

The Ohio Academy of Science
118th Annual Meeting
 Hosted by
 Wittenberg University
 Springfield, OH
 April 17-18, 2009

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!

Wittenberg University welcomes you to the 118th 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. On-site registration will be available at a higher rate. The Ohio Academy of Science must receive forms by **April 10, 2009**. Please use Registration Form on the last page. Mail completed form and fee to:

OAS Annual Meeting Registration
 The Ohio Academy of Science
 PO Box 12519
 Columbus OH 43212-0519
 FAX 614/488-7629 (for Credit Card or PO only)

Registration by credit card or purchase order only will be accepted by FAX at 614/488-7629. Your registration materials, receipt, and name tag will be ready at the meeting registration desk upon your arrival. For further information, please call 614/488-2228.

An Adobe PDF form is available at:

<http://www.ohiosci.org/WittRegistrationForm.pdf>

Online payment option http://ohiosci.org/index_store.html

Friday, April 17: Registration will not be open on Friday.

Saturday, April 18: Registration in the atrium of the Barbara Deer Kuss Science Center from 7:30-11:00 AM. On-site registration is possible by check, VISA, or MasterCard. Cash is discouraged.

PARKING: Watch for signs. See map in program.

For the Friday afternoon field trips, you may park in a small faculty/staff parking lot at the corner of Bill Edwards Drive and North Plum Street, across the street from the Barbara Deer Kuss Science Center. There also should be some parking available along North Plum Street, Bill Edwards Drive, and North Lowry Avenue. You also may park in the lot behind Recitation Hall and then walk to the science building. Recitation Hall and the annex attached to it are listed as buildings 19 and 20. The parking lot is behind it.

For Saturday, park in any of the various Wittenberg lots shown on the map, including the Recitation Hall and the Bill Edwards/North Plum Street lots. There will be six vans working their way through all the larger parking lots every few minutes in order to pick up anyone needing a ride to the building. Watch for a sign in the windshield or passenger side window of the vans.

SMOKING POLICY: Smoking is not permitted in any building.

HOUSING: Please contact hotels and motels directly. See list on page 4.

MEALS: Friday, April 17; none planned. Saturday, April 18; lunch available at nearby restaurants.

GENERAL SCHEDULE

Friday, April 17, 2009

Field Trip: Southwest Ohio's Canyonland

Departs: Friday, April 17 at 1:00 PM (meet in the atrium of the Barbara Deer Kuss Science Center, first floor)

Returns: Friday, April 17 at 5:00 PM

Organizer: Charlie Kwit, Assistant Professor of Biology, Wittenberg University

HUNDREDS OF ACRES OF PROTECTED LAND encompass the Little Miami River's gorge and its surrounding habitats. Prepare to hike through portions of Clifton Gorge State Nature Preserve, John Bryan State Park, and/or Glen Helen Nature Preserve, and enjoy observing and learning about the area's natural history. The dolomite and limestone gorges in this area provide breathtaking scenery, and the habitats in their midst contain a diverse assemblage of species of all kinds, including many that are typical of more northerly parts of the state. There will be something for everyone on this trip: from spring ephemerals to flowering trees and shrubs, to migratory birds, to beautiful scenery, and much, much more. This trip will occur rain or shine and will occasionally involve hiking upslope and downslope on trails. Conditions at times become slippery, so prepare accordingly. Participants should bring binoculars, field guides, proper footwear and insect repellent, and water and a snack.

Field Trip: Cedar Bog State Memorial

Departs: Friday, April 17 at 1:00 PM (meet in the atrium of the Barbara Deer Kuss Science Center, first floor)

Returns: Friday, April 17 at 5:00 PM

Organizer: Timothy L. Lewis, Professor of Biology, Wittenberg University

CEDAR BOG IS ONE OF OHIO'S FEN WETLANDS, sometimes called a swamp/fen habitat or a boreal fen remnant. Home to several dozen plants native to more northern climates, it also has several rare animals including massasauga rattle snake and spotted turtles. We will spend the afternoon hiking the boardwalk and trails at Cedar Bog looking at spring wildflowers, trees, and hopefully a few turtles. This trip will occur rain or shine and has mostly level ground and wooden boardwalks. Participants should dress for the weather and are expected to bring their own water and/or snacks..

Field Trip: Passive Stream Restoration Using Recent Stream Channel and Pattern Changes

Departs: Friday, April 17 at 1:00 PM (meet in the atrium of the Barbara Deer Kuss Science Center, first floor)

Returns: Friday, April 17 at 5:00 PM

Organizers: John Ritter and Mike Zaleha, Department of Geology, Wittenberg University

RECENT CHANGES IN STREAM CHANNEL and pattern morphology, hydrology, and channel and floodplain stratigraphy of nine streams (2nd-3rd order basins) in Clark County were evaluated as part of a data-gathering phase for a stream resource protection plan. Currently most streams are moderately to slightly entrenched, likely the result of channel straightening but also due to reduced sediment yield resulting from improved soil conservation practices or urbanization. On this field trip, we will visit several of the study reaches to illustrate the recent changes in channel and pattern morphology and hydrology. Discussion at field stops will focus on passive stream restoration as well as methods of study. This trip will occur rain or shine and will include walking along or in streams. Participants should bring hip or chest waders if they have them (we will have an ample supply for those who do not) and personal field gear.

3:00 PM-5:00 PM The Ohio Academy of Science
Board of Trustees Meeting
Room T.B.A.

Saturday, April 18, 2009

7:30 AM-11:00 AM General Meeting Registration
Lobby of Barbara Deer Kuss Science
Center

9:00 AM-11:00 AM Morning Podium Sessions
Barbara Deer Kuss Science Center

9:00 AM-11:00 AM Morning Poster Session
Barbara Deer Kuss Science Center

11:30 AM All-Academy Lecture
Auditorium, Barbara Deer Kuss Science
Center

CRAIG M. YOUNG, PhD
Professor
The University of Oregon

*The Invertebrate Zoology of Darwin:
Zoophytes, Barnacles, Corals and Worms.*

CRAIG M. YOUNG IS A PROFESSOR OF BIOLOGY at the University of Oregon and the director of the Oregon Institute of Marine Biology. He completed B.S. and M.S. degrees at Brigham Young University and received his Ph.D. in zoology from the University of Alberta (Canada) in 1982. Much of his college work was completed at marine laboratories, particularly Stanford's Hopkins Marine Station in California and Friday Harbor Laboratories, Washington. Although most of his early work involved scuba diving on underwater rocky reefs in cold water, Dr. Young made his first submersible dives in a Canadian

fjord as a student in 1979. He has now visited the sea floor in 8 different submersibles on more than 70 scientific cruises. He spends much of his time working at laboratories and universities in Europe and holds academic appointments at two universities in England. Dr. Young has published more than 140 scientific papers and has edited many books, including the *Atlas of Marine Invertebrate Larvae*. He also serves as one of the editors of a book series called *Advances in Marine Biology*. Dr. Young and his students have studied many aspects of invertebrate biology using animals from most of the invertebrate phyla, but his lab specializes in the reproduction and larval biology of deep-sea animals, particularly sea squirts, echinoderms and various kinds of worms.

12:30 PM Lunch on your own
Available at nearby restaurants.

12:30 PM Official Notice of Annual
Business Meeting
for Academy Members Only.
Auditorium, Barbara Deer Kuss Science
Center

1:30-3:00 PM Afternoon Poster Sessions
Barbara Deer Kuss Science
Center

About Our Host

DR. HORTON H. HOBBS, III
Chairperson, Local Arrangements

WITTENBERG UNIVERSITY IN THE HEART OF Springfield, Ohio, provides a liberal arts education dedicated to intellectual inquiry and wholeness of person within a diverse residential community. Reflecting its Lutheran heritage, Wittenberg challenges students to become responsible global citizens, to discover their callings, and to lead personal, professional, and civic lives of creativity, service, compassion, and integrity.

