray tree frogs (*Hyla versicolor*; about 15 individuals per chorus and 100% detection rate) and western chorus frogs (*Pseudacris triseriata*; 3-4 individuals per chorus and 67% detection rate). Although the water quality on this site was generally good (mean pH = 6.7; nitrates = < 0.5 ppm), and salamander species diversity was relatively high (n = 3 species), the overall abundance of individuals on this site (n = 15 individuals of all species) was lower than on larger reclaimed sites in the southern portion of this county (n = 88 individuals of all species; Bourne 2012). These findings suggest that extensive surface mining and subsequent land reclamation, leaving patches of island forests behind, might adversely affect salamander abundance and their ability to disperse.

Poster Board No. 003 A COMPARISON OF GRASSLAND BIRD POINT-COUNT DATA ON TWO REGIONS OF A RECLAIMED SURFACE MINE (THE WILDS) IN SOUTHEASTERN OHIO. **Connor Hann (chann@muskingum.edu), Jennifer Hastings (hastings@muskingum.edu), Allie Leggett (aleggett@muskingum.edu), Sarah Landuyt (slanduyt@muskingum.edu), Morgenna Zuby (mzuby@muskingum.edu), Devin Perry (dperry@muskingum.edu), and Jonothan Raugh (jrraugh@muskingum.edu); Biology Dept., Muskingum University, 163 Stormont St., New Concord, OH 43762.**

Although reclaimed surface mines provide suitable nesting habitat for several obligate grassland bird species, there have been management concerns in recent years regarding changes in plant species composition and the encroachment of woody vegetation on such mines. During May-July 2014 we conducted point-count surveys of grassland birds on two areas of a former surface mine that were reclaimed during

different time periods (Zion Ridge – ZR – 1950s through early 1970s and southern sector – SS – early 1980s). Our goal was to look for differences in the abundance of several grassland bird species on the two sites and to make a broad comparison in the plant species composition between the areas. Counts at 23 point sites on the SS revealed significantly more Henslow's Sparrows (*Ammodramus henslowii*) in June and July compared to 17 sites on ZR during the same months ($t = 2.07$, $df = 38$, $p < 0.04$, June; $t = 3.23$, $df = 38$, $p < 0.002$, July). Significantly more Bobolinks (*Dolichonyx oryzivorus*) were detected in May, during the peak of their breeding, on the SS ($t = 3.15$, $df = 38$, $p < 0.003$) versus ZR. Conversely significantly more Grasshopper Sparrows (*A. savannarum*) were detected in May and June on ZR versus the SS region ($t = 5.73$, $df = 38$, $p < 0.0001$, May; $t = 5.47$, $df = 38$, $p < 0.0001$, June). Structural vegetative differences in the two regions associated with different reclamation efforts likely explain differences in grassland bird species diversity between the two regions.

Poster Board No. 004 BUTTERFLY DIVERSITY OF BUTTERFLY HABITATS AT THE WILDS IN CUMBERLAND, OHIO. Alexandra Leggett (aleggett@muskingum.edu), Jim Dooley (jdooley@muskingum.edu), Conservation Science Program, Muskingum University, 163 Stormont St, New Concord OH 43762.

Recent studies have indicated that butterfly populations have been on the decline across the globe. The Wilds, located in Cumberland, Ohio, created a butterfly habitat in the spring of 2003 on ten acres of land with aim of restoring butterfly populations on their property. For this study, data on butterfly diversity and relative abundance were collected in August and September of 2014. Ten circular gardens were surveyed once a week and results were recorded on a data sheet displaying 29 butterfly species common to the area. Butterfly species found at the Wilds included Black Swallowtail (*Papilio polyxenes*), Cabbage White (*Pieris brassicae*), Clouded Sulphur (*Colias philodice*), Orange Sulphur (*Colias eurytheme*), Bronze Copper (*Lycaena hyllus*), Eastern Tailed Blue (*Cupido comyntas*), Meadow Fritillary (*Boloria bellona*), Pearl Crescent (*Phyciodes tharos*), Question Mark (*Polygonia interrogationis*), American Painted Lady (*Vanessa virginiensis*), Red Spotted Purple (*Limenitis arthemis*), Viceroy (*Limenitis archippus*), Common Wood Nymph (*Cercyonis pegala*), Monarch (*Danaus plexippus*), Silver Spotted Skipper (*Epargyreus clarus*), Least Skipper (*Ancyloxypha numitor*), Peck's Skipper (*Polites peckius*), and Zabulon Skipper (*Poanes zabulon*). Results from these surveys indicated that Eastern Tailed Blue, Cabbage White, Clouded Sulphur, Orange Sulphur, and Viceroy were the most common species in the habitat equaling nearly 76 percent of all individuals recorded. Diversity was lower than has been observed in the past with 28 species spotted in 2003 and 17 species in 2014. It may be that declining plant diversity can be a correlation to what appears to be a decline in butterfly diversity. Further analysis continues to be done to find relationships between the plant diversity and butterfly diversity and abundance.

Poster Board No. 005 CHARACTERIZATION OF TREE SECONDARY SUCCESSION WITH GIS MAPPING AT ACACIA RESERVATION (LYNDHURST, OH). Steven J. Shavel (sshavel11@students.ndc.edu), Mark Guizlo (mguizlo@lakelandcc.edu), Bobby Oliver (bolivar@lakelandcc.edu), Patrick Lorch (pdl@clevelandmetroparks.com), Constance Hausman (ceh@clevelandmetroparks.com), Tracey Meilander (tmeilander@ndc.edu), Notre Dame College, 4545 College Road, South Euclid, Ohio 44121.

This research will characterize the sapling distribution and secondary succession of maple, oak, and cottonwood trees at three selected sites on Acacia Reservation, a former golf course and country club recently acquired by the Cleveland Metroparks. We hypothesize that saplings will be more dense and diverse in the rough, near mother trees. Roughs contain Kentucky bluegrass (*P. pratensis sp.*) and fescue (*Festuca sp.*). Seedling density will be higher in the rough than in the fairways, which contain bent grass (*Agrostis sp.*). Transects (50 meters long) were mapped along three linear transects from each of two other species (oak and maple) and across three sand traps. Sampling species, location, height (cm), number of leaves and number of branching nodes (as an estimate of deer browsing) were collected with a square meter plot every 10 meters along a transect with a GIS mobile mapper. ArcMap 10.2 software will be used to analyze and map this data to identify patterns. Preliminary data demonstrates variability in plant communities increasing in species number and size of seedlings between Spring 2014 and Fall 2014. With large numbers of saplings present, various oak species are densest in the rough regions. Maple saplings were present in one small dense fairway location. Cottonwood saplings were only found in sand traps. Impact of deer grazing are predominantly found in open canopy areas, where evidence of browsing affected height, number of leaves and branches of the saplings. Results indicate that the existing roughs contain the majority of saplings due to the nearby location of the forest edge.

Poster Board No. 006 A COMPARISON OF TWO TYPES OF YELLOW STICKY TRAPS FOR MONITORING WESTERN CORN ROOTWORM ADULT POPULATIONS IN FIRST-YEAR AND CONTINUOUS CORN PRODUCTION SYSTEMS. Curtis E. Young (young.2@osu.edu), Ohio State University Extension, Van Wert County, 1055 South Washington Street, Van Wert OH 45891.

Western corn rootworm (WCR), *Diabrotica virgifera virgifera*, is an important pest of corn (*Zea mays*) in the Corn Belt. Corn is a primary crop produced by farmers in Ohio, annually planted on 3.5-4.0 million acres. The harvested corn is used for livestock feed, and ethanol, corn oil and high fructose syrup production. Corn rootworm has become increasingly more difficult to control through adaptations to various pest management strategies including crop rotation. Thus, it is imperative to regularly monitor its development and distribution. The objective of this study was to compare the effectiveness of yellow Pherocon AM/NB and yellow Scentry Multigard sticky traps for monitoring corn rootworm beetles (adults). From July to September of 2014, four fields in Van Wert County, Ohio were monitored for corn rootworm beetle activity by using the two sticky trap types. Overall, the yellow Scentry Multigard sticky traps were found to be better for monitoring corn rootworm adults in this experiment, as they captured significantly more beetles than the yellow Pherocon AM/NB sticky traps (mean=1.5 times more beetles in first-year corn production and mean=1.7 times more beetles in continuous corn production) (t-test, $p<0.05$). The maximum number of beetles captured in one week's time on a Multigard trap and a Pherocon trap was 560 and 260 respectively. Both traps exhibited some flaws in their production or storability. However, the effectiveness of the Scentry Multigard sticky trap to capture corn rootworm adults in both high and low density populations makes it a value tool for monitoring the western corn rootworm.

Poster Board No. 007 SPATIAL VARIATION AND CONNECTIVITY OF SPRING COMMUNITIES IN JOHN BRYAN STATE PARK. Jamie Bonino (j-bonino@onu.edu), Mira Lukkarila (m-lukkarila@onu.edu), Schelby Rosebrook (s-rosebrook@onu.edu), Robert G. Verb (r-verb@onu.edu), Leslie A. Riley (l-riley.1@onu.edu), Department of Biological and Allied Health Sciences, Ohio Northern University, 525 S. Main St., Ada, Ohio 45810.

Freshwater springs provide a unique, stable environment for many different organisms. Despite their prevalence in the landscape, little attention has been paid to the spatial variations between the smaller spring systems and the larger lotic systems with which they merge. The objective of this study was to test for variation between river and spring community structure. We hypothesized that some

groups of organisms would be restricted to springs, while other generalist taxa and those with mobile life history stages would have a more widespread distribution. The study was conducted within a limestone gorge at John Bryan State Park (Yellow Springs, Ohio, USA). Two spring systems were sampled for selected physical and chemical parameters, periphyton, macroinvertebrates, amphibians and reptiles. In addition, three sets of riffle samples were collected from the Little Miami River above, below and in between the spring and river points of confluence. Initial MANOVA analysis demonstrated that the springs had significantly lower algal taxa richness (p<0.001) and diversity (H', p<0.02) than the sites on the Little Miami River. Further analysis with nonmetric multidimensional scaling will be used to examine community similarity among sites and individual taxa distributions will be used to determine the level of connectivity among sites for different groups of organisms.

Poster Board No. 008 BENTHIC COMMUNITIES OF TIP-UP POOLS FROM A SOUTHEASTERN INDIANA FLATWOODS. **Paige M. Kleindl (p-kleindl@onu.edu)[1], Christopher P. Bowers (c-bowers@onu.edu)[2], Leslie A. Riley (l-riley.1@onu.edu)[1], Darrin L. Rubino (rubino@hanover.edu)[3], Robert G. Verb (r-verb@onu.edu)[1], [1]Department of Biological and Allied Health Sciences, Ada, OH 45810, [2]Department of Chemistry and Biochemistry, Ada, OH 45810, [3]Department of Biology, Hanover College, Hanover, Indiana 47243.**

The forests of the Illinoian tillplain in southeastern Indiana are characterized by unique hydrology, soil features, and woody species composition. These hydro-mesophytic forests are typified by their poor drainage and lack of topography, topographic variation is limited to pit-and-mound topography resulting from tree falls. The tree fall pit represents a unique microhabitat in the forest matrix. Although much attention has been given to the woody species composition of these unique forests, almost nothing is known about the biota of these pits. In June 2010, nine tip-up pools from Tribbetts Woods, an old-growth remnant forest in Jennings County, Indiana, USA were visited to determine their diatom and macroinvertebrate community composition and their corresponding physiochemical conditions. Preliminary canonical correspondence analysis depicted that the distribution of diatom and macroinvertebrate taxa along the first four significant (Monte Carlo permutation, p<0.05) multivariate axes was influenced by pool age (Axis I; r=0.09) and various geomorphological measurements of the pool (e.g., depth, canopy cover). Further multivariate analyses will be employed to examine interactions between the algal and macroinvertebrate communities.

Poster Board No. 009 ECOSYSTEM NITROGEN BALANCE: APPLICABILITY OF MEMBRANE INLET MASS SPECTROMETRY FOR MEASURING NITROGEN DYNAMICS IN LAKE ERIE. **Laura E. Smith (smith.7431@osu.edu)[1,2], Darren L. Bade (dbade@kent.edu)[1,3], [1]F.T. Stone Laboratory, Put-in-Bay OH 43449, [2]The Ohio State University, Columbus OH 43210, [3]Kent State University, Kent OH 44240.**

Previous research has implicated nitrogen (N) as a factor affecting the toxicity and growth of photoautotrophic cyanobacteria that comprise Lake Erie's harmful algal blooms. This study sought to measure photic zone N-fixation because this process allows organisms to make biologically unavailable dissolved N_2 gas bioavailable. N_2 equilibrates across the air-water interface, so N-fixation can be measured by comparing the atmospheric and aqueous N concentrations using Membrane Inlet Mass Spectrometry (MIMS). MIMS utilizes a semi-permeable membrane to draw analytes from the sample fluid into a mass spectrometer's vacuum chamber, allowing for direct analysis of those molecules. The hypotheses were: 1) N-fixation will occur when bioavailable N (nitrate) is low and 2) N-fixation or denitrification will be detected as N_2 undersaturation or supersaturation, respectively, in water samples analyzed using MIMS. For the first hypothesis, two sites in Lake Erie's western basin with different nitrate levels were sampled. The 12 mL samples were incubated in three treatment groups consisting of a light-permeable bottle allowing all N-fixation, light-impervious bottle allowing only light-independent N-fixation, and a control kept on ice to halt biologic activity. Significant rates of 3.0, 1.4, and 1.6 μmolN_2/L/hr were found using MIMS for total, light-dependent, and light-independent N-fixation respectively at the nitrate-deficient site (ANOVA, p<0.0001). For the second hypothesis, samples from six sites along a trophic-gradient transect in the western basin were analyzed with MIMS. Four were significantly undersaturated (t-test, p<0.05), indicating N-fixation, while one was supersaturated (t-test, p<0.05), signifying denitrification. Using MIMS to understand N dynamics could lead to more effective management of harmful algal blooms.

Poster Board No. 010 RESPONSES OF NITROGEN-LIMITED CYANOBACTERIAL BLOOMS TO NITROGEN FORM AND LOADING RATE. **Briana C. Zellner (Zellner.34@osu.edu)[1], Karen L. Ortega (klo49@cornell.edu)[1,2], Justin D. Chaffin (chaffin.46@osu.edu)[1], [1]F.T. Stone Laboratory Ohio State University, PO Box 119, Put-in-Bay, OH 43456, [2]Cornell University.**

Nitrogen constrains cyanobacterial bloom biomass accumulation in Lake Erie and these cyanobacteria assimilate many nitrogen forms. We contrasted the growth response and microcystin production by blooms following a single large pulse of nitrate, ammonium, or urea (simulating concentrations following a rainstorm) with low continuous pulses of each form (simulating internal nitrogen recycling). Because of ammonium's reduced state, we hypothesized that ammonium would result in higher chlorophyll and microcystin concentration. *Planktothrix*-laden Sandusky Bay water was collected July 2, 2014 and *Microcystis*-laden Maumee Bay water was collected August 6, 2014. In the laboratory, the water was subject to nutrient enrichment treatments and incubated for 48 hours: 100 μmol/L nitrate, ammonium, and urea added at beginning of experiment, 8.3 μmol/L every 4 hours nitrate, ammonium, and urea, 1.0 μmol/L phosphate, and a control without enrichment (all treatments n = 3). In both experiments, final chlorophyll and microcystin concentrations in the control and phosphate enrichment did not differ (p > 0.05) and collectively averaged 128.8 μg/L and 8.5 μg/L (respectively) for *Planktothrix*, and 56.5 μg/L and 24.9 μg/L for *Microcystis* (respectively). Nitrogen enrichment increased chlorophyll by 21-35% and microcystin by 40-52% (p < 0.001). Chlorophyll did not differ among form or pulse rate for *Planktothrix* (p > 0.05), whereas ammonium resulted in highest chlorophyll for *Microcystis* (p < 0.001). Microcystin in both experiments was greater in the nitrate and urea treatments than ammonium treatments (p < 0.01). Cyanobacteria growth and microcystin responses to nitrogen differ among nitrogen forms and cyanobacteria, but not loading rate.

Poster Board No. 011 THE EFFECT OF RELIGIOUS AND EDUCATIONAL BACKGROUND ON ACCEPTANCE OF GLOBAL CLIMATE CHANGE. **Sara Almalki (salmalki1285@capital.edu), Naima Adan Ilmi (nilmi@capital.edu), (Dr Kimberly Heym, Dr Kerry Cheesman), 1 College and Main, Columbus, OH 43209.**

Global climate change and the data that show it is occurring is supported by most scientists working in the field, and the data that points to human involvement is quite strong. Over the past decade data have been debated publicly by scientists and politicians alike, and the results have indicated that a segment of the US population that does not believe that humans have anything to do with climate change. In addition to political bias, religious affiliation also appears to be related to this phenomenon of denial, according to the Intergovernmental Panel on Climate Change. IRB approval was obtained to develop and administer a fifteen question survey to individuals of

diverse religious backgrounds (N>500) asking about their reactions toward and understanding of climate change, as well as their attitudes toward science as a way of knowing to determine whether or not such a link to religious/tradition background exists. Three separate one way analysis of variance tests will be used to correlate test scores with educational background as well as religious affiliation (Protestant, Catholic, Muslim, Jewish, or other), and with exposure to media and print as a source of information. It is hypothesized that people with strong religious affiliation and/or less education will be less likely to associate human activity with climate change. In addition, other factors such as culture and source of information may play a role in how people understand climate change.