Since its founding in 1845, Wittenberg's curriculum has centered on the liberal arts as an education that develops the individual's capacity to think, read, and communicate with precision, understanding, and imagination. We are dedicated to education in the core disciplines of the arts and sciences and in pre-professional education grounded in the liberal arts.

Wittenberg has more than 60 majors, minors and special programs from which students may choose to focus their studies. Among these majors are outstanding interdisciplinary programs, including East Asian Studies and Russian Area Studies.

The faculty consists of 195 outstanding classroom instructors, true mentors who consider students their top priority. With an average class size of 20 students and a student-faculty ratio of 12 to 1, Wittenberg faculty and students have numerous opportunities for meaningful interaction both in and out of the classroom.

What strikes most people when they visit Wittenberg is how genuinely friendly and welcoming people are. There are 1,950 full-time students currently enrolled, representing more than 37 states and approximately 23 foreign countries. 44 percent of students are male; 56 percent are female.

RESTAURANTS

Applebee's Neighborhood Bar & Grill

1800 W First St—322-6700

Arby's Restaurant

1700 N Bechtle Ave—324-3312

Bob Evans Farm Restaurant

1600 W First St—323-9151

Bradfield's - Upper Valley Mall

1475 Upper Valley Pk—324-3775

Buffalo Wild Wings/BW3

42 N Fountain Ave—323-2999

Burger King

407 W McCreight—322-8887

Chipotle Mexican Grille

1930 N Bechtle Ave—3900287

CiCi's Pizza

1985 N Bechtle Ave—399-4004

Collier's Family Restaurant

2800 W First St—323-5000

El Toro

2017 N Bechtle Ave—342-9015

Fricker's

1616 Upper Valley Pk—325-2200

Frisch's Big Boy

1831 N Bechtle Ave—399-2937

Golden Bowl

1781 N Bechtle Ave—399-5888

Golden Corral

1740 N Bechtle Ave—525-2240

Honeybaked Ham Co & Café

2001 N Bechtle Ave—399-2777

Lone Star Steakhouse

1661 W First St—324-8580

Long John Silver's/A&W

717 N Limestone St—324-1811

Mark Pi Express - Upper Valley Mall

1475 Upper Valley Pike—325-1892

McDonald's Restaurant1160 Upper Valley Pk—322-3752
2100 Bechtle Ave - Walmart—323-4072**Me'la Urban Bistro**Courtyard by Marriot
100 S Fountain Ave—322-3600**Mike & Rosy's Deli**

330 W McCreight Ave—390-3511

New York Pizza - Upper Valley Mall

1475 Upper Valley Pk—322-4880

O'Charley's

1830 N Bechtle Ave—342-1248

Olive Garden

1630 N Bechtle Ave—323-4566

Our Hero Subs

1020 N Plum St—322-9180

Panera Bread

1950 N Bechtle Ave—390-1600

Red Lobster

1898 W First St—323-8051

Ridgewood Café

1647 N Plum St—390-1119

Simply Delicious

1105 N Plum St—324-3600

Station One

325 N Fountain Ave—324-3354

Steak N Shake

1741 N Bechtle Ave—325-1944

Subway

1374 W First St—322-6623

TGI Friday

1720 N Bechtle Ave—322-8121

Texas Roadhouse

1750 N Bechtle Ave—322-6500

Tumbleweed Southwest Grill

1865 W First St—325-8979

Wendy's

2214 N Limestone St—390-2230

TAVERN

Groeber's Lounge

1451 W First St—325-1980

HOTELS

Courtyard by Marriot100 South Fountain Ave—937-322-3600
<http://www.marriott.com/courtyard/travel.mi>**Country Inn & Suites**1751 W 1st Street—937-322-2200
<http://www.countryinns.com/>**Fairfield Inn by Marriot**1870 W First St—866-270-2847
<http://www.marriott.com/fairfield-inn/>

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Aquatic Biology, Biology, Ecology & Insects

Kuss Science Center - 3rd Floor

9:00-11:00 am

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Kuss Science Center - 2nd Floor

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Pre-College Students

Kuss Science Center - 3rd Floor

1:30-3:00 pm

Aquatic Biology

KussScience Center Room 212

Dr. Susan Carty, Presider

09:00

NEW RECORDS FOR FRESHWATER DINOFLAGELLATES IN NEW ENGLAND, NEW BRUNSWICK, AND NOVA SCOTIA. Susan Carty, scarty@heidelberg.edu, Dept of Biology, Heidelberg University, Tiffin, OH 44883.

There are relatively few reports of algae from New England states that include dinoflagellates; no dinoflagellates have been reported from Vermont. The goal of this research was to sample standing water locations for freshwater dinoflagellates in Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine, and nearby New Brunswick and Nova Scotia in July and August 2008. Ninety locations, including lakes, ditches, small ponds, and rivers were sampled using a 10 μ m plankton net, squeezings of vegetation, or collection of whole water. Most locations were brown water lakes with a pH of 5-6. Sixteen species new to specific states were recorded including *Ceratium hirundinella* (CT, ME, VT), *C. rhombooides* (CT, NB), *Peridinium williei* (VT), *P. gatunense* (CT, RI, ME, VT), *P. wisconsinense* (CT, VT, ME, NB), *P. volzii* (ME, NB, RI, VT), *P. umbonatum* (VT), *P. inconspicuum* (CT, MA, ME, NB, NS, RI, VT), *Peridiniopsis polonicum* (MA, ME, NB, VT), *Peridiniopsis quadridentis* (NB, VT), *Entzia acuta* (MA), *Glochidinium penardiforme* (NB), *Thompsodinium intermedium* (ME), *Gymnodinium fuscum* (CT, ME, NB, NS, RI, VT), and *Gymnodinium aeruginosum* (MA, ME, NB, NH, NS, RI). Most of these are common, recognizable species.

09:15

SELENASTRUM AS A BIOINDICATOR OF TOXICITY OF ASPHALT SEALANT. Katherine A. Wood, kwwood@heidelberg.edu, 110 Sunny Ln, Tiffin, OH 44883 (Dr. Susan Carty scarty@heidelberg.edu).

Sealant applied to asphalt parking lots every two to three years to seal cracks and extend the life of the asphalt is a large source of Polycyclic Aromatic Hydrocarbons (PAH's) in parking lot runoff. PAH's are a pollutant that is formed by the thermal decomposition of organic molecules and they have a short biological half-life but can have long term effects on an aquatic ecosystem. There are various methods of bioindication including using bioindicators, ecotoxicology, and biomonitors. All of these methods are used to help judge the human health impacts of a pollutant. Algae are often used in bioindication because they are key species in aquatic food webs, have rapid reproduction, and the remains are resistant to decay. *Selenastrum* is a standard genus used to assess acute and chronic toxicities. The goal of this experiment is to determine the toxicity of asphalt sealant using a bioindicator, *Selenastrum*. The hypothesis is that water run over sealed asphalt will show toxicity to an algal indicator organism compared to water run over unsealed asphalt. Water will be run over 15 cm diameter sealed and unsealed asphalt cores. The water will be collected and added to the *Selenastrum* cultures so that the media is 9, 20, 33 and 43 percent runoff. Cells will be counted using the \dot{U} termohl method at time zero, 16, 24, 72, and 168 hours to assess possible toxic effect and possible recovery of the organism.

09:30

POST HURRICANE CHARACTERIZATION AND DISTRIBUTION OF SCLERACTINIAN CORALS ON REEF CASA DEL MAR, COZUMEL, MEXICO. Stephanie E. Petitjean, spetitjean@cas.org, RoxAnn Williams, rwilliam@capital.edu, (Philip C. Whitford), Capital University, Dept of Biological Sciences, 1 College and Main, Columbus, OH 43209.