Poster Board No. 012 DETERMINING THE CRITICAL WINDOW OF INFLUENCE OF PCB PERINATALLY ON BEHAVIORAL AND HORMONAL DEVELOPMENT IN SPRAGUE-DAWLEY RAT PUPS. Mikayla Bond (mikaylb@bgsu.edu), Natalie Sommerville (nsommer@bgsu.edu), Bailey Guerin (guerinb@bgsu.edu), Lee Meserve (lmeserv@bgsu.edu), H. Casey Cromwell (hcc@bgsu.edu), 217 Life Science, Bowling Green State University, Bowling Green, Ohio 43403.

Polychlorinated biphenyls (PCB), used in manufacturing until they were banned, have left lasting effects on the environment. They have penetrated the food sources of humans and other animals. The effects of PCB can be observed through examination of *Rattus norvegicus*, specifically Sprague-Dawley rat pups. PCB has been shown previously to alter behavioral and hormonal development. To clarify and further examine the point at which exposure is most crucial, pups have been exposed to PCB via maternal ingestion (25 mg per kg maternal diet) during a single week of the gestation period or the first week of pup nursing (BGSU IACUC approved protocol # 13-003). The following behavioral tests were performed on a pair of pups (1 male, 1 female) from each of three litters per group, and comparisons were made among controls (no PCB exposure) and PCB exposed pups: ultrasonic vocalizations - postnatal days (PND) 3, 7; grooming - PND 14; Open field activity - PND 21; and play behavior - PND 22. Also on these days, blood was collected and serum extracted for thyroid hormone concentration determination. ANOVA revealed a main effect of PCB on all measures except grooming and ultrasonic vocalization. Thyroxine (T4) was significantly depressed, more pronouncedly with the later PCB exposures, whereas T3 was elevated at all PCB exposure times. Open field activity and play behavior were significantly increased regardless of tome of PSB exposure, and there was a trend toward increased ultrasonic vocalization. These results suggest that rather than a specific time of development when PCB exposure is most severe, any exposure results in thyroid and behavioral alteration.

Poster Board No. 013 HERPETOLOGICAL SURVEY OF OAKWOODS PRESERVE IN FINDLAY, OHIO. Kristin N. Brooks (brooksk1@findlay.edu), Natalie N. Brock (brockn@findlay.edu), and Justin Rheubert (rheubert@findlay.edu), 1000 N Main St. Findlay, OH 45840.

Herpetological surveys are of great importance to species conservation, as well as serving as a method to gauge the overall health of the ecosystems in which these species are found. In order to assess the diversity and abundance of amphibians and reptiles at Oakwoods Nature Preserve in Findlay Ohio, four drift fences containing pitfall traps were placed within the preserve, and checked daily from January 1 through December 31. Furthermore, coverboards were placed throughout the preserve, and checked on a bi-weekly basis during an active search which included transect surveys, flipping logs, and checking leaf litter. These survey techniques will target all species of amphibians and reptiles. Animals collected are marked using a toe clip or scale clip and returned to the wild. This herpetological survey of Oakwoods Preserve, in Findlay, Ohio is the first time that the reptile and amphibian species and population numbers in this park will have been studied. This is significant especially in light of the many roles served by the preserve, which opened in 1984. The preserve land was previously used as a stone quarry, rail yard, and farmland. Data concerning what species are present will be collected using the Powell et al. dichotomous key. Population size will be utilized using the Lincoln-Peterson method and species diversity indices will be calculated for each species collected using the Simpson Diversity Index.

Poster Board No. 014 DETERMINATION OF EFFECTS OF SOIL COMPOSITION ON MULLEIN ANTIBIOSIS. Renee Chen (r-chen@onu.edu), [Advisors Vicki A. Motz (v-motz@onu.edu), Linda M. Young (l-young@onu.edu) and Christopher P. Bowers].

Native Americans, in some regions but not others, used mullein to treat ear infections. Many recent studies have linked abiotic factors to plant gene expression such that soil difference might logically yield antimicrobial variation. Initial site analysis of mullein growing areas in OH, PA and NJ yielded regional differences in pH, phosphates, chloride and phosphate content of the soils. In July 2014, soil samples from roadside areas in which mullein was growing were collected from New Hampshire, Connecticut, New Jersey, Pennsylvania, Ohio, Oregon, and Washington following NCR 13 guidelines. Samples were dried in a dehumidifier at 40°C and then screened through a 2mm sieve. 5.00 grams of each soil sample was placed into test tubes with 5 mL of dH20 and vortexed for 30 seconds, then centrifuged for 10 minutes at 5,000 RPM. The pH of the supernatant was measured with a Seven Easy Mettler Toledo pH Meter. pH of Midwest soils (7.35+/- 0.38) was significantly higher than east coast (6.57 +/- 0.99) or west coast (6.53 +/- 0.37) soils. These findings are consistent with pH of 2013 samples. Solis will be further analyzed for nitrates, phosphate, potassium, chloride and organic composition. Influence of rainfall will be considered using USGS longitude and latitude climate data. These results will be correlated with the work of others in this lab investigating flower oil antibiosis and genetic variation to evaluate likely abiotic influences on mullein physiology.

Poster Board No. 015 RELATIONSHIP OF CANINE INTESTINAL MICROFLORA AND CANCER USING NEXT GEN SEQUENCING. Cassandra N. DiCioccio (dicioccioc@findlay.edu), Ashley N. Mauer (mauera@findlay.edu), Brittany M. Conkey (conkeyb@findlay.edu), Donald Walker (walkerd@findlay.edu), Linda Peck (peck@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

The microflora within animals have been associated with their phenotypes. In the past, cost and technical restraints prevented the analysis and correlation of the presence of the diversity of microbes contained within a niche environment. With next-generation sequencing and metagenomics it is now possible to analyze many DNA sequences and correlate those sequences with the characteristic of their host environment. This study will use a metagenomic approach to determine whether a relationship exists between microbes within the intestinal lining of canines and the presence of cancer. Our hypothesis is that the composition of microbes may vary in relation to the presence of cancer. In coordination with local veterinary clinics, the intestinal tracts of forty canines will be collected using a long stem sterile swab inserted into the rectum of the canines. Upon IACUC approval, twenty canines known to have lipoma or sarcoma, and twenty without a cancer diagnosis will be used. Demographics from each dog will be collected (age, breed, diet, sex, weight, castrated, health status). DNA will be extracted from fecal matter and PCR performed using primers targeted to the 16S rRNA gene and sequenced on the Illumina MiSeq platform. Results will yield the microbial species composition of the intestinal microflora present within each canine. Comparative

analysis of microbial communities will be made between cancerous and noncancerous canines. Any correlations between demographic information and disease state will also be analyzed through multi-factor ANOVA.

Poster Board No. 016 TOXICITY OF LEAF EXTRACT OF ACER SPP. ON EQUINE ERYTHROCYTES. Bailey K Dye (bailey.dye@otterbein.edu), Jeffrey S Lehman (jlehman@otterbein.edu), SMC 10252, Otterbein University, 1 South Grove Street, Westerville OH, 43081.

Red maple toxicosis is a phenomenon that occurs in equines after the consumption of dried or wilted red maple (*Acer rubrum*) leaves. Within the erythrocytes, it causes hemolysis, methemoglobinemia, and Heinz body development. The toxic agent of red maple leaves has not yet been identified; however, the development of hemolytic anemia and methemoglobinemia in equines after ingestion of the leaves, suggests that the toxin is acting as a strong oxidant. Some studies have noted that not only are wilted red maples leaves toxic to equines, but that wilted leaves of other maple species may also be toxic. Therefore, the objective of this research was to evaluate the toxic effects of dried samples of *A. rubrum*, as well as thirteen other species within the genus *Acer*, on the hemolysis of equine erythrocytes. Two-year old saplings were evaluated in greenhouse and field experiments of 5 and 3 replicates, respectively. Leaves were harvested and dried throughout two growing seasons. The leaf material was suspended in water (0.05 g material/500 µl water) and incubated with equine blood taken from the horses housed at the Austin E. Knowlton Equine Center for two hours in 1.5 ml microfuge tubes. Relative toxicities of species were indicated by percent hemolysis of erythrocytes, which was determined spectrophotometrically. Data exhibited a difference in percent hemolysis across the *Acer* species. Red (*A. rubrum*) and silver (*A. saccharinum*) maple were among species that caused the greatest hemolysis (83 % and 74%, respectively). In contrast, bigtooth (*A. grandidentatum*) and Norway maple (*A. platanoides*) were among those causing the least hemolysis (16% and 19%, respectively). The results of this study indicate toxicity to equine erythrocytes may occur in multiple species throughout the *Acer* genus.

Poster Board No. 017 KNOWLEDGE OF EBOLA VIRUS AMONG COLLEGE STUDENTS. Enas Hassan (ehassan@capital.edu), Kaleb Perez (kperez@capital.edu), Evan Winters (ewinters@capital.edu), (Dr Kimberly Heym, Dr Kerry Cheesman), Capital University, 1 College and Main, Columbus, OH 43209.

Now that Ebola has moved from a disease confined to Africa, to a disease detected in the United States, American health care workers and the general public are concerned about transmission of the virus via public transportation as well as hospital settings. This project is designed to effectively compare the accuracy of current knowledge about Ebola and Ebola transmission among college students at a liberal arts university. IRB approval was obtained to develop and administer a thirteen question fact based test on Ebola and Ebola transmission to science, nursing, humanities, and music students (N>300). Three separate one way analysis of variance tests will be used to correlate test scores with choices of major (science, nursing, humanities or music), with class level (freshman, sophomore, junior, senior), as well as religious affiliation (Protestant, Catholic, Muslim, Jewish, or other). It is hypothesized that science and nursing majors will score higher on the test while students with a humanities or music affiliation will not score as highly. It is also hypothesized that students with a higher class standing will score higher than underclassmen. It is predicted that religious affiliation will have no significant influence on test score. Results of this survey will be used to produce educational material for campus use.

Poster Board No. 018 A NOVEL PROTOCOL FOR REMOVING ENVIRONMENTAL CONTAMINANTS FROM SALAMANDER SKIN FOR STUDIES ON THE AMPHIBIAN MICROBIOME. [1]Brandy R. Lawrence (lawrenceb@findlay.edu), [2]Dakota Esterline (esterlined@findlay.edu), [3]Crystal Kelehear (crystal.kelehear@hotmail.com), [4]Sean P. Graham (sean.graham@sulross.edu), [2]Donald M. Walker (walkerd@findlay.edu), [1]College of Pharmacy, The University of Findlay, 1000 N. Main St., Findlay, OH 45840, [2]Department of Natural Sciences, The University of Findlay, [3]Smithsonian Tropical Research Institute, [4]Department of Biology, Geology, and Physical Sciences, Sul Ross State University.

The skin of amphibians is a living interface between the organism and a diverse microbial community, and evidence suggests that this community is an important factor determining susceptibility of amphibians to emerging infectious diseases. To date, studies on the skin microbiota of amphibians have been relatively scattered and protocols have differed greatly among studies, therefore, a standardized protocol was developed to remove environmental contaminants from amphibian skin. Red-backed Salamanders (*Plethodon cinereus*; n=23) were collected at Litzenberg Memorial Forest, which is an upland deciduous forest in Northwest Ohio (USA). Salamanders were washed for 15 seconds (25 ml sterile water) with a squirt bottle followed by three sequential washes (30 sec/wash) in Petri plates filled with 25 ml of sterile water. Wash water (150 µl) was spread onto tryptic soy agar plates and colony forming units (CFUs) counted after 48 hours of incubation at 32°C. To evaluate whether the washing protocol reduced the quantity of environmental bacteria on the skin of the salamander we performed a repeated measures ANOVA on ln-transformed CFUs using JMP Pro 9.0.0. There was a significant reduction in the amount of cutaneous bacteria (CFUs) with washing ($F_{1,45}$=34.89; p<0.0001). The presence of resident salamander microbiota was confirmed after the wash protocol by DNA extraction, PCR, and gel electrophoresis to visualize PCR amplicons from 10 salamander skin swabs. This procedure provides a standardized method to remove environmental microbes for studies on the amphibian microbiome. The University of Findlay's institutional research policies and guidelines for the ethical treatment of animals were followed during this study.

Poster Board No. 019 ASSESSING INTER AND INTRA SPECIFIC VARIATION IN SPERM MORPOLOGY BETWENN POPULATIONS OF SCELOPORUS CONSOBRINUS AND SCELOPORUS UNDULATUS. Jeanine A. Messak (Messakj@findlay.edu), Justin L. Rheubert (Rheubert@findlay.edu), Dustin S. Siegel (Dsiegel@gmail.com), Kevin M. Gribbins (kevingribbins@gmail.com), 1000 North Main St. Findlay, OH 45840.

Although the number of sperm morphology studies in reptiles is increasing, these studies have operated under an assumption that sperm morphology does not differ intraspecifically. Testing this assumption will allow better assessment of the diversity in sperm morphology and how impactful it may be in future phylogenetic/evolutionary analyses. For example, intraspecific variation in sperm morphology may lead to polymorphic character coating and alter the results of such analyses. These studies may also aid in our overall understanding of reproductive biology in reptiles by gathering insights into variation, providing information on multiple aspects of reproductive biology (i.e. sperm competition, geographic variation), and lead to new hypotheses. Therefore, in order to test the assumption that sperm morphology does not differ intraspecifically but does differ interspecifically a total of 100 individuals from five populations of Sceloporus consobrinus and Sceloporus undulatus were collected. (In equals 20 per population) Specimens were euthanized (approved by The Institute of Animal Care and Use Committee at St. Lewis University where euthanasia was performed) and reproductive tracts were removed in order to study the sperm histologically. Sperm were analyzed via electron microscopy and measured using imageJ software. Measurements recorded were head length, tail length and total length, and were analyzed by using a nested ANOVA. The results suggest that sperm do not vary in terms of morphology but may vary in their morphometrics. However, analyses are still

being conducted.

Poster Board No. 020 EFFECTS OF BITTER MELON JUICE ON LEUKEMIA CELL GROWTH. Macey Brandeberry[1] (brandeberrym@findlay.edu), Abigail Stone (stonea@findlay.edu)[1], Morgan Capestrain (capestrainm@findlay.edu)[1], Rebecca Culbert (culbertr@findlay.edu)[2], Xu Lu (lu@findlay.edu)[1*], 11161 West Township Rd 116, Fostoria, OH 44830, [1]The University of Findlay College of Sciences, Findlay, OH 45840 and [2]University of Findlay College of Pharmacy, *: advisor.

Bitter melon, *Momordica charantia*, a gourd that is rather popular in many parts of the world, has been shown to inhibit the cell growth of cancer cells of several solid tumors. The underlying mechanism is not clear but most likely works by impairing the cell cycle control. We would like to extend this study to leukemia cells. It was hypothesized that bitter melon juice can also inhibit the growth of leukemia cells and will use Jurkat cells, a human T cell leukemia cell line, as our investigation model. We further hypothesize that the inhibitory effect (if any) results from cell cycle arrest. Currently, our data show that bitter melon juice can indeed inhibit the growth of Jurkat cells in a concentration-dependent manner. We are currently investigating the mechanism underlying this inhibitory effect using flow cytometry, real time PCR and western blotting.

Poster Board No. 021 THE ANTI-CANCER EFFECTS OF FUNGAL METABOLITES SUPPLEMENTED WITH BITTER MELON EXTRACT. Alison Cash (casha@findlay.edu), Kunjal Patel (patelk13@findlay.edu), Maddie Simmons (simmonsm@findlay.edu), Laura Richards (richardsl@findlay.edu), Savannah Ferkins (ferkinss@findlay.edu), Shannon Matthews (matthewss@findlay.edu), Donald Walker (walkerd@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

Fungi are important in the production of food and drugs. As an example, fungal metabolites from *Phoma* sp., *Penicilliium crysogenum*, and *Aspergillus terreus* are used as anti-cholesterol statins, penicillin antibiotics, and even immunosuppressants, respectively. Fungal bioprospecting is ideal for discovering new molecules useful in modern medicine. The metabolites and their bio-activity may be able to be altered by controlling the carbon source in the growth media. Bitter melon extract shows inherent anti-cancer properties. This study will investigate the effect on cancer cell viability when bitter melon extract has been added as a carbon source for fungal metabolism. Pure culture fungi will be grown in the presence and absence of bitter melon extract. Fungal metabolites will be collected in ethyl acetate as crude extracts. HCT 116 (colon cancer) cell lines will be cultured in IMDM medium enriched with 10% fetal bovine serum at 37°C and 5% CO_2. Cells will be plated in triplicate at equal seeding densities (500 cells/plate) and dosed with 1, 2, 5, 10 µL of crude extract. After treatment, cells will be fixed with methanol and stained with crystal violet. Colonies of greater than 100 cells will be counted and totaled. Student's t-test will be employed to see if there is a statistical difference between extracts containing bitter melon metabolites and those that do not. Preliminary results have identified several fungal extracts with anticancer properties. These fungi will be cultured in the presence of bitter melon and comparative analysis will be conducted using extracts collected in the presence and absence of bitter melon as a carbon source for fungal growth.