Scleractinian corals are the main components of near shore fringing reefs. Hurricane Wilma, which struck the area in October 2005, destroyed approximately 90% of Paraiso Reef leaving only rubble where massive coral heads as high as 4 meters once stood. Pre-hurricane data on coral distribution had been collected on Paraiso Reef. Reef Casa Del Mar is 1 km north of Paraiso Reef with its crest, fore, and hind reefs at similar depths and comparable in conformation. Pre-hurricane species composition, distribution and age structure of the two sites should have been nearly identical based on these criteria. Both Reefs were likely to have been damaged to the same extent and lost the same species in response to Hurricane Wilma. Data on the distribution and abundance of scleractinian corals and common algae species were collected utilizing three 100 meter transects along Casa Del Mar's near shore fringe reef representing fore reef, crest and hind reef. The

hypothesis is that changes in pre vs post hurricane coral and common algae species composition and distribution are directly attributable to the storm damage and will be representative of changes one can expect for reef of similar depths subjected to direct storm swells of a category 5. The scleractinian corals *Montastraea annularis*, *Montastraea cavernosa*, *Porites astreoides*, *Porites porties*, *Siderasterea siderea*, and *Agaricia agaricia* were the most abundant scleractinian species by cm/30m transect in pre-hurricane Paraiso Reef studies on the near shore fringe reef. Post-hurricane relative abundance (most prominent species) in descending order is expected to be *Montastraea annularis*, *Porites astreoides*, *Montastraea cavernosa*, *Siderasterea siderea*, and *Eusmilia fastigiata*. The total sample size of all scleractinian corals are expected to be $n=100$ or greater. Data including age, characterization, and distribution are also being collected on *Spirobranchus giganteus*, with an expected sample size of $n=100$, to compare with coral host preference prior to the hurricane. A Chi-square goodness of fit test, Chi-square test of independence, and a one-way ANOVA for independent samples will be used to determine current hard coral species relative abundance for the area for comparison with past reference studies (pre-hurricane.)

09:45

DIEL VARIATION IN DISSOLVED OXYGEN IN THE SANDUSKY SUBBASIN OF LAKE ERIE. Jamie L. Viterna^{1,2}, viterna.2@osu.edu, Douglas D. Kane^{2,3}, dkane@defiance.edu, Joseph D. Conroy⁴, conroy.27@osu.edu, 19670 Maurer Dr, Olmsted Falls OH 44138. ²F.T. Stone Laboratory, Put-In-Bay OH 43456. ³Natural Science and Mathematics Division, Defiance College, Defiance OH 43512. ⁴Aquatic Ecology Laboratory, Dept of Evolution, Ecology, and Organismal Biology, The Ohio State University, Columbus, OH 43212.

Large areas of hypolimnetic hypoxia (dissolved oxygen (DO) concentrations < 1.0 mg L⁻¹) in the central basin (up to 10,000 km²) and Sandusky subbasin (up to 450 km²) of Lake Erie continue to occur in spite of lake-wide management plans. Past research investigated the patterns of seasonal DO depletion and the factors responsible for these patterns. The present goal was to determine diel DO dynamics in the Sandusky subbasin; it was hypothesized that DO concentrations would peak in the afternoon due to maximal photosynthetic activity. Using a calibrated electronic multiparameter instrument (YSI, Inc., Yellow Springs, Ohio), water column DO concentrations and temperatures (T) were measured at 0.5-m intervals at six sites in the subbasin on 25 June and 9 July 2008. After graphically distinguishing the epilimnion, metalimnion, and hypolimnion, Mean water column, epilimnion, and hypolimnion DO concentrations between morning, afternoon, and night were statistically compared. From the results of the paired t-tests, the highest average water column DO concentrations was found to occur in the afternoon (mean \pm standard deviation = 8.06 \pm 0.41 mg L⁻¹), with lower concentrations in the morning (7.64 \pm 0.42 mg L⁻¹) and at night (7.62 \pm 0.26 mg L⁻¹). Additionally, in July, intrusion of central basin hypolimnetic water into the subbasin was observed as evidenced by decreased afternoon T (mean = 0.21°C less) and DO concentrations (mean = 0.23 mg L⁻¹ less). Overall, however, data support the hypothesis that DO concentrations peak in the afternoon, consistent with research from other shallow lakes.

Education & Health

KussScience Center Room 211

Presider, Dr. Daniel Repperger

09:00

BEYOND THE WRITTEN PAGE, A LIBRARY'S APPROACH TO MINERAL EDUCATION. Kenton E. Strickland, stricklans@gmail.com, 53 Southmoor Shores, St Marys, OH 45885.

Going beyond the written page, the Mercer County Library Board accepted a world-class mineral collection. Over eight hundred specimens are on display, and a new addition is planned. In the commitment of being one of the only teaching libraries in the area, the Board resolved to combine the collection with a discovery-based program for pre-school through high school learners using Ohio science education standards. The program is modified for adult learners. Learners are supplied with a prospecting pan filled with sand and the specimens. Through guided discovery, learners observe and describe the specimens. For older learners, atomic structure is related to the crystal patterns and properties. Use and conservation of industrial minerals are discussed. Hand lenses for investigation of small crystals and magnets for identifying

magnetite are supplied. The value of geological literature bound in the library is emphasized. At the program's conclusion learns are given a worksheet to assist review the collection. The library program and collection represents an extension of the learning environment and are a benefit to Ohio science in a small town/rural setting.

09:15

STUDIES ON HAZARD FUNCTIONS AND HUMAN PERFORMANCE.

D. W. Repperger¹, Daniel.repperger@wpafb.af.mil, P. R. Havig¹, G. A. Reis¹, J. P. McIntire¹, K. A. Farris¹, J. Townsend², A. Eidels², J. Hout²,¹Air Force Research Laboratory, 711 HPW RHCV, Wright-Patterson AFB, Ohio 45433, ²Indiana University, Bloomington, Indiana 47405.

A powerful tool to assess human performance in visual search tasks involving complex displays is to incorporate hazard functions as a means of quantifying performance in terms of efficiency or capacity. Another advantage of this analysis procedure is to help discover the underlying architecture of the processing of information. Usually more parallel processing of multiple sensory channels has benefits of reduced search time in such tasks. A description of the theoretical basis of hazard functions as they apply to visual search tasks is outlined. A particular case where the human-machine performance is optimized occurs when certain types of displays generate the situation of super capacity which means the capacity coefficient is greater than 1.0. A special signature (survivor interaction contrast function or SIC) of these super capacity displays is decomposed into individual factor's probability density functions in an effort to discern properties of key factors that may be combined in a manner to improve the efficiency in a visual search task. Using Weibull densities to discern linear combinations of the probability densities for signatures of the super capacity displays provides some insight into how the individual factors in complex displays need to be combined to optimize human performance in visual search tasks.

09:30

MITOCHONDRIAL NADH → NAD TRANSHYDROGENATION IN THE ADULT PARASITE *ASCARIS SUUM* (NEMATODA).

Andrew Holowiecki, aholowi@bgsu.edu, Dept of Biological Sciences, Bowling Green State University, Bowling Green OH 43403. Carmen F. Fioravanti, cfiorav@bgsu.edu.

Ascaris suum generates mitochondrial ATP anaerobically by the NADH-requiring, inner membrane-associated (IM), electron transport-coupled fumarate reductase. The NAD-dependent "malic" enzyme, an enzyme reported to be predominantly localized in the intermembrane space, forms intramitochondrial NADH. Thus, a mechanism would be required for hydride transfer from NADH across the IM to NAD producing matrix NADH for electron transport. An IM-associated NADH→NAD transhydrogenation system (NN) has been implicated in this. Our data indicate that *A. suum* lipoamide dehydrogenase (LD) may be largely responsible for the IM-associated NN. In *Hymenolepis diminuta* (Cestoda) mitochondria, NN activity is associated with LD and NADH dehydrogenase (ND) systems. Evaluations of an association of the *A. suum* NN with other NAD(H) utilizing systems were undertaken. Isolated and sonically disrupted *A. suum* muscle mitochondria were assessed spectrophotometrically for NN, ND, LD, and NADH cytochrome c reductase (NC) activities related to pH effects and thermal labilities. Best activities (μmol/min/mg protein) were: NN, 1.3 (pH 5.5); ND, 4.7 (pH 4.5); LD, 0.96 (pH 6.0); NC, 0.08 (pH 8.0). Whether assessed at pH 5.5 or 7.5, the thermal profile for NN simulated that of LD at pH 6.0, losing 40% and 100% activity at 85 and 95° C, respectively. The ND thermal profile, assessed at acidic pH, was similar to LD at pH 6.0 while at pH 7.5, ND decayed precipitously at 45° C. This also occurred with NC assessed at pH 8.0. Together, these data suggest that the *A. suum* LD catalyzes multiple activities at acidic pH.

09:45

A NONLINEAR DYNAMIC MODEL OF THE NEURAL BASIS OF YELLOWNESS.

Vincent A. Billock, vince.billock@gd-ais.com, General Dynamics, Inc., Suite 200, 5200 Springfield Pike, Dayton, OH 45431.

Human color vision is mediated by three cone types (L, M and S) whose signals are ultimately transformed into two hue-opponent channels: redness-greenness and yellowness-blueness. The psychophysically measured redness, greenness and blueness responses are smooth functions of wavelength and such responses can usually be modeled as linear transforms of the cone responses. Yellowness is mysterious: it is not a smooth function of wavelength;

it is often asymmetrically double-peaked; and it appears to be a highly nonlinear combination of the L and M cone responses. Because no visual neurons with these properties have been observed, it is hypothesized that yellowness could be modeled as an emergent property of nonlinear dynamic neural interactions. Billock posited that cortical color mechanisms should be modeled using pooled and rectified LGN cell outputs, designated LC*, MC*

and SC*; e.g., $LC^*(\lambda) = \text{RECT}[aL(\lambda) - bM(\lambda)]$. Billock used coupled neural oscillator theory to predict that neural responses can fuse into a product of power laws. The present study combined these two approaches from Billock to model yellowness in 14 observers culled from the literature. For each subject, proportions of L and M cones were estimated from other data, reducing the fitting parameters to just two. The yellowness function for each subject

was well fit by the model $Y(\lambda) = LC^*(\lambda)^c MC^*(\lambda)^d$. This fit implies that yellowness could be cortically constructed by synchronizing two nonlinear neural oscillators (one driven by LC* and one by MC*) whose asymmetric coupling is given by *d* and *c*. This has implications for electrophysiological studies of color processing in cortex – the neural correlates of some basic color percepts may be found in the responses of entire networks, rather than single cell types.

10:00

USE OF A HOME DIARY TO ASSESS CHILDREN'S PAIN AFTER TONSILLECTOMY.

Adrienne P. Jeffries, Adrienne.jeffries@cchmc.org, Myra M. Huth, PhD, RN, myra.huth@cchmc.org, Nancy Daraiseh, PhD, nancy.daraiseh@cchmc.org, Mail Location Center 11016, 3333 Burnet Avenue, Cincinnati, OH 45229-3039.

Diaries are a means of collecting pain data in the home. Most tonsillectomies are outpatient surgeries after which children report moderate to severe pain. Because untreated pain can become chronic, it is vital to have a means of obtaining pain-rating data in patients' homes. Thus, the following research questions are addressed: 1) Is a home diary feasible to assess pain, medication side effects, sedation, sleep, food intake, and medication use during the first four days after a tonsillectomy with or without an adenoidectomy? 2) Can parents understand and complete a home diary? 3) Is it feasible to recruit and retain participants for such a research study? An investigator-developed home diary and follow-up interview were used in this research. The study recruited parents of 40 children, aged 5 to 17 years, scheduled for a tonsillectomy with or without an adenoidectomy. Descriptive statistics and a paired t-test were used. Forty children [mean age = 9.9 (SD = 3.2)] and their parents have been enrolled in the first 20 weeks: 27 female children (67.5%) and 13 male children (32.5%). Of these children, 22 are white (55%), 12 are African-American (30%), 1 is Asian (2.5%), 3 are "other" (7.5%), and 2 preferred not to disclose (5%). To date, 26 diaries have been returned. Significant differences were found between mean pre-medication pain scores (60.1, SD 26.0) and post-medication pain scores (37.2, SD 26.5) (CI =15.8, 30.0) on a self-report pain scale of 0-100. Parents (71.8%) reported that their children ate "less than normal." On a difficulty scale of 0 (very easy) to 10 (very difficult), the average rating by parents to complete the diary was 1.34, and to understand the diary was 0.94. Conclusions are pending.

10:15

EPIDEMIOLOGICAL USE OF EXPORT DATA FROM A STATEWIDE DISEASE REPORTING SYSTEM.

Donald E. Brannen, dbrannen@gcchd.org, Amy Schmitt, Mark A. McDonnell, Greene County Combined Health District, Xenia, OH 45385.

It has been traditionally assumed that export data will be used for surveillance. The Ohio Disease Reporting System (ODRS) is a state government stand alone web based component of the National Electronic Disease Surveillance System (NEDSS). Surveillance systems and disease reporting systems are developed for different purposes. A review of Ohio's web based infectious disease information system and to determine the utilization of export data may help in guiding future improvements in public health informatics. Local Ohio public health agency epidemiologists (N=72) throughout Ohio were asked to complete an online survey on their use of the ODRS export utility on August 4, 2006 with half responding. Two-thirds of local public health epidemiologists exported data from the state government's web based disease reporting system, with less than half exporting monthly, and over 60% using advanced statistical software. Other disease surveillance systems and census data was used to augment reports but school, environmental, and provider data were also used. Reports are typically published in paper, email and sometimes web based format with a target audience primarily comprised of local public health, health providers, and other stakeholders. ODRS

export functionality is utilized by local public health epidemiologists (in order of descending importance) to improve surveillance, improve disease outbreak management, and to build stakeholder buy in. Export functionality of this communicable disease reporting system was utilized by a majority of local Ohio public health epidemiologists for internal reporting with attempts to compile the data in an integrated report with the purpose of improving surveillance, outbreak management and build stakeholder support.

10:30

FACTORS RELATED TO THE SUCCESSFUL IN-SERVICING OF INQUIRY SCIENCE TEACHING MODULES BY THE TEACHER LEADER COHORT OF THE 2004 MATH AND SCIENCE PARTNERSHIP (MSP) TEACHER LEADERSHIP ACADEMY OF SOUTHWESTERN PENNSYLVANIA. Kenneth A. LaSota, lasota@rmu.edu, Stephanie Marie Arnold, smarst13@rmu.edu, Robert Morris University, Dept of Natural Sciences, 6001 University Blvd, Moon Township, PA 15108-1189.

The Math and Science Partnership (MSP) of Southwestern, Pennsylvania is a NSF funded consortium of the Allegheny Intermediate Unit; Carlow, Chatham, Pittsburgh-Greensburg, Robert Morris, and St Vincent Universities; and 39 area school districts. In 2004, districts sent high and middle school science teachers to a five day summer Teacher Leadership Academy for facilitation in 13 modules of inquiry science instruction. Inquiry science instruction engages participants in interactive learning to master the investigative techniques scientists utilize to advance their disciplines. Teacher Leaders subsequently were to in-serve the modules for 33 hours at their host district during the 2004-2005 academic year. Analysis from this study found: Only three schools completed all 13 modules and eight schools completed four or less, with an average of 7.4 modules in-serviced per district. The most in-serviced module was the Beluga Whale Module (36 districts). The Concept Coherence, Adapting Instructional Materials, and the Tuning Protocol/Adapting Lessons modules were the least in-serviced, by only eight districts. Demographics of each district showed no relationship between income level and the number of modules it in-serviced, as determined from family income and participation in reduced lunch programs, nor between the district's student population and the number of modules it in-serviced.