Poster Board No. 022 THE EFFECT OF FUNGAL METABOLITES ON THE DOUBLING TIME OF CANCER CELLS. Forrest Miler (millerf@findlay.edu), Jonathon Mitchell (mitchellj1@findlay.edu), Donald Walker (walkerd@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

Fungi are extremely important in the production of pharmaceuticals, accounting for more than 10-20% of the most profitable human drugs, including; antibiotic penicillin (*Penicilliium crysogenum*) and the immunosuppressant cyclosporine A (*Aspergillus terreus*). Secondary metabolites of some fungi exhibit anti-cancer properties. These properties involve damage to the DNA which then induce apoptosis. Prior work in our lab demonstrated that diluted fungal extracts cause mutations at the *hprt* locus. It is possible that the extracts induced apoptosis or altered cell cycle progression and that the mutations observed were secondary effects. This study will investigate the effect of diluted fungal extracts on the doubling time of colon cancer cells. HCT 116 (colon cancer) cell lines will be cultured in IMDM medium enriched with 10% fetal bovine serum at 37°C and 5% CO_2. Cells will be plated in triplicate at equal seeding densities (250 K cells/plate) and dosed with 1, 2, and 5 uL of crude extract. After treatment, cells will be counted at 4 time periods (12, 24, 48, 62 hours). Cells will be removed from plates and cells counted using a hemocytometer. Average doubling time for each time point will be calculated. The doubling time will be compared between treated and untreated cells using the Students t-test. Preliminary data suggests that the cell doubling time is approximately 22 hours with no statistical difference between the treated and control plates.

Poster Board No. 023 THE EFFECT OF FUNGAL METABOLITES ON THE CELL CYCLE OF CANCER CELLS. Graham Rossi (rossig@findlay.edu), Meredith Evans (evansm@findlay.edu), Emily Green (greene@findlay.edu), Donald Walker (walkerd@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

During the cell cycle, the DNA damage and repair pathways that correct DNA alterations are activated. This leads to a delay in the cell cycle, thus allowing time for a repair response. This time delay should be detectable and may provide a measurement of DNA damage. The greater DNA damage to the cancer cells causes a longer repair pathway. Previous work in our lab has demonstrated that fungal metabolites are mutagenic. Cancer cells treated with fungal extracts cause mutations which signal the cell to initiate apoptosis due to genotoxic effects. This study investigates the effect that sub-lethal amounts of these extracts have on the cell cycle of cancer cells. A thymidine block will be used to synchronize cultures of human cancer cells. Addition of thymidine arrests cells in the G1/S boundary by preventing DNA synthesis. Cells will be treated with 1, 2, 5, and 10 uL of fungal extract and released from the thymidine block. Cells will be recovered at 8, 12, 16, 24 hours after treatment. Cells will be fixed in ethanol, stained with propidium iodide, and then analyzed by flow cytometry for DNA content. The amount of cells in each phase of the cell cycle will correlate to their DNA content. A comparative analysis between treated and untreated cells will be conducted and a Students t-test used to determine whether there is a statistical difference. A slower progression of cells through the cell cycle is anticipated for treated cells.

Poster Board No. 024 THE MUTAGENIC EFFECTS OF FUNGAL EXTRACTS. LeeAnn Tatar (tatarl@findlay.edu), Rebecca Amos (amosr@findlay.edu), Joseph Hunter (hunterj@findlay.edu), Katie Schmilloehler (schimmoehlerk@findlay.edu), Donald Walker (walkerd@findlay.edu), and Michael Edelbrock (edelbrock@findlay.edu), The University of Findlay Department of Natural Sciences, 1000 N. Main Street, Findlay Ohio 45840.

In the modern pharmaceutical world, fungal compounds account for 10-20% of the most profitable drugs. Their multitude of uses range from antibiotics to anticancer drugs. Some commonly used drugs of fungal origin are Penicillin (Penicillium Crysogenum) as well as cyclosporine A (Aspergillus terreus). The role fungi have played in

developing modern pharmaceuticals is unprecedented, much more research is needed to fully understand what fungi have to offer. Fungal bioprospecting is ideal for discovering new molecules useful in modern medicine. HCT 116 (colon cancer) cell lines were cultured in IMDM medium enriched with 10% fetal bovine serum at 37°C and 5% CO_2. Cells were plated at equal seeding densities for treatment studies. HAT was then added to the plates to eliminate preexisting hprt mutants. After 5 passages in HAT media and once 70-80% confluency was attained, different cells were dosed with varying amounts of fungal extracts (1, 2, and 5 µL). Treatment was continued through several passages over a 2-3 day period. Next cells were treated with 6-thioguanine for 7 days. The 6-thioguanine selected for the cells with mutations at the hprt loci. After treatment with the 6-thioguanine, cells were stained with crystal violet, and colonies of greater than 50 cells were counted and totaled. These colonies represent the cells that had mutations in the hprt loci. Preliminary results indicate that the fungal extracts have mutagenic properties. This study will verify preliminary data and determine whether a dose-dependent effect on XXX exists.

Poster Board No. 025 A COMPARISON OF CHEMICAL ENHANCEMENTS FOR THE DETECTION OF LATENT BLOOD WITH HEMASCEIN USING EDTA. Peter Brown (pbrown001@defiance.edu), Somnath Dutta (sdutta@defiance.edu), Defiance College, 701 North Clinton Street, Defiance, OH 43512.

Blood is often found at crime scenes and collected in EDTA (ethylenediaminetetraacetic acid) vacuum tubes to prevent coagulation. Latent blood can be detected by several enhancement methods, including the use of luminol, and commercially produced, stable fluorescein reagents, such as Bluestar^R reagent, and the Hemascein^R reagent. In this study, the hemascein fluorescent reaction is going to be studied to see how ethylenediaminetetraacetic acid (EDTA), the material used to store blood, affects latent blood detection. Using Potassium ferricyanide as a blood substitute at lower concentrations of EDTA (5 x 10^{-5} to 5 x 10^{-3} M) chemiluminescence of luminol was enhanced, whereas at higher concentrations of EDTA (5 x 10^{-2} to 5 x 10^{-1} M) luminol chemiluminescence was unamplified. Above results differed from the results obtained by Seashols et al. because in their work they found that the blood that was not treated with EDTA gave similar or slightly more sensitive results than the blood that was treated with EDTA (Seashols et al. 2013). Stock solutions of the potassium ferricyanide (7.59 x 10^{-5} M), 0.5 M EDTA, and (and 5.64 E^{-5} M) hemascein will be prepared. Serial dilutions (5.0 E^{-2} M, 5.0 E^{-3} M, 5.0 E^{-4} M, and 5.0 E^{-5} M) of the EDTA will then prepared. Chemiluminescence will be studied in 96 well plates using a Synergy HT Microplate.

Poster Board No. 026 STRUCTURE AND SCORES IN SIMULATIONS AND SCREENINGS: INHIBITING AROMATASE WITH FLAVONES. Gavin M James (John Means) (jimvansage@gmail.com), 1314 Dunlap Rd. Portsmouth, OH 45662.

Aromatase, or CYP19, is the enzyme in the body responsible for producing estradiol, and estrogen precursor. Reducing estrogen levels through inhibition of this enzyme is important for treatment of certain types of breast cancer. Some polyphenols found in common fruits, plants and other foods have been previously found to inhibit aromatase; but such studies utilize a wide variety of methods which sometimes produce conflicting results for the same compound. In this study, an array of flavones and compounds of similar molecular structure will be selected for simulation of aromatase inhibition/binding using the Autodock component of PyRx. By calculating the general correlation coefficient with respect to the two sets of data – the simulated binding scores and IC_{50} values, it can be determined whether the binding scores acquired in docking simulations are an accurate predictor of the actual performance *in vitro*. The *in vitro* performance of these same compounds are going to be screened using a fluorescence multi-well plate inhibition assay. The results of known inhibitors can be compared to values found by other methods. The polyphenol chemical structures will be correlated with the respective IC_{50} values to better understand what structural factors play a key role in the inhibition of aromatase, and suggestions will be made for future work in this area.

Poster Board No. 027 STORAGE AND RELEASE OF DRUG MOLECULES IN METAL ORGANIC FRAMEWORKS. Richard A. Moore (rmoore@muskingum.edu), Paul S. Szalay (pszalay@muskingum.edu), 1402 John Glenn Highway Apt. B New Concord, OH 43762 Muskingum University.

Metal organic frameworks (MOF's) are made up of metal units connected by organic linkers that provide a molecule that has a large surface area and low density. MOF research has been booming recently due to their effectiveness as a catalysts, in separations, and the ability to store and release molecules. These properties allow them to be used to capture CO_2, catalyze reactions, separate gases, and store and deliver drugs into the body. The focus of these research methods are the storage and delivery of drugs into the body. These processes can be made more efficient by controlling the rate of release from MOF's into the body and the amount of drugs the MOF's can hold. MOF molecules with varying surface area size will be synthesized and loaded with ibuprofen, procainamide, and nitric oxide. The MOF's with a range of surface areas from 200 m^2/g to 10,400 m^2/g will be investigated. Specific compounds to be explored are MOF-200, Mill-100 Cr, MOF-74-Fe, and MOF-2. These will also be placed in a phosphate buffered saline (PBS) to analyze the release of the drug in a physiological solution similar to the body. The MOF with the highest loading percentage is expected from the molecule with the highest surface area but is also expected to have the most rapid release. The synthesis will be confirmed with infrared spectroscopy (IR) the loading percentage can be estimated using thermogravimetric analysis (TGA) and the release will be quantified using ultraviolet-visible spectroscopy (UV/Vis).

Poster Board No. 028 DISCOVERY OF NEW COMPOUNDS TO FLIP THE RIBOSWITCH. Michael E. Parcell (michaelparcell@yahoo.com), John A. Means (jmeans@rio.edu), University of Rio Grande 214 Houck Road, Patriot OH, 45658.

The virtual screening of drug-like compounds allows for the testing of much larger quantities of molecules, which increases the likelihood that potential new drugs can be identified. The target of the virtual screening in this research is the T-box riboswitch, which regulates the transcription of many genes that control the synthesis of proteins in Gram positive bacteria. Specifically, the research consists of identifying molecules which destabilize the antiterminator structure and force the terminator structure of the riboswitch to form. The antiterminator structure of the T-box riboswitch allows gene transcription to continue downstream, whereas the terminator structure terminates gene transcription and leads to cell death. The software utilized in this research will be Autodock 4.2 and PyRx. This software displays the binding energies of the compounds being tested with the target. The predicted lowest binding energies indicate the compounds which have the most effective binding to the target. The compounds that will be tested in this research are all small molecules found in molecular libraries from the National Institute of Health and TimTec. The specific libraries used will be: Anti-Inflammatory, Anti-Infectives, Flavonoids, Natural Derivatives, Diversity Set IV, and Diversity Set V. In addition to virtual screening, this research will use fluorometric experimental methods to confirm the virtual screening results of the libraries. Using fluorescence, the binding affinity of selected compounds can be quantitatively determined. In addition, selected aminoglycosides will be used to validate the fluorometric protocol since these aminoglycosides have already been shown to have a high

affinity for the T-box riboswitch.

Poster Board No. 029 DETECTION OF POSSIBLE TAMPERING IN CAFFEINATED ENERGY DRINKS BY BLEACH. Vicki Plummer (vplummer001@defiance.edu), Somnath Dutta (sdutta@defiance.edu), Defiance College 701 North Clinton Street, Defiance, OH 43512.

Bleach (Sodium Hypochlorite), a potential carcinogen, has been reported as an adulterant in tampered beverages by the U.S. FDA. Detection of bleach in beverages can be impacted by age of the beverage and its composition. The purpose of this study is to study if methods available to detect bleach can be used for caffeinated beverages. The caffeinated beverages chosen for this study are Red Bull, Monster and Rockstar. Bleach will be added to these caffeinated energy drinks in various concentrations (v/v) (0%, 10%, 20%, and 50%). A control bleach solution will be prepared to rule out any matrix interference. Three samples of each concentration will be stored at room temperature for 24 h. Iodometric titration will be used to measure amount of hypochlorite in different concentrations of the beverage. To perform this potassium iodide will be added to each solution. The iodine will then be titrated with standardized 0.1 N sodium thiosulfate with a brown to light yellow color change at the first end point. Starch will be added at the first end point to complex with iodine. Titration with sodium thiosulfate will be continued thereafter until the blue color disappears at the second and final end point. Student's t-test will be used to compare means.

Poster Board No. 030 COMPUTATIONAL HOMOLOGY MODELING AND DOCKING ANALYSIS OF HALOPERIDOL AND HUMAN DOPAMINE D2 RECEPTOR. Josiah D Smith (jdsmith2@malone.edu), 1172 Yuma Circle Apt. D Hartville Ohio 44632 Malone University.

Haloperidol (HP) was originally developed as an antipsychotic drug. The drug is administered to reduce symptoms related to psychosis; however, its use has been lessened due to strong side effects. *In vivo*, HP interacts with the human dopamine D2 receptor and is eventually metabolized in the liver. One metabolite of HP is 4-(4-Chlorophenyl)-1-[4-(4-Fluorophenyl)-4-oxobutyl]-1,2,3,6-Tetrahyropyridine (HPTP). Past studies have indicated that HP displays a much stronger affinity for the D2 receptor than HPTP. The purpose of this study is to model the interaction of both HP and HPTP with the D2 receptor, and calculate their respective binding energy. Homology modeling was applied to create a homologous D2 receptor due to the unknown crystal structure of the human dopamine D2 receptor. Yet Another Scientific Artificial Reality Application (YASARA) was the computer program used to develop the model receptor. HP and HPTP were individually docked with the homologous D2 receptor. The average binding energy of the HP-D2 receptor complex was 9.72 Kcal/mol and the HPTP-D2 receptor complex was 7.11 Kcal/mol, using the Binding Affinity Prediction of Protein-Ligand (BAPPL) server. These initial results are in line with previous experimental findings that described HP with a stronger binding affinity for the homologous D2 receptor than HPTP. The research is in progress and more work will be needed to verify these results. Future calculations will also include using X-Score, a program developed by Dr. Renxiao Wang in Dr. Shaomeng Wang's group at the Department of Internal Medicine, University of Michigan Medical School.

Poster Board No. 031 INVESTIGATING THALLIUM'S TOXICITY TO GLIOBLASTOMA CELLS AND HUMAN AND CANINE BLADDER CANCER CELLS: A COMPARISON STUDY. Alyssa M. Zimmer (alyssazimmer@walsh.edu), Joseph A. Lupica (jlupica@walsh.edu), Amy J. Heston (aheston@walsh.edu), Walsh University, 2020 East Maple Street, North Canton OH 44720.

Thallium and thallium containing compounds are highly toxic. The focus of this project was to investigate the effects of Thallium (I) ions (Tl^+) on glioblastoma (GBM) cells, human bladder cancer (HTB-5) cells, and canine transitional cell carcinoma (Canine TCC) cells. These were chosen for this study in order to learn more about how exposure to Thallium (I) ions result in cell death. It is hypothesized that these ions can enter the cell through the Na^+/K^+ pump, disrupt normal cellular pathways, and, therefore, could lead to cell death. The GBM, HTB-5, and Canine TCC cells were treated with various concentrations of $TlNO_3$ and Sulforhodamine B (SRB) assays monitored overall cell death. In a 72 hour study using 1-100 μM $TlNO_3$, the assay showed that the GBM cells had 3% growth inhibition at 5 μM $TlNO_3$ and 97% growth inhibition at 100 μM $TlNO_3$. The HTB-5 cells demonstrated 1% growth inhibition at 10 μM $TlNO_3$ and 82% growth inhibition at 100 μM $TlNO_3$. In the same study, the Canine TCC cells demonstrated 12% growth inhibition at 25 μM $TlNO_3$ and 82% growth inhibition at 100 μM $TlNO_3$. These results support that Tl^+ ions possess anti-cancer properties and have the ability to kill both human brain and bladder cancer cells as well as canine bladder cancer cells, in vitro. The GBM cells exhibited greater antiproliferative effects of metal ions and, therefore, the Tl^+ ions are more effective toward GBM cells than the bladder cancer cells under these conditions.

Poster Board No. 032 THE UTILITY OF QUANTITATIVE PERFORMANCE METRICS. Aerial N. Camden (camden.5@wright.edu), Christopher M. Meier (meier.17@wright.edu), Chandler A. Phillips (chandler.phillips@wright.edu), R. Andy McKinley (andy.mckinley@wpafb.af.mil), David M. Kender (david.kender@wright.edu), 207 Russ Engineering Center, Wright State University, 3640 Colonel Glenn Highway, Dayton, OH, 45435.

The Multiple Attribute Task Battery (MATB) is the standard for multitasking assessment in U.S. government applications. MATB presents four components for an operator to perform simultaneously. While much literature shows that increasing number of tasks has a negative effect on performance, these studies traditionally do not maintain a constant overall difficulty level. By applying the information theory-based Human Operator Informatic Model (HOIM) the overall system complexity and human performance can be described with a single metric. Although the HOIM is both objective and quantitative, it is not yet widely used in multitasking research. To show the utility of an information theory model, 31 participants performed four three-component combinations and one four-component combination on MATB, each at a constant information input rate. Performance was not significantly different amongst the task combinations (p-value = 0.5253) with a calculated statistical power over 99%. These results suggest that the difficulty of each task is appropriately calculated by its task-specific information rate, measured in bits/s. The lack of a difference in performance between task combinations indicates that task interaction effects are negligible. This study only looked at one information input rate, however, examining performance at multiple information input rates is an intriguing area of future research. Ultimately, this study highlights the reliability of an information theory-based model for the assessment of multitasking. Information theory could be applied to other multitasking environments, extending this work beyond MATB. This could allow for overall performance assessment using a single metric, rather than a different metric for each task.