Environmental Science

Kuss Science Center Room 260

Presider TBA

09:00

DETERMINISTIC INTERPOLATION METHODS IN MAPPING CONTAMINATED SEDIMENT CONCENTRATIONS: A COMPARATIVE STUDY. Ramanitharan Kandiah, rkandiah@centralstate.edu, Central State University, International Center for Water Resources Management, Wilberforce, OH 45384.

Characterization and remediation of a contaminated sediment site depend on the sampling strategies and the consequent contamination modeling. Modeling of the spatial distribution of heavy metals and polychlorinated biphenyls (PCBs) in aquatic sediments can be done either by statistical techniques or by deterministic techniques. This paper presents a comparative study of four deterministic interpolation methods; Inverse Distance Weighting (IDW), Radial Basis Functions (RBF), Global Polynomial (GP), and Local Polynomial (LP). Three objectives were identified; generalizing if and how the type and the shape of the water bodies and the contaminant type influence the mappings, comparing the capabilities of different models to predict the extreme concentrations, looking into the effectiveness of the set of segment models in the place of a single model. Bottom sediment metal concentration data from three sites (Seal Beach, CA, 43 locations; Lake Geneva, Switzerland, 200 locations; Duwamish River, WA, 300 locations) and sediment PCB concentration data in the fourth site (Hudson River, NY, 242 locations) were used in the study. The models were evaluated based on validation and cross validation RMS errors in prediction. The predicting ability of IDW, LP and RBF models varied with the properties of specific data sets. For low density data, LP model provided better mapping than what RBF models did (For Duwamish-Chromium data, RMSE for LP is 6.3 ppm and RMSE for RBF is 6.6 ppm). IDW models performed poorer to data with spatially isolated extreme concentrations than LP models (For Seal Beach-Lead Data, the most extreme concentration, 14500 ppm was predicted as 11719 ppm by LP and 9457 ppm by

IDW). GP models were the poorest models due to their inefficiency to capture the local variations (For Hudson-Aroclor 1242, RMSE for GP is 71.1 ppm and RMSE for IDW is 60.7 ppm). Segment models worked better for lake and ocean data, though for river data they did not improve the prediction from single. Spatial modeling and mapping of aquatic sediment contaminant concentrations were influenced by number of factors including water body shape, contaminant type, data density and sample size, data spread pattern in the region, and extreme concentrations.

09:15

EFFECTS OF THE EMERALD ASH BORER (*AGRILUS PLANIPENNIS*) ON THE FOREST COMMUNITY OF THE LAKE ERIE ISLANDS II: SOUTH BASS AND GIBRALTAR ISLANDS. Douglas D. Kane^{1,2}, dkane@defiance.edu, Amy Christel Miller¹, miller.3868@osu.edu, Sarah Jane Rose¹, rose.891@osu.edu,¹F.T. Stone Laboratory, Put-In-Bay, OH 43456, ²Defiance College, Natural Sciences and Mathematics Division, Defiance, OH 43512.

Emerald Ash Borer (*Agrilus planipennis*) (EAB), an invasive Asian wood-boring beetle (Coleoptera:Buprestidae) has been confirmed on Middle Bass Island (Ottawa County, OH) and Kelley's Island (Erie County, OH), but neither adults nor larvae have been found on South Bass Island nor Gibraltar Island (Ottawa County, OH). We surveyed the general health of ash trees on the latter two islands in order to estimate potential degree of EAB infestation and observe how forest tree community composition has changed over time. Forest community composition was determined using Importance Values (IV) and values from this study were compared to Boerner's data. A survey of ash health included walking the islands, GPS-marking ash trees, and designating a health rating per tree (0-3, with 0 indicating highest health). Two study sites in and near Ladd Carr woods were almost completely dominated by sugar maple (*Acer saccharum*) (IV = 3 and 5), with blue ash (*Fraxinus quadrangulata*) (IV = 3 and 3) also being an important species. Biodiversity decreased compared to Boerner's (1984) data (5 vs. 8 species). This may be due to presence of amur honeysuckle (*Lonicera maackii*) rather than EAB, as ash is still an important species on South Bass Island. Of the 431 ash trees surveyed on South Bass and Gibraltar Islands, 13% rated 0, 34% rated 1, 30% rated 2, and 23% rated 3. Tree decline was not necessarily related to EAB, but results support that EAB is likely present in low densities, showing the typical "lag phase" of new invaders. In addition, D-shaped exit holes indicative of EAB were found on several trees (7 out of 97 ash trees surveyed) at East Point, South Bass Island.

09:30

EXPLORING RESISTANCE TO ALLELOPATHIC EFFECTS OF INVASIVE *ALLIARIA PETIOLATA* IN *IMPATIENS CAPENSIS*. Kyle D. Titus, kttitus@wilmington.edu, and Kendra A. Cipollini, kendra_cipollini@wilmington.edu. Wilmington College, 1870 Quaker Way, Wilmington, OH 45177.

Seedlings of populations of jewelweed (*Impatiens capensis*) that have grown with invasive garlic mustard (*Alliaria petiolata*), i.e., "experienced" plants, display resistance to *A. petiolata*. Carbon, which experimentally manipulates allelopathy, was used to investigate if allelopathy occurs and if experienced *I. capensis* are resistant to the negative allelopathic effects of *A. petiolata*. A fully factorial study was performed in a growth-room with the factors of carbon application (+ or -), experience level (experienced or naive) and *A. petiolata* (+ or -). Experienced and naive plants were collected from the field from 3 sites in southwest Ohio (N = 3 sites x 2 carbon levels x 2 experience levels x 2 *A. petiolata* levels x 4 replicates = 96). To determine the effect of carbon, *A. petiolata* were grown with and without carbon. A nested Multivariate Analysis of Variance (MANOVA) was performed on the response variables (for *I. capensis*) of final plant height, number of seeds, total mass of seeds, date of first chasmogamous flower, total biomass and root:shoot. *Alliaria petiolata* significantly reduced the number of seeds (P = 0.011) and total mass of seeds (P = 0.010). The interaction of carbon and garlic mustard was significant (P = 0.008), indicating that ameliorating the allelopathic effects of *A. petiolata* affected the response of *I. capensis*. Carbon did not affect growth of *A. petiolata* (P > 0.05) or *I. capensis* (P > 0.05), validating that carbon can be used as a manipulative tool for these species without any direct effects.

09:45

COMPOSITION OF CANYON-SLOPE WOODLANDS IN ZOAR VALLEY, WESTERN NEW YORK, AS ASSOCIATED WITH SLOPE ORIENTATION AND ELEVATION. Richard G. Catterlin, skier304@aol.com, Thomas P. Diggins, tpdiggins@ysu.edu, Youngstown State University, Dept of Biological Sciences, Youngstown, OH 44555.

The 11-km long and 50 - 140-m deep Zoar Valley Canyon in western New York State represents a nearly undisturbed riparian ecosystem. Forest composition and age structure have previously been studied here on riverside floodplains and raised terraces, but the slopes above were heretofore unexplored. The present study aimed to catalogue tree species distributions on 20 - 50° slopes that also tend to be solidly forested. Two major objectives were to evaluate the influence on forest composition of north vs. south slope orientation and elevation above the river bed. Additionally, multivariate Non-metric Multidimensional Scaling (NMDS) ordination was used to assess the relative roles of different slope communities in providing colonizers to the lower elevation fluvial landforms. A clinometer and laser rangefinder were used to measure slope angles and elevations of safe vantage points and of individual trees. Trees were identified to species and classified as understory, midstory, canopy, and emergent. South-facing slopes >40 m above the river supported xeric canopies, often <10 m in height, dominated by *Quercus rubra*, *Q. prinus*, and *Pinus resinosa* (57 - 93% of trees collectively). In contrast, north-facing slopes supported >30-m tall mesic canopies (*Acer saccharum*, *Fagus grandifolia*, *Tsuga canadensis*, *Fraxinus americana*, *Liriodendron tulipifera*) across their entire vertical profiles. Eastern hemlock was notably more abundant on mesic north-facing slopes than on terraces below (27 - 48% vs. 2 - 27%, respectively), especially above 40 m where it comprised 42 - 58% of trees. Ordination results suggest xeric communities play little role in floodplain/terrace colonization (communities were widely separated in ordination space), but that mesic slopes have variable influence on the flats below.