Poster Board No. 033 AUGMENTING HUMAN PERFORMANCE WITH TRANSCRANIAL DIRECT CURRENT STIMULATION (TDCS) DURING A VISUAL SEARCH TASK. Justin M. Nelson (nelson.39@wright.edu)[1], Chandler A. Phillips (chandler.phillips@wright.edu)[1], Richard A. McKinley (richard.mckinley.2@us.af.mil)[2], Lindsey K. McIntire (lindsey.mcintire.ctr@wpafb.af.mil)[3], Charles D. Goodyear (charles.goodyear.ctr@wpafb.af.mil)[3]; [1]207 Russ Engineering Center, Wright State University, 3640 Colonel Glenn Highway, Dayton OH,

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Various military operators endure vigorous and tedious man hours dedicated to monitoring and locating targets. These tasks are monotonous in nature which may result in a vigilance decrement. As the operators' vigilance declines, critical targets may be missed. The objective of the study is to administer a form of non-invasive brain stimulation known as transcranial direct current stimulation (tDCS) to the left frontal eye field (LFEF) in efforts to augment cognition and improve target detection accuracy. A total of eleven active duty military personnel participated in the study. Each participant completed a 30 minute visual search task on four separate days. Day one was training while days two, three and four were testing sessions. The testing session was randomized and participants received either anodal, cathodal or placebo stimulation on each day. A 2 mA DC current was administered during the tDCS sessions. The data was analyzed in 10 minute time intervals. Anodal and cathodal stimulation displayed a higher mean accuracy during the 10-20 and 20-30 minute time intervals compared to training and placebo conditions. A paired t-test revealed that the relationship between anodal and placebo conditions during the 10-20 minute time interval showed a statistical significant difference in accuracy (p=0.0161). The findings show that applying anodal and cathodal tDCS of 2mA over the LFEF improve critical target detection during a search task. From these findings, the next phase will be to implement this concept in a multi-tasking paradigm (MATB). The objective will be to evaluate if tDCS can improve multi-tasking performance.

Poster Board No. 034 CHEMICAL AND TOXICITY ANALYSIS OF AN ENVIRONMENTALLY FRIENDLY CLEANING PRODUCT. Hannah J. Baumann (hbaumann@ashland.edu), Douglas A. Dawson (DDAWSON2@ashland.edu), Jeffrey Weidenhamer (JWEIDEN@ashland.edu), 448 Blue Jay Circle, Bellville, Ohio 44813.

Concerns about toxicity of commercial cleaning products have prompted development of several environmentally friendly cleaners based on natural products that include essential oils. Many essential oils have antibacterial properties, and these are added to environmentally friendly cleaners as disinfectants. One such cleaner known to contain components of thyme, lemongrass and oregano oil was analyzed for toxicity and chemical content. The objective of this study was to correlate the toxicity of the essential oil components to the toxicity of the cleaner using analytical chemistry. Several monoterpenes commonly found in essential oils were analyzed for antibacterial properties through single chemical and mixture toxicity tests using the Microtox® bioassay: thymol, *p*-cymene, geraniol, carvacrol, terpinene, borneol and linalool. The bioassay utilizes the natural luminescence of the bacterium *Vibrio fischeri* to measure toxicity based on decreased luminescence. Seven to nine concentrations of each component were evaluated for toxicity at exposure times of 5, 10 and 15 minutes. From these data EC_{50} values, the concentration at which bacterial luminescence was inhibited by 50%, and other toxicity parameters were calculated. A gas chromatograph-mass spectrometer was used to determine response factors for each essential oil component relative to camphor. Terpenes were removed from a known amount of cleaner through evaporation followed by heating under vacuum. The remaining surfactants were used to prepare aqueous standard solutions of thymol, geraniol, linalool, p-cymene, terpinene, borneol, eucalyptol, carene, camphene, pinene and caryophyllene at 10 to 40 mg/L. Standard solutions and the cleaner were prepared for chemical analysis using solid phase microextraction.

Poster Board No. 035 CHANGING TIMES: BUILDING MODELS FOR HYDROLOGICAL AND ECOLOGICAL RISK ASSESSMENT FOR MARCELLUS SHALE EXPLORATION IN EASTERN OHIO. Hayley C. Buzulencia (buzulencia.hc@gmail.com), C. McClaugherty (mcclauca@mountunion.edu), Environmental Science Program, University of Mount Union, Alliance, OH 44601.

The increased demand for energy resources has caused a surge of natural gas exploration. In eastern Ohio, the current focus is on the extraction of natural gas from the Marcellus and Utica shale formations. This region may have the potential to produce 53 billion cubic meters of natural gas. Through hydraulic fracturing, successful extractions have been done through horizontal drilling; this is providing economic stimulus to the region. The extent and scale of the oil and gas development requires an extensive network of pipelines, road, well, pads and other infrastructure to be constructed. The objective of this research is to locate and determine the extent and potential risk for ecological and hydrological disturbance related to the new infrastructure. The specific area of interest for this project extends from Salem, Ohio (40.900833 N, 80.856667 W) to Scio, Ohio (40.395833 N, 81.084722 W), spanning 58 km latitudinally and 32 km longitudinally. High resolution aerial imagery (20 cm) was captured by LightHawk, a non-profit provider of aerial services in October 2014. Well location and related data along with wetland locations and floodplain data were obtained from the Ohio Department of Natural Resources (ODNR. Digitization of areas of interest for this study was done using ArcGIS® 10.2 software. These areas and features included pipelines, well pads, and service roads. Initial observations indicated that out of the 2.394 km of trenched pipelines and 15.725 km of bored pipelines currently digitized, there have been approximately 20 wetland crossings.

Poster Board No. 036 EFFECTS OF HYDRAULIC FRACTURING PADS, ROADS, AND PIPELINES ON FRAGMENTATION OF NORTHEAST OHIO ECOSYSTEMS. Eric A. Genshock (genshoea@mountunion.edu), Charles A. McClaugherty (mcclauca@mountunion.edu), Dept. of Biology, Univ. of Mount Union, 1972 Clark Ave., Alliance, OH 44601.

Natural gas extraction using hydraulic fracturing and horizontal drilling has become widespread in selected regions of the United States. In Ohio, the Utica and Marcellus shales have been the focus of drillers' attentions in the last five [years] in Northeastern Ohio. The expansion of the industry requires an infrastructure of drill pads, pipelines and access roads. This infrastructure modifies the landscape of the region and this study examines the landscape-level effects of this infrastructure development in a 1300 square km region centered on Columbiana and Carroll counties, in Ohio, extending south from Salem, OH to just north of Scio, OH. High resolution (20 cm) aerial imagery was collected and geo-referenced by LightHawk, a non-profit organization specializing in aerial image acquisition. Using the imagery as a base, and relying on well permits and drilling log data from the Ohio Department of Natural Resources, the sites of all producing, in process and permitted gas and oil wells were added to a geodatabase. Polygons of disturbed areas were digitized by features including well pads, disturbed areas, access roads, support facilities, and pipelines using ArcGIS®. Adjacent areas, the landscape matrix, were classified by land use type as crop land, pasture, forest, and residential. Pipeline widths vary from 4.8 m to 37.2 m (mean =12.9 m, N=186 segments totaling 300 km) and well pad areas range from 0.89 ha to 1.65 ha (mean= 1.33 ha, N= 33). Cropland is the major matrix in the northern glaciated area; forest matrix is more common in the unglaciated southern region.

Poster Board No. 037 IMPACT OF *AGRILLUS PLANIPENNIS* ON FOREST CARBON STORAGE AND TREE GROWTH RATES. Sierra L. Lindsey (lindseys@findlay.edu), Benjamin J. Dolan (dolan@findlay.edu), The University of Findlay, 1000 N. Main St., Student Box 0732, Findlay, OH 45840.

Agrillus planipennis (EAB) is an invasive pest that has been causing the death and loss of ash (*Fraxinus spp.*) populations in deciduous forests of the eastern United States. EAB is harmful in the larval stage

where it feeds on the phloem of the host ash trees and impedes the flow of nutrients. It is estimated that ash represents approximately 2.5% of above ground carbon storage mass and the loss of the ash could have a significant effect on forest composition and tree growth rates (Flower 2013). This experiment looks at the change in carbon storage among the species remaining after the death of ash in various forest plots in Ohio, Tennessee, and western Pennsylvania. This is done by examining the changes in the growth rates over time. Growth rates are determined by the measuring the biomass of the trees in pre-determined 100 m^2 plots, from five forest preserves, and comparing values from data collected annually from 2012 to 2014. It is predicted that in sites impacted with EAB the non-ash tree species will exhibit faster growth and carbon storage rates than sites without EAB because of the decreased competition for nutrients, water, and light. Comparison of growth rates among sites will be tested with ANOVA. It is expected that growth rates of *Acer saccharum*, *Ulmus americana*, and *Acer negundo* are faster on EAB impacted sites than un-impacted sites.

Poster Board No. 038 ANALYSIS OF IMPLEMENTING COMPOSTING AT CAPITAL UNIVERSITY. Carly J Moss (cmoss@capital.edu), 541 ½ S Drexel Ave Columbus, OH 43209.

With individuals and businesses turning to environmentalism and sustainability, it is timely to investigate what universities can do to reduce their carbon footprint. Many campuses are moving towards energy efficient lighting, alternative energies, and widespread recycling campaigns. The purpose of this project was to lay the groundwork for the implementation of a composting system at Capital University (CU) to reduce organic waste. Scientifically, composting is controlled decomposition that starts with nitrogen and carbon rich organics and ends with a stable product, called humus, which may be used to replenish nutrients in the soil. Food waste data at CU indicated approximately 33.54 yd^3 of compostable waste is currently being disposed of improperly. The most feasible location for the compost pile would be next to the Main Dining Room because of the proximity to food waste. A questionnaire at CU revealed that 65.5% of students and faculty believe that Capital's highest priority should be to create less waste and divert waste from landfills by recycling and composting, suggesting support for the implementation of a compost program. However, with the small space available on campus and the overall cost of implementing an operation it would be more appropriate to start a small scale pilot trial. Composting can help save money, provide educational opportunities for classes, and can reduce tons of organic wastes from landfills. This report will provide the administration, staff, faculty, and students on campus with a background on composting and a plan for the eventual implementation of such a program.

Poster Board No. 039 REDUCTION OF PATHOGENIC BACTERIA AND VIRUSES BY PEAT TREATMENT, ENHANCED WITH CHLORINATION IN A RESIDENTIAL WASTEWATER REUSE. Eunyoung Park (park.1061@osu.edu)[1], Jiyoung Lee (lee.3598@osu.edu)[1] , Karen M. Mancl (mancl.1@osu.edu)[2], [1]Division of Environmental Health Sciences, 250 Cunz Hall, 1841 Neil Ave, The Ohio State University, 43210, [2]Department of Food, Agricultural and Biological Engineering, The Ohio State University, Columbus, OH 43210.

The reuse of reclaimed wastewater with slow rate irrigation on site has been an attractive and sustainable option for the protection of both water resources and public health, but the reliability of onsite wastewater reuse system (OWRS) in especially reducing/inactivating resistant types is an important concern. Our hypothesis was that an OWRS enhanced with chlorination using batch system is more efficient than using conventional chlorine system in removing pathogenic bacteria and viruses. It was found that F-specific coliphage (an enteric virus indicator, 3.0 log reduction) and *C. perfringens* (a surrogate for disinfection of protozoa, 2.5 log reduction) were more resistant to immobilization/inactivation than *E. coli* (a fecal bacteria indicator, 5.4 log reduction); F-specific coliphage and *C. perfringens* were detected in 80% and 100% of the final effluents, while *E.coli* was not found. In addition, detection and quantification of the reduction of selective pathogenic bacteria (*Arcobacter*, *Campylobacter*, Shiga-toxin producing *E. coli* (STEC)) and antibiotic resistance (*tet*Q) by OWRS were investigated using qPCR. It was found that Arcobacter (100%) and STEC (61%) were frequently detected, whereas *Campylobacter spp.* were not. The reduction of *Arcobacter* (3.1 log), *gyr*B (2.3 log), and *tet*Q (2.3 log) was mostly due to the treatment through a peat biofilter. This study showed the potential of OWRS enhanced by batch chlorination system in removing/inactivating viruses, protozoa, and pathogenic bacteria under conditions of residential water reuse.

Poster Board No. 040 PATTERNS OF ANTIBIOTIC RESISTANCE IN COLIFORMS. Sarah Tegtmeier (tegtmeiers@findlay.edu), Chelsea Berning (berningc1@findlay.edu), Ashley Putman (putmana@findlay.edu), and Bethany Henderson-Dean (henderson-dean@findlay.edu), The University of Findlay, 1000 N. Main St. Findlay, OH 45840.

Three sites along the Blanchard River (Hancock County) are being tested to determine how agriculture impacts total microbial diversity, coliform diversity, and antibiotic resistance patterns. Previous studies of two sites, pristine and septic leaching, yielded inconclusive results. Additional sediment samples were collected from three sampling sites from July to September 2014. Total DNA will be extracted from sediment samples and the presence of resistance genes will be determined through PCR analysis. Samples will then be sent for 454 next gen sequencing to define the overall microbial diversity. Sediment samples will also be screened for tetracycline, streptomycin, and erythromycin resistant isolates through culturing and genomic analysis. Resistance patterns will be compared between the three sites using analysis of variance (ANOVA) to determine if septic leachate leads to greater antibiotic resistance diversity (Pearson's r). Through this study, it is predicted that agricultural practices near the Blanchard River lead to increased microbial diversity and increased resistance to antimicrobials used in commercial feed lots.

Poster Board No. 041 GROUNDWATER POLLUTION POTENTIAL FROM SURFACE SPILLS OF HYDRAULIC FRACTURING FLOWBACK AROUND CLASS II DISPOSAL WELLS IN NORTHEAST OHIO. Seokyeong Yee (yees@mountunion.edu), Charles A. McClaugherty (mcclauca@mountunion.edu), Dept. of Biology, Univ. of Mount Union, 1972 Clark Ave., Alliance, OH 44601.

Hydraulic fracturing is responsible for 43% of oil and 67% of natural gas production in the United States. Flowback from the fracturing process includes high levels of salts, carcinogenic chemicals, and sometimes radioactivity. Class II injection wells are currently considered the safest and most viable means of disposal of flowback water. Accordingly, injection well disposal for fracking wastewater is rapidly growing in Ohio. However, groundwater in shallow aquifers in the area around class II injection wells may not be safe from contamination due to significant risks for spills. The purpose of this study is to categorize the potential for groundwater resources to be contaminated by spills of flowback water (brine) around class II wells in Carroll, Portage, and Stark counties. Groundwater vulnerability to contamination is defined by factors including hydrogeology, well location, and volume and frequency of injections. First, all class II locations were digitized and the amount of fluid managed on each well site was identified. To analyze groundwater vulnerability to the surface spills, the map of the locations of the 24 class II wells in the study area was combined with the hydrogeological data by using ArcGIS®. The data, obtained from the Ohio Department of Natural Resources, includes geological strata types and their porosity and the US EPA DRASTIC index. This in-

dex includes data on depth to water, net recharge, aquifer media, soil media, topography, vadose zone media, and hydraulic conductivity of the aquifer. This approach identified, ranked, and mapped the wells and their potential to pollute groundwater due to brine spills.

Poster Board No. 042 ANNOTATION OF DROSOPHILA BIARMIPES CONTIG 37 FROM THE HETEROCHROMATIC DROSOPHILA DOT CHROMOSOME AND CONTIG 62 FROM EUCHROMATIC CHROMOSOME 3. Rachel Boody (r-boody@onu.edu), Kathryn Kuchefski (k-kuchefski@onu.edu), and Jamie L. Sanford (j-sanford@onu.edu) (Advisor), 525 N. Main Street, Ada, OH 45810.

The advent of next-generation sequencing technologies has resulted in an almost exponential increase in the number of fully sequenced genomes, including many *Drosophila* species. This has resulted in a corresponding need for increased manpower to manually annotate these genomes. The Genomics Education Partnership (GEP), at Washington University, was developed to utilize undergraduates to annotate newly sequenced *Drosophila* genomes. Their research goal is to understand the evolutionary mechanisms that underlie gene transcription on the highly heterochromatic 4th (dot) chromosome in *Drosophila*. Interestingly, the proportion of transcribed genes on the dot chromosome is similar to that of euchromatic chromosomes 1-3. The GEP is utilizing a comparative genomics approach to relate gene features of the Dot chromosome to those of chromosome 3. The current study focuses on annotation of contigs from the D. biarmipes genome. Data from annotation of contig 37 from the Dot chromosome of *D. Biarmipes* revealed the presence of orthologues to the *D. melanogaster* Oct-TyR and CG7139 genes. Annotation of contig 62, located on chromosome 3 in *D. biarmipes*, revealed the presence of several genes: Rpn10, Mkrn-1, ppk5, CG11109, Cdk12, CG7611, SAK, and M6. Annotation results were obtained using standard bioinformatics approaches, including NCBI Blast, and involved determination of gene models for all of the identified orthologues. These gene models include exon and intron coordinates for all isoforms of each gene. Future investigations will expand upon these gene models by conducting motif hunting to find conserved regulatory regions that may contribute to transcription of genes from the dot chromosome.

Poster Board No. 043 ANNOTATION OF THE *DROSOPHILA BIARMIPES* CONTIG 31. Callie M. Brown (c-brown.5@onu.edu), Alex Kneubehl (a-kneubehl@onu.edu), and Jamie L. Sanford (j-sanford@onu.edu) (Advisor), 525 N. Main Street, Ada, OH 45810.

The Genomics Education Partnership based in Washington University in St. Louis seeks to involve a growing number of undergraduate institutions and students in high quality genomics research. The researchers begin with raw sequencing data from newly sequenced *Drosophila* genomes and utilize standard bioinformatic approaches to produce complete gene models. The project specifically focuses on the transcriptionally active, but highly heterochromatic 4th "dot" chromosome. The GEP aims to compare annotation data from the dot chromosome of several *Drosophila* species to gain insight into the evolutionary mechanisms that allow genes to be transcribed in the highly compact chromosomal landscape. Current research efforts are annotating contigs 31, 42, and 43 of *Drosophila biarmipes*. NCBI BLAST was utilized to compare the sequences of *D. biarmipes* to the *D. melanogaster* genome. Gene models were constructed utilizing the UCSC Genome Browser and contig 31 was found to contain orthologues to the Ten-m, Hem, Aats-ile, and srpk790 genes. Contig 42 includes the entire bent gene while contig 43 contains half of the bent gene as well as the MED26 gene. The final gene models developed from annotation of contigs 31, 42, and 43 include start and stop coordinates, and all exons coordinates. Future work will include annotation of transcription start sites to expand the current gene models. Overall, the genes annotated in this study will be used in conjunction with other annotated genes across *Drosophila* species to unwrap the mechanical enigma behind transcription of highly heterochromatic regions of a genome.

Poster Board No. 044 FORENSIC IDENTIFICATION OF SALIVA USING STABLE miRNA MARKERS AND NASBA. Stacey A Lawton (slawton001@defiance.edu), Nathan D. Griggs (ngriggs@defiance.edu), 701 N. Clinton St. Defiance, OH 43512.

Field testing of forensic samples is essential in determining if and how the samples are handled for further processing. Nucleic acid sequence based amplification (NASBA) is an isothermal amplification technique that shows promise for field testing. NASBA has the advantage over PCR in that a thermocycler capable of multiple temperatures is not required. This is of great advantage in field identification of samples. The purpose of this study is to determine if NASBA may be applied to tissue identification. Previous work has identified microRNAs (miRNA) that are tissue specific. Saliva-specific miRNAs were selected and these were identified using NASBA. NASBA uses three enzymes to amplify the sample: avian myeloblastosis virus reverse transcriptase (synthesizes cDNA), RNase H (removes dsRNA), and T7 RNA polymerase (produces cRNA). Saliva samples were collected from donors using a saline mouth rinse and stored at -80˚C. NASBA reaction mixtures include: Tris, ph 8.5, $MgCl_2$, KCl, 15% v/v DMSO, 1 mM each dNTP, 2mM each NTP and test miRNA for a final reaction mix of 23microliters. The enzyme mixture includes: Bovine serum albumin, RNase H, T7 RNA polymerase, and AMV-rt. Primers used in this study include Histatin 3 (f:AATT CTAATACGACTCACTATAGGGATGGGTACTACAGAGA AACG), Statherin (f:AATTCTAATACGACTCACTATAGG GTCTCGGTTCTACTTCCGTTT), Mucin 7 (f:AATTCTAAT ACGACTCACTATAGGGTAGGTCAACGAACGAAAATC) and S. salivarius (f:AATTCTAATACGACTCACTATAGG GGGCTTCGCTCACTTCTACACCGTTGTG) as a control. All primers are bound to T7 RNA polymerase at the 5' end.

Poster Board No. 045 USING REVERSE GENETIC APPROACHES IN UNCOVERING THE CELLULAR FUNCTION OF DROSOPHILA MELANOGASTER CG12054, A GENE ESSENTIAL FOR VIABILITY AND THE HOMOLOG TO HUMAN JAZF1. Brittany N. Stawicki (bstawicki11@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu), Notre Dame College, 4545 College Road, South Euclid, OH 44121.

Delicate balance of gene expression is crucial in coordinating proper cellular function while avoiding chaotic breakdown of cellular mechanisms. An example of the need for proper regulation is seen in JAZF1, a C2H2 Zinc finger protein associated with prostate and endometrial cancers in humans and a reported transcriptional repressor. This study will examine the *Drosophila melanogaster* homologue to JAZF1, CG12054. Previously, CG12054 has been unstudied and this report examines it using *in vivo* and *in vitro* methods. Two *in vitro* methods are focused on the generation of a CG12054 mutant. The first of these methods uses a FLP-FRT system to generate a null mutant based on heat shocked driven enzyme, FLP, which causes recombination between FRT DNA sequences that flank the 5' and 3' ends of CG12054. The second method employs an ethyl methanesulfonate (EMS) mutagenesis to induce point mutations within CG12054, followed by a complementation test. Mutants are then crossed producing a stable line and screened over a CG12054 allele that has been found to be a homozygote lethal. To date 262 chromosomes have been stably crossed to test in the complementation assays. To determine the molecular partners of CG12054, a yeast two-hybrid analysis against an embryonic *Drosophila* cDNA library is being conducted. Full-length cDNA of CG12054 has been subcloned for use in the yeast two-hybrid systems. An embryonic cDNA library has been selected because expression of CG12054 peaks during embryonic stages 1-16. Together these investigations are helping to further reveal the

function of CG12054 in proper cellular regulation.

Poster Board No. 046 ANNOTATION OF THE DROSOPHILA BIARMIPES TEN-M GENE. Charlotte Wirth (c-wirth@onu.edu), Alex Kneubehl (a-kneubehl@onu.edu), Lauren Guerriero (l-guerriero), and Jamie L. Sanford, Ph.D (j-sanford@onu.edu) (Advisor), 525 N. Main Street, Ada, OH 45810.

Comparative genomics is an essential modern-day approach to elucidating the mechanisms that lead to evolution at both the gene-level and organismal-level. The Genomics Education Partnership (GEP) which was established in order to combine the efforts of an undergraduate force in annotating newly sequenced *Drosophila* genomes. The primary research goal of the GEP is to gain insight into gene evolution on the uniquely heterochromatic *Drosophila* dot chromosome. Thus far, the GEP has annotated the genomes of *D. grimshawi*, *D. erecta*, *D. virilis* and *D. mojavensis* and is currently annotating the genome of *D. biarmipes*. In analyzing these genomes, the GEP hopes to gain insight into the regulatory mechanisms responsible for the transcription of the 80 genes that are actively transcribed from the dot chromosome. This project focused on annotation of contig 30 of the *D. biarmipes* genome assembly. Annotation was completed utilizing BLAST to identify *D. melanogaster* orthologues present on the contig. The orthologue's exonic sequence was then used in conjunction with the UCSC Genome Browser and ab initio gene finders to annotate the exact coordinates of each exon of genes present on contig 30. While annotation is still ongoing, analysis has shown that contig 30 contains an ortholog of the gene Ten-m, or Tenascin major. Utilizing the methods indicated above, the annotation of contig 30 will continue until the coordinates of each exon of Tenascin Major and each of its isoforms has been mapped in *D. biarmipes*.

Poster Board No. 047 TRENDS IN OHIO'S TOP TEN REPORTABLE INFECTIOUS DISEASES. Sarah Bousfiha (sarah.bousfiha@otterbein.edu), Sarah Holbrook (sarah.holbrook@otterbein.edu), Jennifer Bennett (jbennett@otterbein.edu), and Jeff Vasiloff (jvasiloff@otterbein.edu), Dept. of Biology, Otterbein University, 1 South Grove St. Westerville, OH 43081.

Ohio public health law mandates which diseases are reportable in Ohio. Many of these diseases are communicable. It is important for both the medical community and citizens of Ohio to be made aware of these diseases, including how common they are, how they are transmitted, and what measures can be taken to prevent and control them. Thus, the purpose of this study is to: 1) determine the most frequently reportable infectious diseases in Ohio; 2) determine trends in incidence over recent years; 3) elucidate case characteristics and risk factors; and 4) examine trends in microbiological characteristics of causative organisms. Reportable diseases are identified by medical practitioners, as well as testing laboratories. Case data is reported to local health agencies and transmitted to the Ohio Department of Health (ODH). Recent data from ODH was analyzed. It was possible to rank all reportable infectious diseases by number of cases from most cases per year to least cases per year. In-depth analysis of the 10 most frequently reported diseases is ongoing. Initial Observations: Analysis of 2012 data revealed that the top ten reportable infectious diseases were: 1) Chlamydia (53,310 cases); 2) Gonorrhea (16,551); 3) Shigellosis (1812); 4) Salmonellosis (1270); 5) Invasive *Streptococcus pneumoniae* (1188); 6) Campylobacteriosis (1129); 7) Human Immunodeficiency Virus (HIV) (1101); 8) Pertussis (905); 9) Varicella (811); and 10) Aseptic meningitis (701).

Poster Board No. 048 SYPHILIS: TALE OF TWO CITIES IN OHIO. Amanda Drake (amada.drake@otterbein.edu), Jennifer Bennett (jbennett@otterbein.edu), and Jeff Vasiloff (jvasiloff@otterbein.edu), Dept. of Biology, Otterbein University, 1 South Grove St. Westerville, OH 43081.

Introduction: Syphilis is a sexually-transmitted infection that is endemic in Ohio. Previous work (JV) revealed that most cases were reported in large metropolitan areas. However, the demographics and risk factor profiles of cases in Franklin County (Columbus) and Hamilton County (Cincinnati) were distinct through 2012. In the former, most cases occurred in men who had sex with men, while in Hamilton County many cases were in women and heterosexual men. The purpose of this study is to: 1) determine the incidence of primary and secondary (P&S) syphilis in Ohio in 2013 and the first half of 2014; 2) determine the demographics and risk factor profiles of cases in Hamilton and Franklin counties, and compare them to each other; 3) compare 2013 and 2014 to past data; and 4) generate hypotheses to explain any persistent inter-city differences. Methods and Materials: Reportable diseases like syphilis are identified by medical practitioners, as well as laboratories that conduct testing for infectious agents. Case data is reported to local health agencies and transmitted to the Ohio Department of Health (ODH). Recent data containing the incidence, demographics, and risk factor profiles of cases of P&S syphilis was acquired from ODH. In-depth analysis of statewide and county-specific data is ongoing. Initial Observations: Analysis of 2013 and 2014 data revealed 649 cases of P&S in Ohio in 2014 and 369 cases in the first half of 2014.

Poster Board No. 049 EVALUATING THE EFFECTS OF A COMBINED INPATIENT DIABETES MANAGEMENT TEAM AND OUTPATIENT TRANSITION OF CARE CLINIC ON READMISSION AND EMERGENCY DEPARTMENT UTILIZATION. Gabrielle M. Mey (gabriellemey@walsh.edu)[1], Colleen V. Duncan[2], Travis D. Macek[2], Nisreen A. Nusair (nnusair@walsh.edu)[1], John M. Moorman (jmoorman@neomed.edu)[2], [1]Walsh University, 2020 E. Maple St. mailbox # 770, North Canton OH 44720, [2]Northeast Ohio Medical University (NEOMED).

Diabetes affects 29.1 million people in the United States. Of patients discharged from a hospital with diabetes, 20% are readmitted within 30 days. A Diabetes Management Team, which includes a physician, pharmacist, nurse practitioner, and dietician, is established to improve glycemic control, adherence, and hospital readmissions. This study examines the impact of combined inpatient and outpatient diabetes management services on the rate of 30-day hospital readmission and emergency department (ED) visitation. The primary objective of this study is to compare the composite outcome of unplanned 30-day readmission rate and ED visitation between patients seen by these services and matched historical controls who were seen by neither service. The retrospective evaluation of this study involves an intervention group matched with a control group based on age, gender, time of year during admission, and comorbidities. The intervention group will consist of adult patients who were admitted to the hospital between May 2010 and April 2014, received their first diagnosis with diabetes mellitus, discharged to home, and were seen by both the inpatient and outpatient diabetes management team. Sample size of n=150 is expected. Assessment of ED visitation and readmission will determine the primary objective. For patients readmitted within 30 days of discharge, reason for admission will be collected to determine the impact on diabetes-related readmissions. In addition, the following data will be collected in order to assess predictors of readmission: age, race, number of medications, socioeconomic status, comorbidities, insurance, length of stay, acuity of admission, number of outpatient visits, length of time from discharge to clinic appointment, and medication routes of administration. Descriptive statistics, Chi-squared test and Student's t-test will be used to analyze baseline demographics and study outcomes.

Poster Board No. 050 EFFECTIVENESS OF ORAL PROBIOTICS IN THE GASTROINTESTINAL CONDITION. Marija, J, Rowane (mrj179@case.edu), 2937 Legend Lane, Willoughby Hills, Ohio 44092.

Series of clinical trials have accompanied the resurgence

of public interest in probiotics to identify potential health benefits from the dietary supplements. The United States Food and Drug Administration has not affirmed health claims in the oral probiotics market that surpass scientific evidence, yet this intake of beneficial bacteria is recommended to alleviate gastrointestinal health concerns. This research sought to ascertain if the probiotics *Lactobaccillus*, *Bifidobacterium*, and *Saccharomyces boulardii lyo*, inhabiting the pediatric oral probiotic brands Culturelle®, Florajen®, and Florastor®, are not susceptible to the gastrointestinal bacteria *Escherichia coli, Clostridium difficile*, *Bacteriodes fragilis*, *Prevotella melaninogenica*, and *Propionibacterium acnes*. Due to the insufficiency of data validating oral probiotic benefits, the hypothesis proposed that if gastrointestinal bacteria were exposed to oral probiotics, then the probiotics would be ineffective against the bacterial growth. To assess the effectiveness of oral probiotics against gastrointestinal bacteria in vitro, the zones of inhibition, yielded by oral probiotic solution-infused, antibiotic sensitivity blank, sterile disks, were evaluated. After oral probiotic solutions were infused onto disks for forty-eight hours, the disks were positioned onto agar plates with the five gastrointestinal bacteria and incubated for fortyeight hours. The five trials demonstrated minimal or no effect of the oral probiotics to bacteria, as only two trials with Culturelle® and Florajen® yielded zones of inhibition, eleven (11) and sixteen (16) millimeters in diameter. The research suggests long-term oral probiotic intake for effectiveness. Further clarification of the origins, functions, and efficacy of probiotics are necessary to support current, indefinite scientific evidence and public advertisements.

Poster Board No. 051 PRE-PACKAGED VEGETARIAN AND GLUTEN-FREE FOOD AND THEIR HEALTH IMPLICATION FOR PEOPLE WITH CERTAIN CHRONIC ILLNESSES. Grant Trimble (gtrimble06@hotmail.com), Dana Evans (Danae@rio.edu), University of Rio Grandem, 214 Houck Road, Patriot OH, 45658.

The goal of this project is to examine several common pre-packaged vegetarian and gluten-free foods' nutritional data through the lens of several common diseases, Celiac's Disease, Diabetes, Hypertension, and Estrogen-Sensitive Breast Cancer, in an attempt to assess their appropriateness for these conditions' diets or whether they might prove problematic. This is even more of concern if a patient has concomitant conditions (Ex. Hypertension is often caused by Diabetes.) Many chronic illnesses have dietary restrictions to help control the symptoms and dangers associated with the illness. People with hypertension and heart disease need a lower sodium diet. Additionally, a high blood pressure diet should include low amounts of saturated and trans-fats. Diabetics have to restrict the total amount of carbohydrates they consume. There is growing evidence a low fat diet reduces breast cancer risk. Patients with Celiac's Disease need to avoid the protein, gluten. The hypothesis is pre-packaged foods for two popular diets (gluten-free, vegetarianism) will violate the dietary restrictions of the aforementioned causes of morbidity and mortality. Utilizing online and package nutritional data, the pre-packed foods are accessed for carbohydrate, fat, gluten, soy, and sodium content, then compared to the individual dietary restrictions to determine the food's appropriateness. For example, Udi's gluten-free Margherita pizza is designed for people with Celiac's disease so it would meet their dietary requirements. However, with over 300 mg of sodium and 5 grams of saturated fats, it would be problematic for diabetics and hypertensives.

Poster Board N. 052 PREVALENCE OF METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS AND CORRELATION TO CRYPTOSPORIDIUM PARVUM. Rebecca Amos (amosr@findlay.edu), Joseph Hunter (hunter@findlay.edu), Madeleine Kuieck (kuieckm@findlay.edu), Jennifer Morgan (morganj@findlay.edu), Dr. Bethany Henderson-Dean (henderson-dean@findlay. edu).