10:00

DETECTION OF PARACETAMOL IN FLY LARVAE USING GC-MS. Samantha J. Stegeman, sstegeman001@defiance.edu, Somnath Dutta, sdutta@defiance.edu, Spiro Mavroidis, smavroidis@defiance.edu, Defiance College, 701 North Clinton Stt R-455, Defiance, OH 43512.

Entomotoxicology is the use of insects to detect drugs and toxins in severely decomposed tissues. Some drugs that have been successfully detected in insect larvae include barbiturates, benzodiazepines, antidepressants, opiates, and amphetamine derivatives. However, further investigation is needed to determine different detection methods, especially at lower concentrations (< 250mg/kg). Paracetamol (acetaminophen) is a widely available pain reliever and it accounts for the highest percentage of pharmaceutical-exposed deaths annually. A previous study used high performance liquid chromatography to detect paracetamol in fly larvae but was not able to detect concentration levels of 250mg/kg typical in skeletal muscles from fatal overdoses in humans. Gas chromatography-mass spectrometry (GC-MS), which has greater detection sensitivity, will be used to detect paracetamol in fly larvae. Greenbottle fly eggs (*Lucilia illustris*) have been collected and separated into four treatment groups and reared on paracetamol-treated artificial foodstuff containing concentrations of 0mg/kg, 250mg/kg, 1000mg/kg, and 2000mg/kg, respectively. Larvae were collected at the start (day 2, ~10g) and end (day 8, ~10g) of larval development.

10:15

VECTOR BORNE DISEASE—KALA AZAR (VISCERAL LEISHMANIASIS) IN NEPAL. Roshani Rajbanshi, rajbanshir@findlay.edu, 702 Cherry Ln Apt #108, East Lansing, MI 48317.

Kala-azar is a very common disease in tropical regions. The vector borne disease, kala-azar is caused by protozoa *Leishmania* species and the vector sandfly, *Phelbotomus* species spreads the disease. Humans, dogs, Nile rats, donkeys and horses are all reservoir of the disease. Of the concern is that 88 countries in four continents are infected by the disease. Worldwide, 12 million people are affected by kala-azar and 57,000 deaths are reported annually. This article is a descriptive research paper that is a compilation of resources, published papers and data from the World Health Organization. This study focuses on three different countries Nepal, Sudan and Brazil. Co-infection of HIV/visceral leishmaniasis and resistant to antileishmanial drugs are creating problems in the treatment. The findings from this article explain the distribution of the vector is due to similarity in the climatic factors of three countries. High temperature and low rainfall determine more

infection. The presence of a garden around the house, clay soil, deforestation, and a house near a pond or river are risk factors for kala-azar to occur. Access to health service, overcrowding, lack of safe drinking water, mass migration, poor nutritional status, unplanned urbanization, drought and civil war are positively associated with the disease kala-azar.

10:30

A FIELD STUDY OF A NOVEL MICROBIAL FUEL CELL DESIGN AS AN ALTERNATIVE ENERGY FUEL SOURCE UTILIZING A *SUS DOMESTICUS* MANURE SUBSTRATE AT A COMMERCIAL PRODUCTION OPERATION. Rachel A. Yoho, ryoho@capital.edu, Nancy Swails PhD, nswails@capital.edu, 1 College and Main, Columbus, OH 43209.

A study is being done in a commercial agricultural production facility using a novel microbial fuel cell design in order to create an environment for voltage production from a *Sus domesticus* manure substrate. Microbial Fuel Cells (MFC) utilize bacteria present in the *S. domesticus* manure substrate to generate electricity directly. Previous studies have shown that the manure is a viable fuel source and that the bacterial load will decrease over time in a closed environment. This study seeks to adapt a previously productive fuel cell design for application as an alternative fuel source in a large-scale production location. A design utilizing carbon cloth electrodes, plastic piping, sealant, and standard wire was constructed for application in the manure pit of a commercial *S. domesticus* farm. Previous testing (N=19) revealed that this design effectively produced voltages maximizing at 0.303 V from a 3.8 liter environment. On-site testing of the MFC (N=10) includes designs to create larger cells, form a grid, and maximize the electrical production of each distinct component. Studies will include analysis of the bacterial load of the manure and identification of the most prevalent species in order to further increase the output of each MFC. The physical characteristics of the cell including the internal resistance, total electrical capacity, peak production and lifetime usage will also be evaluated. These studies, performed under actual conditions will serve as the basis for future applications at other commercial locations, including those with other vertebrate species.

Biochemistry & Biology

KussScience Center Rm 248

Christopher A. Drummond, President

09:00

DEVELOPMENTAL CHANGES IN THE FATBODY MITOCHONDRIAL TRANSHYDROGENASE OF THE TOBACCO HORNWORM, *MANDUCA SEXTA*.

Christopher A. Drummond, cdrummo@bgsu.edu, Kurt P. Vandock, kurtv@bgsu.edu, Stan L. Smith (Deceased 9/20/2008), Carmen F. Fioravanti, cfiorav@bgsu.edu, Dept of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

In *Manduca sexta*, ecdysone 20-monoxygenase (E20M), the mitochondrial cytochrome P450 system that converts the molting hormone ecdysone (E) to its physiologically active metabolite 20-hydroxyecdysone (20E), is induced by E, requires NADPH as cofactor, and varies in a stage and tissue specific manner. Recently, the midgut mitochondrial transhydrogenase of fifth larval instar *M. sexta* was demonstrated to be a possible source for the generation of NADPH needed by active E20M. This reversible transhydrogenase catalyzes NADP⁺ reduction from NADH, in both an energy-linked and nonenergy-linked manner. Energy-linked transhydrogenations utilize electron transport-dependent NADH or succinate oxidation (ETD and SD) or ATP hydrolysis (ATPD). In the present study, the activities of the mitochondrial nonenergy-linked and energy-linked transhydrogenations exhibited by *M. sexta* fatbody tissue throughout the ten day stadium of the fifth larval instar were assessed. During this period, the nonenergy-linked and energy-linked activities per mg tissue displayed significant peaks on day five i.e., nonenergy-linked, 0.28 $\mu\text{mol}/\text{min}/\text{mg}$; ETD, 0.81 $\mu\text{mol}/\text{min}/\text{mg}$; SD, 1.15 $\mu\text{mol}/\text{min}/\text{mg}$; and ATPD, 2.63 $\mu\text{mol}/\text{min}/\text{mg}$ (One way ANOVA, N=6, P<0.05, Post-Hoc: Tukey's PSLD). By day ten activity levels were at or below those observed on day 1 of the instar i.e., nonenergy-linked, 0.13 $\mu\text{mol}/\text{min}/\text{mg}$; ETD, 0.48 $\mu\text{mol}/\text{min}/\text{mg}$; SD, 0.72 $\mu\text{mol}/\text{min}/\text{mg}$; ATPD, 1.63 $\mu\text{mol}/\text{min}/\text{mg}$ tissue. When compared to fatbody E20M levels throughout *M. sexta* fifth instar development, the peak transhydrogenase activities occurred one day past the peak E20M activity. These findings suggest that the transhydrogenation levels on day 4 may be sufficient for maximal *M. sexta* E20M activity.