Antibiotic resistance is a continual and growing problem worldwide in both human and animal medicine. One such example of antibiotic overuse is the increased prevalence of methicillin-resistant Staphylococcus aureus, MRSA, as a humanosis and more recently as a zoonosis. MRSA transmission has been well documented in multiple animal species around the world with most studies focusing on equine and swine populations. This research focuses on the presence of MRSA in dairy calves from the University of Findlay animal science facility. The hypothesis of this study is that MRSA will be isolated from calves also contaminated with *Cryptosporidium parvum*, a common protozoal parasite causing enteric infection, at a higher probability than those free of infection due to lowered immunity in times of pathogenic and environmental stressors. At the University of Findlay Animal Science Farms, numerous calves may have become more susceptible to detrimental bacterial infections; due to their not yet fully developed immune systems, with further health suppression by protozoal infections. Fecal samples were collected from all eighteen dairy calves throughout the individually housed phase. These samples will be diluted and plated on mannitol salt agar with oxacillin to determine the presence and distribution of MRSA. Additionally, a molecular spa-typing and PVL testing will be used to determine if the isolates are ca-MRSA or ha-MRSA. The expected outcome is that the calves that are positive for protozoan infections will show a higher prevalence of MRSA infections. To test this, 3 samples from each of the eighteen calves will be collected. These samples will be isolated while the calves are in individual hutches; when the calves arrive to the facilities, after a major stressor (castration/dehorning), and a few weeks after a major stressor. This ensures that the samples will be collected when the calves are most likely shedding the protozoal infection. Each sample will be plated and grown up on mannitol salt agar inoculated with oxacillin. Individual colonies will then be isolated and PCR will be completed on each sample to ensure that the mecA gene is present demonstrating that MRSA has been isolated. Molecular spa-typing and PVL testing will follow to then determine if the infection is ca-MRSA or ha-MRSA. Confirmation of cryptosporidium infection will be conducted using a Crypto/Giardia test kit, on each sample taken from the calves. Correlations between protozoan infection and MRSA isolation and stressor inducers versus infection cycles will be determined from the results using Pearson's correlation.

Poster Board No. 053 A NEXT-GENERATION SEQUENCING APPROACH TO ASSESS THE DIVERSITY OF INTESTINAL AND SKIN MICROBIOTA OF THE SLIMY SALAMANDER SPECIES COMPLEX (PLETHODON GLUTINOSUS). Michael McAndrew (mcandrewm@findlay.edu), Dakota Esterline (esterlined@findlay.edu), Brandy Lawrence (lawrenceb@findlay.edu), Ingrid Godfrey (godfreyi@findlay.edu), Brandon Edelbrock (edelbrockb@findlay.edu), Julia Edelbrock (edelbrockj@findlay.edu), Michael A. Edelbrock (edelbrock@findlay.edu), Donald Walker (walkerd@findlay.edu). Department of Natural Sciences, The University of Findlay, Findlay OH 45840.

Amphibians have become an increasing global conservation concern due to documentation of widespread declines in populations throughout the world. Many of these declines are attributable to outright habitat loss and degradation; however, many are linked to an emerging infectious fungal pathogen: *Batrachochytrium dendrobatidis* (Bd). Some amphibians have developed an active and potent battery of cutaneous antimicrobial peptides to control potential pathogen growth. In addition, a few studies have shown that amphibians have a symbiotic gut microbial community that either assists with digestion or is entirely benign to the host organism. Therefore, studies simultaneously considering the gut and skin microbe community of amphibians may contribute to our understanding of their peculiar susceptibility to emerging infectious diseases. Skin swabs (n=57) and fecal samples

(n=57) were collected from 8 pure and 5 hybrid *Plethodon* spp. (n=57 individuals) in the southeastern US. DNA was extracted, the 16S rRNA gene PCR amplified, and total microbial communities sequenced on the Illumina MiSeq platform. The most common bacterial phyla on the skin and intestines were Bacteroidetes, Firmicutes, Proteobacteria, and Verrucomicrobia. A non-metric multidimensional scaling ordination indicated strong differences (stress 0.13) in skin and intestinal microbial communities across all Plethodon species. Two-way ANOSIM analyses were performed to assess whether host species and/or skin/fecal communities were significant predictors of variability across *Plethodon* species. The ANOSIM confirmed results from the ordination plot, skin and fecal communities were a significant predictor of variability (R=0.976, p<0.001), whereas, host species was not (R=0.149, p<0.001). This comparative analysis documents the microbial diversity of both the skin and intestinal microbiome for species of slimy salamanders.

Poster Board No. 054 A COMPARISON OF ANTIBIOTIC RESISTANCE IN *ESCHERICHIA COLI* AND *ENTEROCOCCUS SPP.* BETWEEN THE UPPER AND LOWER CUYAHOGA RIVER. Josephine W. Naji (jnaji@kent.edu), Mitchell Myers (mlmyers3@kent.edu), Douglas A. Modic (dmodic@kent.edu), Kent State University Geauga Campus, 10212 Blair Lane, Kirtland, Ohio 44094.

The bacteria *E.coli* and *Enterococcus* are part of the normal intestinal microbiome. They can also cause serious infections in humans. Antibiotic resistance is a growing problem in both. *E.coli* and *Enterococcus* may enter waterways from wildlife, livestock and humans. The number and antibiotic susceptibility of *E.coli* and *Enterococcus* were examined in the Cuyahoga River in northeast Ohio. The hypothesis states that due to human influences, an increase in bacteria and antibiotic resistance will occur as the river flows from the upper to the lower Cuyahoga River. Sampling sites included the upper Cuyahoga River in Burton and 3 lower sites: Rockside Rd, Harvard Ave, and the "Flats" in Cleveland near the mouth of the river. Methodology included membrane filtration of water using bile esculin azide media (*Enterococcus*) and mTec agar (E.coli) and Kirby Bauer antibiotic susceptibility testing. No antibiotic resistance was observed in isolates of *Enterococcus* (n= 21) or *E.coli* (n=4) obtained from the upper Cuyahoga in Burton. Resistant strains of both bacteria were observed in all downstream locations. In samples from the Flats, 5/13 E.coli isolates and 3/26 *Enterococcus* isolates demonstrated antibiotic resistance. Resistance in *E.coli* was against Ampicillin and Cephazolin. *Enterococcus* showed resistance to Erythromycin, Tetracycline and Ciprofloxan. Water from the Flats contained the greatest amount of both bacteria, an example for Enterococcus: 1200 CFU/ 100 ml water in Burton vs. 15,000 CFU/100 mls in the Flats. The absence of resistant strains of *Enterococcus* or *E. coli* in the upper Cuyahoga, the presence of resistant strains in the lower Cuyahoga and the increase in number of bacteria in the Flats, support the hypothesis that antibiotic resistant strains are entering the river from human activity, such as discharge from sewage treatment plants or CSO overflows.

Poster Board No. 055 FUNGAL MEDIATED BIOTRANSFORMATION OF BITTER MELON EXTRACT BY *CYTOSPORA CHRYSOSPERMA* INCREASES ANTIMICROBIAL ACTIVITY AGAINST *STAPHYLOCOCCUS AUREUS*. Rachel Speaker (speakerr@findlay.edu), Madison Eichstadt (eichstadtm@findlay.edu), Katelyn Durbin (durbink@findlay.edu), Michael A. Edelbrock (edelbrockm@findlay.edu), Donald M. Walker (walkerd@findlay.edu), Department of Pharmacy, The University of Findlay, Findlay, OH 45840.

Natural products chemistry encompasses the bioprospecting of any living natural organism including both plants and fungi and accounts for some of the most profitable drugs on the market (e.g, penicillin, taxol). Fungi contain unique fermentation capabilities that can be harnessed within an industrial setting and used to create unique and complex organic molecules. Bitter melon (*Momordica charantia*) contains triterpenes with previously documented activity against microorganisms and the fungus *Cytospora chrysosperma* has activity against both gram positive and gram negative bacteria. In this experiment the fermentative capabilities of *Cytospora chrysosperma* were used to biotransform bitter melon and screen the raw extracts for activity against *Staphylococcus aureus*. *Cytospora chrysosperma* was grown for two weeks in two experimental treatments including potato dextrose broth (PDB) with and without bitter melon (0.8 g; Bitter Melon-Powder, Nature's Herbs™). Raw extracts were produced by solid-liquid separation and solvent partitioning (ethyl acetate). Raw extracts were rehydrated in DMSO and screened using the Kirby-Bauer disc diffusion assay under standard conditions. The fungal extract containing bitter melon significantly inhibited the growth of S.taphylococcus aureus; (tF1, 8(23) = 22.1438.51,; p = 0.0001,) when compared to the fungal extract containing only PDB. potato dextrose broth The fungal extract containing bitter melon was significantly better at inhibiting *S. aureus* than the negative controls of PDB with bitter melon; t(42) = 8.57, p = 0.0001, and PDB alone; t(42) = 85.95, p = 0.0001 and the negative control. Results demonstrate the biotransformation abilities coupled with antimicrobial potential of *Cytospora chrysosperma*.

Poster Board No. 056 DETERMINING BEST PRACTICE CLEANING FOR PREVENTING TRANSMISSION OF INFECTIONS VIA WRESTLING MATS. Suzy Young (s-young.3@onu.edu), 417 North Gilbert St., Ada, OH. 45810. [Advisors Linda M Young (l-young@onu.edu) and Vicki A. Motz (v-motz@onu.edu)].

Numerous disinfectants claim to effectively kill microbes that contaminate wrestling mats and spread infection to athletes. Although effective, exposure to harsh chemical constituents of some cleaners may cause skin and respiratory irritation in athletes. To determine optimal mat disinfection practices, this study compared the antibacterial capabilities of 10% bleach, OxiTitan, Benefect, eWater, and KenKlean, five common products with different mechanisms of action. In a biosafety cabinet, unused 6" x 6" wrestling mat squares were disinfected with one of five agents, tested and found not to have bacterial growth. Each was then inoculated with 0.5 McFarland standard of *Staphylococcus epidermidis*, the most common skin bacterial species, and allowed to dry. 1" x 6" strips of these mats were sampled (N=4) by rubbing all sides of a rayon swab moistened with Stuart's medium on the area for 30 sec at t=0, 1, 2, 6, and 24 hours. Swabs were extracted in 2 ml of Mueller-Hinton broth using a thermoagitator at 1000 rpm for 5 minutes at 37°C. A 10 µl aliquot was spread on TSA with 5% sheep red blood cells and incubated at 37°C in 5% CO_2 for 24 hours. Mean colony counts rose the first hour for all treatments, however products claiming residual activity (OxiTitan and KenKlean) reduced bacterial load 98-fold compared to non-residual disinfectants (10% bleach and eWater). Over 24 hours, the pattern of bacterial growth was inconsistent, however residual products had a 63% reduction in bacterial load over non-residual agents. Benefect, an all-natural, thymol-based cleaner, decreased bacterial load 38%, also demonstrating residual antibacterial activity. After 24 hours, mats were retreated with their original product, resulting in complete disinfection, validating the killing effectiveness of each cleaner, and supporting claims of residual activity for OxiTitan and KenKlean.

Poster Board No. 057 MICROBIOLOGICAL EVALUATION AND DISTROBUTION OF ANTIBIOTIC RESISTANCE AS INDICATORS RESULTING FROM ACCUMULATING WATERSHED EFFECTS. Mychal Taubken (taubkenm@findlay.edu), Zachary J. Young, (youngz@findlay.edu), 2141 Bright Rd Findlay, OH 45840.

The premise of this study is that transcriptional expression of the tetracycline genes will increase in the presence of

increasing concentration of tetracycline. Since a single bacterium may have more than one *tet* gene conveying resistance, isolates will be screened through RT-PCR analysis to determine if expression patterns vary based on the number of tetracycline resistance genes to determine if there is a correlation between the Minimal Inhibitory Concentration and the number of resistance genes. Tetracycline resistance in bacterial coliforms has been a prevalent problem in agricultural settings because of the prophylactic use of antibiotics in livestock. To date there are over 39 *tet* genes and three main modes of resistance known to effect these genes. We collected three water and sediment samples from each of three different locations in the Blanchard River (Hancock County, Ohio) and screened for tetracycline resistant coliforms. Due to nutrients and other residues from runoff accumulating in the river in downstream regions, the types of antimicrobial resistance should increase in number and diversity. If the run off continues in the city then the resistance will increase downriver. The isolates will be screened through PCR analysis for the presence of *tet* resistance genes.

Poster Board No. 058 A STRATEGIC APPROACH TO DETERMINING THE FUNCTION OF THE UNSTUDIED *DROSOPHILA MELANOGASTER* GENE CG4496. Vladimir Bokun (vbokun12@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu), Notre Dame College, 4545 College Road, South Euclid, OH 44121.

The ability of an organism to turn on and off genes in response to environmental and developmental signals is maintained using a myriad of proteins with various motifs. One common motif is found in the family of C2H2 zinc-finger regulatory proteins, which is one of the largest of all protein families. CG4496 encodes a C2H2 zinc-finger regulatory protein in *Drosophila melanogaster*, but its exact role in *Drosophila* is unknown at this point. In an effort to determine its role, two experimental strategies will be used, the first one being *in vivo* and the second *in vitro*. To uncover the potential *in vivo* relevance of CG4496 to the *Drosophila*, a mating schematic to obtain a knockout has been devised using FLP-FRT recombination system. This system incorporates the forced expression of a FLP-recombinase enzyme to cause recombination between two FRT DNA sequences that flank either the 5' or 3' end of CG4496. The resulting recombinants will generate a chromosome that lacks CG4496 and thereby produce a null-mutant. By examining physical changes that may result in the knockout a phenotype of the null-mutant can be ascertained. The second strategy is based on the use of yeast-two-hybrid screens, which will be performed using a library of both adult and larvae cDNA in order to identify possible proteins with which CG4496 interacts. For this purpose a full length cDNA coding region of CG4496 was subcloned into yeast-two-hybrid vectors. Further analysis of the exact protein region responsible for interactions can also be pinpointed following yeast-two-hybrid screens. Using the two aforementioned approaches, CG4496 regulatory roles should be elucidated.

Poster Board No. 059 A FLP-FRT RECOMBINATION AND YEAST TWO HYBRID SYSTEM APPROACH TO ELICIDATING THE FUNCTION OF THE *DROSOPHILA MELANOGASTER* GENE CG12744. Brian J. Burleson (bburleson12@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu) Notre Dame College, 4545 College Road, South Euclid, OH 44121.

Gene regulation is an essential mechanism for the functioning of all biological systems. Central to gene regulation is the control at the level of transcription. One of the largest regulatory protein families in nature is the C2H2 zinc finger protein (znf), a molecule consisting of a two ß sheets and an α helix surrounding a Zn ion held in place by two cysteine and two histidine amino acids. C2H2 znf form a verity of cellular interactions that regulate gene expression with their most well known being through DNA interactions. The *Drosophila melanogaster* gene CG12744 encodes a C2H2 znf that previous high throughput studies have predicted to function in gene regulation and have associations with immune-defensive response to fungal infections. In order to better determine the role of CG12744, two methods of experimentation have been devised to explore CG12744 both *in vivo* and *in vitro*. The *in vivo* method is employing two available FRT recombination sites to be used in an FLP-FRT recombination strategy to specifically knockout CG12744. Through the removal of CG12744 this reverse genetic approach should reveal any phenotypic effects on the organism in the absence of the gene. The *in vitro* method will employ a yeast two hybrid system to uncover potential protein-protein interactions. Full length cDNA CG12744 has been subcloned and placed in yeast two hybrid vectors which will be used against *Drosophila* cDNA libraries to screen for potential protein-protein interactions. This two pronged approach should begin to further elucidate the function of this little known gene.

Poster Board No. 060 CG15436/HNDC GOVERNS CHROMATIN STRUCTURE MECHANISMS THAT CONTROL THE INTEGRITY AND FATE OF STEM CELLS IN THE *DROSOPHILA MELANOGASTER* OVARY. Marcia F. Leon (mleon11@students.ndc.edu), Brittany N. Stawicki (bstawicki11@students.ndc.edu), Lauren R. Sandrock (lsandrock12@students.ndc.edu), Matthew L. Johnson (mjohnson@ndc.edu), Notre Dame College, 4545 College Road, South Euclid, OH 44121

Regulation of cell identity is indispensable in coordinating the various cell types present in multicellular organisms. In the Drosophila melanogaster ovary, this process is particularly evident in the behavior of stem cells, which simultaneously maintain themselves while undergoing differentiation that is critical to proper egg production for reproduction. Central to this process are molecular mechanisms that regulate chromatin structure and gene expression. This study describes the role of CG15436, also known as HNDC (Hunchback of Notre Dame College), a C2H2 Zn finger protein whose null phenotype is linked to abdominal malformations and loss of egg production. Analysis of the 0.06% of the genome with which HNDC is most highly associated reveals correlation with central stem cell differentiation regulators of the ovary such as BAM, PUM, NOS and AGO3 among other stem cell regulatory genes. These associations and the null phenotype of HNDC suggest a likely role in stem cell differentiation in the Drosophila ovary. Furthermore, others have reported an interaction between CG15436 and a known chromatin regulating protein, SuUR (Suppressor of Under-Replication). In an effort to further characterize this interaction and investigate the molecular function of HNDC, the full transcripts of HNDC and SuUR have been subcloned and placed in yeast two hybrid constructs to better characterize these protein associations. Altogether this study demonstrates a link between the phenotype of HNDC mutants and begins to reveal the molecular interactions that regulate chromatin structure and are critical in controlling genes involved in regulating differentiation within the ovary.