09:15

DEVELOPMENTAL CHANGES IN MIDGUT MITOCHONDRIAL TRANSHYDROGENASE DURING THE FIFTH LARVAL INSTAR OF THE TOBACCO HORNWORM, *MANDUCA SEXTA*. Kurt P. Vandok, kurtv@bgsu.edu, Christopher A. Drummond, cdrummo@bgsu.edu, Stan L. Smith, (Deceased 9/20/2008), Carmen F. Fioravanti, cfiorav@bgsu.edu, Dept of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Midgut mitochondria from wandering stage fifth larval instar *Manduca sexta* exhibit a membrane-associated and proton translocating transhydrogenase that catalyzes a reversible reaction as follows: $\text{NADPH} + \text{NAD}^+ \leftrightarrow \text{NADP}^+ + \text{NADH}$. NADPH formation occurs as a non energy- or energy-linked reaction. Energy linkages occur via electron transport-dependent NADH (ETD) or succinate utilization (SD) or Mg^{++} -dependent ATP hydrolysis (ATPD). In *M. sexta*, conversion of the molting hormone, ecdysone, to its physiologically active form, 20-hydroxyecdysone (20H), is catalyzed by a mitochondrial cytochrome P-450 dependent steroid hydroxylase, i.e., ecdysone 20-monooxygenase (E20M). E20M preferentially uses NADPH as the cofactor, and this NADPH could arise from the mitochondrial transhydrogenase. During the ten day stadium preceding larval-pupal development, the nonenergy- and energy-linked NADPH-forming activities in *M. sexta* midgut mitochondria per mg wet weight displayed significant peaks on day five i.e., nonenergy-linked, $0.93 \pm 0.12 \mu\text{mol}/\text{min}/\text{mg}$; ETD, $3.09 \pm 0.08 \mu\text{mol}/\text{min}/\text{mg}$; SD, $3.99 \pm 0.25 \mu\text{mol}/\text{min}/\text{mg}$; and ATPD, $8.60 \pm 0.22 \mu\text{mol}/\text{min}/\text{mg}$ (One way ANOVA, $N=6$, $P<0.05$, Post-Hoc: Tukey's PLSD). Day ten levels were below those observed on day one i.e., nonenergy-linked, $0.25 \pm 0.04 \mu\text{mol}/\text{min}/\text{mg}$; ETD, $1.29 \pm 0.09 \mu\text{mol}/\text{min}/\text{mg}$; SD, $1.78 \pm 0.06 \mu\text{mol}/\text{min}/\text{mg}$; ATPD, $3.98 \pm 0.13 \mu\text{mol}/\text{min}/\text{mg}$ tissue. Interestingly, the peak transhydrogenase activity on day five corresponded to a 50 fold increase of E20M activity previously noted in *M. sexta* midgut mitochondria. These significant increases in E20M and transhydrogenase during larval-pupal development, supports the notion that an energy-linked transhydrogenase may be crucial to NADPH formation for mitochondrial E20M activity.

09:30

SUPERPARASITISM AND HOST DISCRIMINATION BY *LESPEZIA ARCHIPPIVORA*. David M. Wissemann, dwissemann09@wooster.edu, Michelle J. Solensky, msolensky@wooster.edu, The College of Wooster, C-3072, 1189 Beall Avenue, Wooster, OH 44691.

Superparasitism occurs when a female organism parasitizes a host that was previously parasitized by another individual of the same species. The phenomenon of superparasitism occurs in numerous Hymenopteran and Dipteran parasitoids. However, much of parasitoid research has focused on the Hymenoptera with relatively little attention paid to Dipteran parasitoids. As a result, less is known about the parasitoid behavior of Dipteran species. In the Dipteran-generalist parasitoid *Lespesia archippivora*, superparasitism occurs in wild and captive flies. But it is unknown if this species has the ability to discriminate between previously parasitized and unparasitized hosts. Logically, host discrimination should be selected for, based on the decreased resource competition for the larvae. The hypothesis is that the flies will discriminate against high levels of parasitism, but not against low levels of parasitism. Twelve flies were given the choice between three caterpillar hosts of different parasitism levels: non-parasitized, somewhat parasitized (1-3 eggs), and highly parasitized (6-12 eggs). Host preference was measured using initial host choice as well as the number of attacks on each host, the latency to first contact of each host, and the number of eggs per host. Initial host choice will be analyzed using a Chi-squared test while all other three variables will be analyzed using repeated measure ANOVA. Preliminary observations are that there is little difference between treatment groups. These results suggest that the flies do not discriminate between hosts based on parasitism levels. Because logically host discrimination should be selected for, this finding suggests that *L. archippivora* does not discriminate due to its generalist lifestyle.

09:45

DETERMINANTS OF REPRODUCTIVE SUCCESS IN MAYAPPLE (*PODOPHYLLUM PELTATUM*) IN THE CLEVELAND METROPARKS. Kathryn L. Hertz, khertz@bw.edu, Michael N. Melampy, mmelampy@bw.edu, Kayla I. Perry, kiperry@bw.edu, 210 Mulberry Street, Berea, OH 44017.

Mayapple, *Podophyllum peltatum*, is a common woodland herbaceous plant that grows in discrete patches. It is insect pollinated but does not produce nectar and is reputed to rely on other nectar-producing species to attract insects. The impact of mayapple patch size and density versus the abundance of other flowering plants on mayapple's pollination and fruit production in the Cleveland, Ohio Metroparks was examined. One hundred and twenty patches with at least five flowering stems, along transects in four different reservations of the Metroparks were selected. Eighteen patches were hand-pollinated; the rest were allowed to be naturally pollinated. Pistils were collected from half the naturally pollinated flowers and analyzed for the presence of pollen tubes using fluorescence microscopy. Developing fruit diameters were measured every 10 days through the end of July 2008 when fruits were collected and examined for seed production. Hand-pollinated flowers ($n=90$) produced fruits at a higher rate (63%) than naturally pollinated flowers ($n=102$; 22%), and natural fruit set varied significantly across reservations (3 to 31%). Significant correlations were found between the abundance of flowering plants in the vicinity of mayapple patches and fruit set ($r = .167$, $0.01 < p < 0.05$, $n = 118$) and between the abundance of flowering plants and the number of pollen tubes per stigma ($r = .467$, $0.02 < p < 0.05$, $n = 24$). The lowest fruit set among reservations was associated with the lowest flowering plant density (0.08 stems/ m^2). The reproductive success of mayapple appears to be a product of a complex interplay between total flowering plant abundance and other environmental factors.

10:00

MORPHOLOGICAL SIMILARITY OF BEAN EXTRAFLORAL NECTARIES BETWEEN AND WITHIN SPECIES OF THE GENUS *VIGNA*. Mark E. Headings¹, headings.1@osu.edu, Leona E. Horst², horst.9@osu.edu, Leslie A. Morris³, Leslie.Morris@ars.usda.gov, ¹The Ohio State University Agricultural Technical Institute, 1328 Dover Rd, Wooster, OH 44691, ^{2,3}USDA-ARS at The OSU Ohio Agricultural Research and Development Center.

Nectaries located on plants, other than inside of flowers, are referred to as extrafloral nectaries. These are attractive to certain nectar-seeking insect species. Beans were grown in a field setting and examined to determine which types have extrafloral nectaries and to describe and compare the morphological structure of such nectaries. Out of some 50 types of bean plants examined over the past few years, eleven were confirmed to have extrafloral nectaries, of which nine were in the genus *Vigna*. The plants in this genus were mung beans, *V. radiate*; adzuki beans, *V. angularis*; cowpeas (California Blackeye No. 5), *V. unguiculata*; and yard-long beans, *V. unguiculata* (subsp. *sesquipedalis*.) Five additional varieties were: mung beans (Mappe Green); yard-long beans (Orient Wonder); and cowpeas (Brown Crowder, Pinkeye Purple Hull and Big Boy). Extrafloral nectaries are located on stems adjacent to floral attachments and appear as raised structures with one to seven orifices in each. These nectaries were removed from stems and then fixed using a mixture of glutaraldehyde and paraformaldehyde in 0.1 M phosphate buffer. This was followed by a dehydration series in EtOH. The samples were lightly coated before examining them with the SEM. The microscope used was a Hitachi S-4700 at 15 mm working distance with 20.0 kv accelerating current. A total of 56 close-up photos were produced. The extrafloral nectaries were observed to be morphologically similar on all nine of the different plant types within the genus *Vigna*.