Poster Board No. 061 A NOVEL CELL CULTURE MODEL FOR THE STUDY OF THE DISEASE, FIBRODYSPLASIA OSSIFICANS PROGRESSIVA. Deborah R. Nascimento (deborahrn19@gmail.com)[1], Sarah F. Martins (sarahebreia@yahoo.com.br)[2], Fabiana Alves (alves.bio@gmail.com)[2], Francisco O. Vieira (chicobrant@gmail.com)[2], Liane R. Giulliani (lrossog@yahoo.com)[1], Marilene G. Palhares (marilene.palhares@bol.com.br)[1], Elaine M. S. Fagundes (elainefagundes@gmail.com)[2], Durval B. Palhares (dbpalhares@hotmail.com)[1], Amy Milsted (milsted@uakron.edu)[3], and Almir S. Martins (alisbetermster@gmail.com)[2], [1]Universidade Federal de Mato Grosso do Sul, Campo Grande/MS, Brasil and The University of Akron, Department of Biology, 302 Buchtel Commons, Akron, OH 44325-3908. [2]Universidade Federal de Minas Gerais, Belo Horizonte/MG, Brasil, [3]University of Akron.

Fibrodysplasia ossificans progressiva (FOP) is characterized by congenital skeletal malformations with postnatal heterotopic ossification leading to inappropriate bone formation in muscle and other tissues. FOP patients have a mutation in the ACVR1 gene. Specific cellular mechanisms contributing to FOP are not clear, moreover, the difficulty in obtaining tissue samples from patients and animal models is a limitations hinder our ability to dissect the pathogenesis of the disease. In this study we evaluated the functional genome and mRNA expression of target genes related to pathophysiological pathways of FOP in cell cultures from peripheral blood of patients. Whole blood samples were collected for cultivation of peripheral blood mononuclear cells (PBMC) from eight volunteers (4 FOP patients and 4 healthy controls). Total RNA was extracted with Stat60 and analyzed with RT PCR. ANOVA was used to evaluate significance of results. Levels of expression of the target genes ACVR1, BMP4, COL1 and COL3 were identical in the control group PBMC. In cells from FOP patients, ACVR1 and COL3 were expressed at reduced levels (0.4 fold for each, $p < 0.01$) while BMP4 and COL1 expression were elevated (1.6 and 2.8 fold, $p < 0.01$). This model suggests that in PBMC the mutated ACVR1 gene might trigger a positive feedback mechanism that increases expression of bone morphogenic genes, leading to subsequent imbalance of signaling pathways involving COL1 and COL3. In conclusion, PBMC may represent a simple cell culture model for the study of the functional genomics involved in FOP pathophysiology.

Poster Board No. 062 MACROPHAGE-DERIVED MYD88 ACTS AS A NEGATIVE REGULATOR OF TLR3 SIGNALING. Haley M. Spaner (hspaner11@students.ndc.edu), Angela C. Johnson (acjohnson@ndc.edu) Notre Dame College, 4545 College Road, South Euclid, OH 44121.

Innate immune recognition is governed by a variety of pattern recognition receptors, including Toll-like receptors (TLRs). These receptors, which are expressed in macrophages, dendritic cells, and epithelial cells, are a critical point in the recognition of invading microorganisms. Recent studies have suggested that MyD88, a common adaptor molecule utilized by most TLR signaling pathways, plays a negative regulatory role in the signaling of TLR3, as a genetic knock-out of MyD88 results in increased TLR3 activity. Therefore, it is endeavored to extend these findings by studying the effects of combined triggering of TLR2, which utilizes MyD88, and TLR3. As TLRs are highly expressed and regulated on macrophages, the macrophage cell line J774 will be utilized. Macrophages will be treated with Pam3Cys (TLR2 agonist) alone, Poly(I:C) (TLR3 agonist) alone, and a combination of Pam3Cys and Poly(I:C). At the conclusion of the experiment, cell activation will be assessed by nuclear translocation of NF-κB and cellular production of CCL5/RANTES. In agreement with previous MyD88 gene knock-out studies, it is expected that both NF-κB nuclear translocation and cellular production of CCL5/RANTES will be increased in the group receiving both Pam3Cys and Poly(I:C). Presumably, as MyD88 is utilized for signaling via TLR2, its negative impact on TLR3 signaling will be relieved and; therefore, TLR3 activation can proceed with more intensity. As the specific details of these pathogen recognition pathways are elucidated, the impact of bacterial infections (TLR2) upon viral infection (TLR3) will be better understood.

Poster Board No. 063 PHOTOLITHOGRAPHY FOR THE INVESTIGATION OF NANOSTRUCTURES. Helen M. Cothrel (hc261409@ohio.edu), 6141 Lancaster-Kirkersville Rd., Baltimore, OH, 43105.

Developing a rapid, iterative, and limited-resource method of microfabrication with which devices with large localized electric fields can be generated will expand research capabilities for those interested in nanostructures. Photolithography is a common method of microfabrication, and it can be conducted within the confines of a small laboratory. The parameters for photolithographic methods, such as baking temperature, exposure, and development time, were optimized to yield interdigitated-finger devices with features on the order of 2 µm capable of creating electric fields up to 10 kV/cm. One such device has been used to examine quantum dots (QDs) in toluene. QDs are semiconductor nanoparticles, with sizes in the range of 1-50 nm, which are often called "artificial atoms" due to their discrete energy levels arising from atomic-like quantum confinement. Many potentially useful properties of QDs depend on their behavior in external fields. Using devices created with photolithography, two trials have been conducted with QDs. In the first, QDs suspended in toluene were applied to conducting interdigitated fingers which had no bias applied; luminescence of the QDs showed that they did not preferentially align or cluster on the fingers. However, in a second trial, QDs in the presence of an applied electric bias clustered on fingers with lower potential. This indicates that the QDs are accumulating charge during handling, possibly from interaction with the toluene solution in which the QDs are stored. This could provide a method for preferential deposition and/or localization of QDs using electric fields. Future experiments will work to isolate the charging mechanism and explore the potential for nanoscale manipulation of QDs using external fields.

Poster Board No. 064 HUMAN SRY INCREASES BLOOD PRESSURE OF SD RATS AND ALTERS RENIN-ANGIOTENSIN SYSTEM GENE EXPRESSION. Fabiana Alves (alves.bio@gmail.com)[1,2], Francisco de Oliveira Vieira (chicobrant@gmail.com)[1], Antônio Augusto Bastos Peluso (augustopeluso@gmail.com)[2], Amy Milsted (milsted@uakron.edu)[2], Jeremy W. Prokop (jwp7@zips.uakron.edu)[3], Monte E. Turner (meturner(at)uakron.edu)[2] , Maristela de Oliveira Poletini (marispoletini@icb.ufmg.br)[4] , Nariele Araújo Fernandes Ferreira (narydiow@hotmail.com)[2], Deborah Ribeiro Nascimento (deborahrn19@gmail.com)[1], Sarah Fonseca Martins (sarahebreia@yahoo.com.br)[1], Luiz Orlando Ladeira (ladeira@fisica.ufmg.br)[5], Robson Augusto Souza Santos (robsonsant@gmail.com)[2], Almir Sousa Martins (alisbetermster@gmail.com)[1] . Rua Júlio Diniz, 604 apt 201 Bairro Santa Branca, CEP.: 31565-180, BH, MG, Brasil. [1]Núcleo de Fisiologia Geral e Genômica Funcional-ICB, [2]Laboratório de Hipertensão-ICB, [3]Department of Biology-UAkron-OH/USA, [4]Laboratório de Metabolismo-UFMG; [5]Departamento de Física-UFMG.

The Sry gene on the Y chromosome is responsible for male sexual differentiation. It also participates in blood pressure (BP) control in rats. The aim of this study was to evaluate the influence of human Sry gene (hSry) on blood pressure of Sprague Dawley rats (SD) through the renin angiotensin system (RAS). Human Sry DNA was delivered to kidneys of adult male SD rats (n=3) by electroporation; 3 (control) rats were electroporated with non-specific DNA. In a second experiment the same DNAs were delivered together with 100 µg/ml of multi-walled carbon nantotubes (MWCN) via the external carotid artery. To evaluate hSRY effects on RAS gene expression, SD neonatal cardiomyocytes were transfected with 50 ng of hSRY (n = 5) complexed to 25 µg/ml of MWCN. Expression of renin, angiotensinogen, ACE, ACE2 and receptors Mas, AT1 and AT2 were evaluated by quantitative RT-PCR. Telemetry data showed significant increases in SD BP after delivery of gene by either route ($p < 0.01$). After transfection into cardiomyocytes of SD rats with hSry, there was a significant increase in the expression of the renin ($p = 0.0059$), ACE ($p = 0.0380$) and AT2 ($p = 0.0440$); without significant changes of AT1, ACE2 and MAS. These results demonstrate for the first time that the human Sry gene increases BP in SD rats, and significantly modulates RAS gene expression in rat cardiomyocyte cultures.

Poster Board No. 065 ALTERED EXPRESSION OF TRIM69 FOLLOWING ISHCHEMIA/REPERFUSION INJURY. Anjella Manoharan (manoharan.11@osu.edu)[1], Jenna Alloush (Jenna.Alloush@osumc.edu)[2], Eric X Beck (Eric.Beck@osumc.

edu)[2], Uday Nori (nori.1@osu.edu)[3], Beth S. Lee (lee.2076@osu.edu)[2], Noah Weisleder (Noah.Weisleder@osumc.edu)[2], [1]Biomedical Science Undergraduate Program, College of Medicine, [2]Department of Physiology and Cell Biology, College of Medicine, [3]Department of Internal Medicine, Division of Nephrology.

Ischemia/reperfusion injury results in death of cells in tissues and ultimately organ failure. Renal ischemia/reperfusion damages capillary endothelial cells, and especially in the peritubular capillaries, ultimately leading to acute kidney injury. Most cells in the body have a repair mechanism to protect them from disruptions of the plasma membrane. Changes in the capacity of cells to reseal membrane disruptions after injury can lead to the acceleration of disease; whereas increasing this capacity may be an effective therapeutic approach. TRIM69, a member of the tripartite motif (TRIM) family, could increase membrane repair in the cells since it shares high homology with MG53, a protein involved in cell membrane repair. The effectiveness of TRIM69 to protect kidney cells will be evaluated by damaging human embryonic kidney (HEK293) cells by exposing the cells for 30 minutes with various concentrations of hydrogen peroxide (H_2O_2) ranging from 0 uM to 10 uM and evaluating the extent of damage produced through lactate dehydrogenase (LDH) and MTS assays. Data obtained will be analyzed using t tests (n=5). Preliminary studies demonstrated that the amount of TRIM69 decreases in the rat kidneys following ischemia/reperfusion surgeries. Thus, it is hypothesized that the decrease in TRIM69 after kidney ischemia/reperfusion increases the cell injury that results under these conditions. Initial experiments have shown a decrease in LDH release and an increase in cell viability for cells that were transfected with TRIM69 compared to cells that were untransfected; therefore, TRIM69 may have some protective effects in cells against ischemia/reperfusion injury. Future studies will focus on the mechanism of action of these protective effects.

Poster Board No. 066 ASSESSMENT OF COLLEGE COUNSELING SERVICES. Julie M. Keller (jkeller206@capital.edu), Jennifer Davis (jdavis3@capital.edu), Cathy McDaniels Wilson (cmcdanielswilson@capital.edu), Andrea M. Karkowski (akarkows@capital.edu), College and Main, CU Box 3039, Columbus, OH 43209.

College mental health is an issue on campuses and mental health concerns have increased over time. A recent study noted that 11% of the college population uses counseling services provided by campus counseling centers. Specifically, college students seek treatment and counseling for life events that become unmanageable to them. The current study assessed whether students' quality of life changed over the course of counseling provided by a university counseling center. This was accomplished by analyzing differences between a baseline measure of quality of life, a mid-counseling measure given at the fourth week of counseling, and test at termination of counseling. These measures were administered to all undergraduate and graduate students (N = 298) undergoing counseling between 2011 and 2014. A secondary goal was to examine how important the subscales of the quality of life measure were for college students. One way ANOVAs for repeated measures followed by post hoc analyses using the subscales of the quality of life measure as well as the total quality of life score revealed increases in students' self-esteem (F = 6.935), love (F = 6.857), and overall quality of life scores (F = 7.350). A one way ANOVA for repeated measures followed by post hoc analyses examined students' ratings of the importance of the quality of life subscales and indicated (F = 85.217) that some subscales (e.g., children and money) were not important for college students. These data provide a baseline for understanding the value of counseling experiences and indicate that, while the quality of life measure can be applied to a college population, not all subscales are relevant to college students.

Poster Board No. 067 ASSESSMENT OF THE MUSSEL COMMUNITIES IN THE LOWER SECTION OF BIG WALNUT CREEK. Jared B Ellenbogen (jared.ellenbogen@otterbein.edu), Michael A Hoggarth (mhoggarth@otterbein.edu), SMC 12707, Otterbein University, 1 South Grove Street, Westerville OH, 43081.

Since the enactment of the 1977 Clean Water Act, biologists have created numerous multimetric assessment tools to evaluate the biological integrity of water resources, using biological criteria. The integrity of Big Walnut Creek, Ohio, has been in flux since the 1955 construction of Hoover Dam, and while current water quality is high, mussel communities in the creek have yet to recover from historical decline. This study sought to determine the cause of the decline in the mussels in the lower section of the creek below the dam. Historical creek data, including a fish-based index of biotic integrity (IBI), invertebrate community index (ICI), qualitative habitat evaluation index (QHEI) and modified index of well-being (MIWB), were compared to a recent mussel-IBI for the creek. These data were compared to urbanization data (i.e. percent plant cover) describing land use in 1 km^2 sample regions around each biometric data collection site. Data were analyzed using linear region and student t-tests to understand any correlative relationships with the status of mussel communities. Mussel-IBI data were compared to percent land developed (r^2=0.225, p >0.01), percent plant cover (r^2=0.1 p>0.01), road density (r^2=0.007, p > 0.01), census tract data as a measure of population density (r^2=0.003, p > 0.01), riparian zone width (r^2=0.107, p > 0.01) and creek width (r^2=0.001, p > 0.01). Ohio EPA biometric data were compared to percent plant cover data: IBI (r^2=0.185, p > 0.01), MIWB (r^2=0.004, p > 0.01), ICI (r^2=0.028, p > 0.01) and QHEI (r^2=0.265, p > 0.01). No significant correlations were found between urbanization and integrity, suggesting that land use does not directly affect the lower section of Big Walnut Creek. Therefore, it is possible (pending future research) that the mussel communities could recover in time, similar to the fish and invertebrate communities in the creek.

Poster Board No. 068 HOW LEARNING STYLES AFFECT WORKING MEMORY OF AN INDIVIDUAL. Nina, M. Napolitano (nnapolitano@capital.edu), Mark, W. Ivey (mivey@capital.edu) and Kimberly, W. Heym (kheym@capital.edu), Department of Biological and Environmental Sciences, Capital University, 1 College and Main, Columbus, Ohio 43209.

Listening to lectures and note taking require working memory; the temporary storage and active manipulation of information during every day cognitive tasks. It was hypothesized that visual learners hold visual information in working memory better than verbal information. To test for working memory, students enrolled in a general biology class (N = 95) viewed a PowerPoint slideshow containing groups of 6 written words, 6 images, and 6 spoken words followed by a math problem, which served as a distractor. Students solved the math problem and then wrote each of the previously viewed words in exact order. Each participant completed the Felder Learning Styles Inventory to identify the student as a visual, balanced, or verbal learner. Accurate recall of written words, spoken words, and images, was calculated for visual and verbal learners. A two-way between subjects ANOVA showed a significant main effect of modality F (2,184) = 26.09, p< 0.001, and a significant learning style x modality interaction F (2, 184) = 2.58, p=0.04, but no main effect of learning styles F (2, 184) = 1.13, p= 0.33. The results show no statistical difference in the ability of visual or balanced learners to hold images, printed words, or spoken words in working memory; however, verbal learners produced superior accurate recall with spoken words compared to images and printed words. Results indicate that visual learners do not retain visual or textual information in working memory better than auditory information; therefore their reliance on visual cues may be misleading.

Poster Board No. 069 A COMPARISON OF NUTRIENT REMOVAL BY TURF GRASS IN A HYDROPONIC SYSTEM. Nimesha M. Gunarathnaa (nimesha.madavi@gmail.com), Kun Liua (liu.3181@buckeyemail.osu.edu), Karen Mancla (mancl.1@osu.edu), Olli H. Tuovinenb (tuovinen.1@osu.edu). [a]Department of Food, Agricultural and Biological Engineering, The Ohio State University, 590 Woody Hayes Dr. Columbus, OH 43210, [b]Department of Microbiology, The Ohio State University, 484 W 12th Ave. Columbus, OH 43210.

Excess nutrients found in wastewater cause eutrophication. Wetland treatment systems, for example, remove 40-50% of total nitrogen and 50-60% of total phosphorus. Combining wastewater treatment with growing plants in a hydroponic system is a treatment option, because plants can absorb dissolved compounds in the wastewater as nutrients for growth. This study compared nutrient removal ability of four grass species: orchard (*Dactylis glomerata*), tall fescue (*Lolium arundinaceum*), Kentucky blue (*Poa pratensis L.*) and perennial rye (*Lolium perenne*). The wastewater, from a turkey processing plant, was treated in a sand bioreactor system. Each plant species was cultured on media consisting of perforated plastic plates and one-layer burlap. The plate/fabric/grass hydroponic cells with two days hydraulic retention time were studied. Two replicate samples of each plant species were made for each measurement for 28 consecutive days. The nutrient analysis were conducted using American Public Health Association (APHA) approved Hach (2002) methods. Initial average nutrient concentrations in treated wastewater of nitrate (NO_3^--N), phosphate (PO_4^{3-}-P) and ammonia (NH_3-N) were 101.7± 14.8 mg/l, 4.2 ±0.9 mg/l and 0.2 ±0.1 mg/l respectively. There was no statistically significant difference ($p<0.05$) in removal of NO_3^--N and NH_3-N between plant species. However, there was a significant difference between plant species in removal of phosphate. All plant species achieved >82% NO_3^--N removal, >92% NH_3-N removal and >79% PO_4^{3-}-P removal. Consequently, a batch hydroponic system using common grass species removed a large amount of wastewater nutrients and appears to be a feasible option.

Poster Board No. 070 WATER QUALITY MONITORING ON THE UPPER MAUMEE RIVER. Alison M. Rifenburgh (arifenburgh001@defiance.edu)[1], Douglas D. Kane (dkane@defiance.edu)[1], Stephanie Singer (ssinger@defiancecounty.com)[2], [1]Defiance College, Defiance, OH, 43512, [2]Defiance County Soil and Water Conservation District, Defiance, OH, 43512.

The Maumee River, the largest tributary to the Great Lakes, is a major contributor of non-point source pollution to Lake Erie. Land use in its watershed is greater than 70 percent agricultural and thus nutrient runoff is a large concern and has been shown to contribute to harmful algal blooms in Lake Erie. In 2013 from spring to fall, four sites were sampled on the Upper Maumee River, which stretches from Fort Wayne, IN to Defiance, OH. The sites were selected to be in a diverse range of land use types, with one each in an urban, suburban, rural town, and agricultural area. Once a month at each site, Secchi depth was measured and a YSI multiprobe was used to measure temperature, dissolved oxygen, and pH. Water samples were also taken, and the concentrations of nitrate, phosphate, and ammonia were measured using Hach colorimetry nutrient tests. Chlorophyll a and blue green algae cell count were estimated using a handheld fluorometer. We found that mean nitrate and phosphate concentrations, ranging from 2.16-4.17 mg/L for nitrate and 0.08-0.29 mg/L for phosphate, were well above the target levels set by the Upper Maumee Watershed Partnership (1.6 mg/L and 0.05 mg/L, respectively). Future monitoring would provide a better understanding of the nutrient dynamics of the river and help evaluate the efficacy of current programs to reduce nonpoint source pollution in the watershed.

Poster Board No. 071 A STUDY OF DIFFERENT WATER SAMPLING METHODS ON LAKE ERIE. Victoria E. Simons (simons.81@osu.edu), Justin D. Chaffin (chaffin.46@osu.edu), F.T. Stone Laboratory, Ohio State University P.O. Box 119, Put-in-Bay, Ohio 43456.

Several organizations collect water samples in Lake Erie to determine chlorophyll *a* (chla) and total phosphorus (TP) concentrations to monitor water quality. However, these organizations collect samples by using one of four different methods: surface-to-near-sediment (WC), surface-to-2 meter depth (0–2 m), surface-to-twice the Secchi depth (2xSD), and the Ohio EPA method (OEPA) of pooling subsamples from three depths. Hence, measured concentrations may not be comparable among datasets. During summer 2013 and 2014 we sampled Lake Erie weekly at 27 sites (n=352 total samples) ranging from Maumee Bay to Avon Point. At each site lake water was collected with all methods to determine if TP and chla data from the methods are comparable. Chla and TP concentration were determined using standard EPA methods. Data was analyzed by linear regression using WC data as the independent variable and the other methods as dependent variable in order to find equations to convert one data set to another. For WC samples, chla ranged from 1.456 to 122.84 µg/L, while TP ranged from 0.118 to 6.239 µmol P/L. Both chla and TP from the comparisons methods showed a strong one-to-one linear relationship with the WC sample. Linear regression slopes for 0–2 m, 2 x SD, and OEPA chla against WC chla were 0.9913, 0.9636, and 1.0027, respectively, while slopes for TP were 0.9694, 1.0465, and 1.0081, respectively. The r^2 values for all regressions were greater than 0.98 for both chla and TP. This study indicates that the TP and chla data collected by different organizations are comparable.

Poster Board No. 072 NUTRIENT LIMITATION IN THE CENTRAL BASIN OF LAKE ERIE. Kathryn E. Stierwalt (stierwalt.5@osu.edu)[1,2], 1764 N. High St. Columbus, OH 43201. Douglas D. Kane (dkane@defiance.edu)[1,3], Justin D. Chaffin (chaffin.46@osu.edu)[1], [1]Franz Theodore Stone Laboratory, [2]The Ohio State University, and [3]Defiance College.

Sporadic summer blooms of the diazotrophic cyanobacterium *Dolichospermum* (formally *Anabaena*) occur in Lake Erie's central basin but the cyanobacterium lack heterocysts. High concentrations of nitrate make the presence of a diazotrophic cyanobacterium rather anomalous. Phosphorus (P) is generally considered the limiting nutrient for algae growth but low concentrations of iron (Fe) and molybdenum (Mo) can constrain nitrate uptake whereas boron (B) is required for heterocyst formation. Thus, low concentrations of trace metals may lead to nitrogen (N) limitation even in the presence of measurable nitrate. During summer 2014, we conducted nutrient enrichment bioassays to test the hypothesis that enrichment of P and trace metal would result in additional algal growth than P-only enrichment. We conducted (between June 24 and September 3) four bioassays with central basin water, enriched with the above nutrients and then used changes in chlorophyll *a* concentration (chla) as a surrogate for algal biomass changes. In all experiments P-alone enrichment resulted in higher chla than control (control means ranged between 1.59 to 2.19 µg/L, P-alone means ranged between 3.36 to 4.30 µg/L, $p < 0.001$), indicating P was the primary growth limiting nutrient, but P with B resulted in higher chla than P alone in 3 of 4 experiments ($p < 0.001$). Enrichments with P, N, Fe, Mo, and B resulted in the highest chla in 2 of 4 experiments, indicating multiple nutrient limitation ($p < 0.001$). These results suggest that trace metal limitation may play a role in the *Dolichospermum* blooms in the central basin.

Poster Board No. 073 DIFFERENTIATION BETWEEN INTERNAL AND EXTERNAL PHOSPHORUS LOADING IN WESTERN LAKE ERIE USING HIGH-RESOLUTION PHOSPHORUS DATA. Joseph V. Turner (joseph.turner@rockets.utoledo.edu)[1,2], Phoenix C. Golnick (phoenix.golnick@utoledo.edu)[2], Thomas B. Bridgeman, (Thomas.bridgeman@utoledo.edu)[2], [1]4400 Kessler Frederick Rd., West Milton, OH 45383, [2] Department of Environmental Sciences, University of Toledo, Toledo OH 43606.

Dissolved reactive phosphorus inputs from major tributaries to Lake Erie have increased six-fold since the mid-1990s causing dense *Microcystis spp*. blooms that produce harmful toxins. Tributaries also deliver phosphorus-rich sediments to the lake bottom. These deposited sediments may play an important role as an additional, internal source of phosphorus. When the lake is agitated by wind and waves, sediments become re-suspended and sediment-bound phosphorus is released into the water column. This newly available phosphorus has the potential to cause or exacerbate harmful algal blooms. The goal of this study is to determine if high resolution in situ phosphorus concentration measurements can be used along with weather data to distinguish between short-term increases lake phosphorus concentration due to lake sediment resuspension events or to tributary inputs (Maumee River). A high-resolution (2 hour interval) CycleP phosphate sensor was deployed at the City of Toledo's low-service pump station from June 13 to August 20, 2014. Wind speed and river flow data recorded by the National Oceanic and Atmospheric Administration and the United States Geological Survey during this period were used to determine whether internal or external loading conditions were likely. Results suggest that sustained wind speeds greater than 2 m/s agitated the lake sediments enough to cause a ten-fold spike in phosphorus concentration. No such spikes were observed with an increase in the flow of the Maumee River. Future research will include additional variables to further investigate the factors contributing to pulsed increases in phosphorus concentration that may contribute to harmful algal blooms.

Poster Board No. 074 ASSESSING WATER QUALITY IN NINE MILE CREEK. Meaghan B Wierzbic and Tracey Meilander, Department of Biological Sciences, Notre Dame College, 4545 College Road, South Euclid OH 44121.

Nine Mile Creek, is a restored step pool design wetland area that replaced a former channelized basin in South Euclid, OH. Built in 2008, it serves as a flood control basin draining 7.6 square miles. The purpose of this study was to assess the state of water quality in this bioengineered system that also serves as a habitat for plants, animals, and microbes. Water quality metrics (including ammonia, chloride, conductivity, dissolved oxygen, nitrate, and phosphate) were periodically monitored from March 2013 to October 2014 to gauge potential impacts of runoff into the system. Comparisons were made between water quality measures in upstream, midstream, and downstream sections. Water was tested for contamination with coliforms and *Escherichia coli* in Spring 2014 using a coliform test kit and microbiological media. Microbial photosynthesis and respiration rates were extrapolated from a five-day change in oxygen concentration. The microbial media tests confirmed the presence of coliforms, *Escherichia coli* as well as the potential presence of sulfur reducing bacteria, citrate utilizing bacteria, motile species, denitrifiers, and nitrate reducers within the water. The presence of *E. coli* could be due to leakage of untreated sewage or animal sources. The test results were similar across the stream gradient with most tests, including but, not limited to, phenol red lactose, glucose, and sucrose broths, urea agar, urease broth, lysine iron agar slant, phenylalanine, bile esculin agar. Differences in results across the stream gradient were observed with triple sugar iron agar slant, motility, citrate, nitrate broth, sulfide indole motility media, and mannitol salts agar tests. Monitoring of Nine Mile Creek will continue through fall 2014. Continued water quality and additional biotic factor monitoring will assist in determining the health status of the stream.

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Index to Fields of Interest of Abstracts


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The Ohio Journal of Science considers for publication solicited **Book Reviews** and **Research Reviews,** and unsolicited **Brief Notes** and **Research Reports.** Solicited submissions will be requested by the editor or member of the editorial board. Book reviews will be requested of experts in the subject matter of the book to be reviewed. Research Reviews will be requested to serve as extensive surveys of the literature of an area of science in which Academy members have an interest.

Unsolicited manuscripts that present quantitative or qualitative data including:

a. Brief notes of fewer than 2000 words and containing no more than one graphic; and
b. Research reports of approximately 7000 words and may contain more than one graphic.

AIM AND SCOPE. The aim of *The Ohio Journal of Science* (OJS) is to publish and disseminate peer-reviewed original contributions to education, science, engineering, and technology. Although research that is relevant in Ohio is especially encouraged, editors will consider all submittals that advance the mission of The Ohio Academy of Science to foster curiosity, discovery, and innovation to benefit society.

STYLE. The CSE Manual for Authors, Editors, and Publishers, 7th Ed. is used for editorial decisions with regard to style.
Manuscripts must adhere to the following format:

- One inch margins on 8.5 x 11 inch paper;
- Text should be left-justified using twelve point type;
- Double spaced throughout, including the title and abstract;
- Arabic numerals should be used in preference to words when the number designates anything that can be counted or measured (7 samples, 43 species) with 2 exceptions:
- To begin a sentence (Twenty-one species were found in...)
- When 2 numeric expressions are adjacent in a sentence. The number easiest to express in words should be spelled out and the other left in numeric form (The sections were divided into eight 4-acre plots.).
- Measurements and physical symbols or units shall follow the International System of Units (SI Le Système international d'unités) with metric units stated first, optionally followed by United States units in parentheses. E.g.: xx grams (xx ounces); and
- Avoid personal pronouns

TITLE, AUTHOR(S), AFFILIATION(S). The first page of the manuscript should contain the title, author(s) name(s), the affiliation of the author(s) at the time the research was carried out, a shortened title (running head), and the abstract. The title must be typed in upper and lower case letters as it will appear when typeset. Name(s) of the author(s) should be typed in capital letters below the title. The address (department, institution, city, state, postal code, country if not USA) should appear below the name of the author(s). If more than one institution is to be credited, they should appear in the order of the authors' affiliation. A running head of not more than 38 letters and spaces should be typed in capital letters between the address and the abstract.

FORMAT.
Abstract. In 250 or fewer words summarize any new methods or procedures critical to the results of the study and state the results and conclusions.
Introduction. Describe the knowledge and literature that gave rise to the question examined by, or the hypothesis posed for the research.

Materials and methods. This section should describe the research design, the methods and materials used in the research (subjects, their selection, equipment, laboratory or field procedures), and how the findings were analyzed.

Results. The text of the results should be a descriptive narrative of the main findings, of the reported study. This section should not list tabulated data in text form. Reference to tables and figures included in this section should be made parenthetically in the text.

Discussion. In this section compare and contrast the data collected in the study with that previously reported in the literature. Unless there are specific reasons to combine the two, as explained by the author in the letter of transmittal, Results and Discussion should be two separate sections.

Acknowledgments. Colleagues and/or sources of financial support to whom thanks are due for assistance rendered in completion of the research or preparation of the manuscript should be recognized in this section rather than in the body of the text.

LITERATURE CITED
References to scientific literature should be arranged by the order that is cited in the manuscript. From The CSE Manual for Authors, Editors, and Publishers (8th Edition):

Research Articles:
Format: Author(s). Year. Article title. Abbreviated journal title. Volume(issue):pages.
In-text reference: Traumatic life events and posttraumatic stress disorder (PTSD) are endemic among American civilians (Kessler et al 1995). Each year…

End reference: (no number) Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. 1995. Posttraumatic stress disorder in the National Comorbidity Survey. Arch Gen Psychiatry. 52(12):1048–1060.

Books:
Format: Author(s). Year. Title. Place of publication: publisher name. Number of pages.
End references: Voet D, Voet JG. 1990. Biochemistry. New York: J Wiley. 1223 p.

Multiple author citation: If a citation has upto 10 authors, list all of the authors. If the citation has more than 10 authors, list the first 10 and followed by "and others".

TABLES and FIGURES. Please submit all Tables and Figures as separate files.
Tables. Tables must be typed double spaced, one table to a page, numbered consecutively, and placed in the manuscript at the appropriate place. Since tables must be individually typeset, consolidation of data into the smallest number of tables is encouraged. A horizontal double underline should be made beneath the title of the table, and single underlines should be made the width of the table below the column headings and at the bottom of the table. Do not use vertical lines, and do not place horizontal lines in the interior of the table. Use footnotes, to clarify possible questions within the table, should be noted by asterisks, daggers, or other symbols to avoid confusion with numerical data. Tables should be referred to parenthetically in the text, for example (Table 1).
Figures and Illustrations. Figures may be photographs, computer -generated drawings, or graphs and should be placed in the manuscript at the appropriate place.. All illustrations are referred to as "Figures" and must be numbered consecutively. Illustrations other than those generated by the author(s) must include permission for use and credit to the originator. The size and proportion of each illustration should be suitable for reduction to a single column. Excessive white space should be avoided. Illustrations will be reduced to one column width (3 and 3/8 inches) or two column width (7 inches) at the discretion of the editor. Font size must ensure readability after reduction. Incorporate a graphic scale on maps and other illustrations where original size is a concern. Each figure must have a complete legend that is typed, double-spaced, on a separate sheet which precedes the figures in the manuscript. Figures should be referred to parenthetically in the text, for example (Fig. 1).

FOOTNOTES.
Text footnotes should not be used with the following exceptions:

- Added to the title to state the dates of manuscript submission and revision.
- A footnote to name(s) of author(s) may be used to indicate present address different from that at which the research was done, or to indicate the author to whom inquiries should be directed.
- Footnotes to tables are permissible, and are encouraged to promote clarity.

Attention to the above instructions will minimize the need for revision and editorial correction, and will shorten the time from submission to publication. Any questions which are not answered by these instructions, or by consulting the *CBE Manual for Authors, Editors, and Publishers*, 8th Edition, should be addressed to the editors.

IMPORTANT:
After consulting the manuscript preparation guidelines at http://www. ohiosci. org/ojsinstr.htm, please submit all materials to:

Electronic submission only:
http:library.osu.edu/ojs/index.php/ojs

For technical questions about electronic formats or other details for submission, contact:
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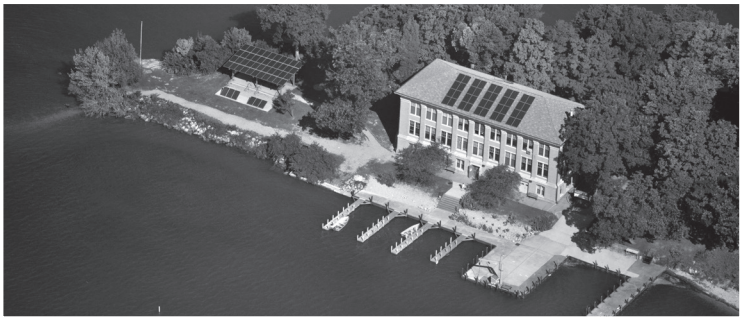

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