10:15

USING GAS CHROMATOGRAPHY-MASS SPECTROMETRY TO DETECT ACRYLAMIDE IN POTATO CHIPS. Kelsey L. Huff, khuff001@defiance.edu, Dr. Somnath Dutta, sdutta@defiance.edu, 2899 Packard Road, Sand Creek, MI 49279.

Acrylamide has neurotoxic, genotoxic, and carcinogenic effects on rats. In recent years, acrylamide has been detected in carbohydrate-rich foods heated above 120°C. Acrylamide can be extracted from commercial food and detected using Gas Chromatography-Mass Spectrometry (GC-MS). Acrylamide ($\text{CH}_2\text{CHCONH}_2$) has been detected in commercial products such as potato chips, french fries, crackers, and even breakfast cereals. Potato chips appear to be the food of most concern with one study showing a mean acrylamide content of 1.80ppm. The objective of this research is to detect the presence of acrylamide and a subsequent acrylamide quantification in four brands (three trials each) of potato chips/crisps using GC-MS. Because the potato chips are cooked at high temperatures above 120°C, the hypothesis is that acrylamide will be detected. Through GC-MS, each sample of potato chips, regardless of the brand name, are first crushed and acrylamide is extracted by water. The mixture is then centrifuged

for 30 minutes and the supernatant is removed. In order for acrylamide to be stable within the GC-MS column, it must first be derivatised through bromination to 2,3-dibromopropionamide ($\text{CH}_2\text{BrCHBrCONH}_2$) using hydrobromic acid and bromine water and stored in the dark at 0°C for 12 hours. Sodium thiosulfate is then added to remove the excess bromine ($2\text{S}_2\text{O}_3^{2-} + \text{Br}_2 \rightarrow \text{S}_4\text{O}_6^{2-} + 2\text{Br}^-$). The derivatised acrylamide is then transferred to an ethyl acetate/hexane mixture and separated using a separatory funnel. Sodium sulfate is added to dry the solution. A known amount of N,N-dimethylacrylamide ($(\text{CH}_3)_2\text{NCOCHCH}_2$) is added as an internal standard. The sample is then ready to be injected into the GC-MS.

10:30

HOOF STRENGTH OF PIGMENTED AND UNPIGMENTED KERATIN IN *EQUUS CALLABUS*. Catherine A. Dukles, cdukles09@wooster.edu, Michelle J. Solensky, msolensky@wooster.edu, The College of Wooster, C-1464, 1198 Beall Ave, Wooster, OH 44691.

Domestic horses (*Equus callabus*) have hooves made of keratin, which is one of the strongest biomaterials known. The complex cellular structure of keratin deters cracks from reaching the coronary band. Weak hooves are more likely to crack, which can cause lameness. A commonly held belief among equestrians is that black hooves are stronger than white hooves, but there is little empirical support for this pattern. This study tests the prediction that pigmented hooves will experience less cracking than unpigmented hooves. This study had an observational and experimental component. The observational component involved horses ($n = 72$) whose hooves had been trimmed at least three weeks prior. The length and number of cracks were measured with a digital caliper, and hoof color was recorded. The experimental component involved a subset of horses ($n = 18$) from the observational study that were lunged for thirty minutes once a day for seven days following the initial crack measurements, and then remeasured on the last day of the lunging treatment. This added a consistent stressor to the hoof to determine whether more cracking occurs in the white hooves. Crack severity of black and white hooves will be compared using a two-sample t-test. Since keratin has a common strength the weight was measured for all subjects. Statistical tests will be done in order to test whether weight is an explanation for cracks. For the experimental study, the change in crack length of white and black will be compared with a paired t-test.

10:45

ASSESSING THE IMPORTANCE OF SUB-EPIDERMAL LEAF PIGMENTATION (ANTHOCYANIN), P^{STI} PHOTOCHEMISTRY, AND THE XANTHOPHYLL CYCLE AS PHOTOPROTECTIVE MECHANISMS IN TWO MORPHS OF *AGAVE STRIATA* WITHIN THE NORTHEAST DESERT OF MEXICO. Nicolas Y. Fondom¹, fondomny@muohio.edu, Sergio Castro-Nava², scastro@uamac.uat.mx, Alfredo J. Huerta¹, huertaaj@muohio.edu, ¹Miami University, Dept of Botany, Pearson Hall 316, Oxford, OH 45056, ²Unidad Académica Multidisciplinaria Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, México.

This study tested the hypothesis that leaf epidermal pigments screen light of particular wavelengths from reaching the photosynthetic machinery, reducing the dependence of the xanthophyll-cycle as an energy dissipation process. Under field conditions, measurements of photosynthesis and water relations were conducted in two morphs of *Agave striata* ($n = 4$) that differ in leaf coloration (green and reddish-purple) under low irradiance by shading (30%) and full sunlight (100%) for six days. Also measured were $R_{\text{RED}}:R_{\text{GREEN}}$ ratio, an index of anthocyanins; and change in photochemical reflectance index (ΔPRI), an index of xanthophyll-cycle. Where appropriate, data were analyzed using one-way ANOVA at $P < 0.05$. Diurnal acid showed that both morphs expressed typical CAM-activity with values ranging from 25-250 $\mu\text{Eq.g.fr.wt}^{-1}$ and 20-115 $\mu\text{Eq.g.fr.wt}^{-1}$ under sun and shade respectively. Both morphs were well hydrated with RWC $>90\%$. Leaf temperatures were similar for both morphs though the green-morph was slightly warmer (3°C) under sun and shade. The red-morph under sun had F_0 -value of 259.75 \pm 39, F_v/F_m -value of 0.84 \pm 0.00, and ϕ_{PSII} -value of 0.46 \pm 0.02 compared to 231 \pm 19, 0.8 \pm 0.01, and 0.33 \pm 0.10 respectively in the green-morph. qN was significantly higher, 0.85 \pm 0.04 for the green-morph compared to 0.62 \pm 0.03 for the red-morph. This higher qN was associated with a larger daytime xanthophyll-cycle and leaf temperature. However, the sunlight experienced by both morphs did not predispose either of the morphs to photoinhibition ($F_v/F_m \geq 0.8$). It is possible that the leaf anthocyanins, serve as a photoprotective mechanism in the red-morph, screening excess light energy, reducing dependence on the

xanthophyll-cycle. Whereas the xanthophyll-cycle coupled with qN within the green-morph did dissipate excess excitation energy.

11:00

THE EFFECT OF GLAUCOMA ON THE ACTIVITY LEVELS OF A CAPTIVE WESTERN COUGAR. Sarah E. Wills, swills@capital.edu, CU BOX 1481, 1 College and Main, Columbus, OH 43209.

The premise of this study was to determine if the glaucoma levels, measured by the intra-ocular pressure (IOP), of Jessie, a captive, female cougar at the Columbus Zoo and Aquarium, would affect her activity levels. According to the Zoo's veterinary ophthalmologists, Jessie's excessively high IOP's had led to at least partial blindness. The North American Zookeepers sought to find out if this would lead to a decrease in her activity levels, thus the purpose of the study was to determine whether or not glaucoma had a significant affect on Jessie's activity level. The study contained three hypotheses: (1) Jessie's mean activity will not change from Time Period 1 when compared to Time Period 2, (2) Jessie's mean intra-ocular pressures will not change from Time Period 3 when compared to Time Period 4 and (3) Jessie's mean right intra-ocular pressures will not change from Time Period 3 when compared to Time Period 4. This study was both observational and historical in it's methodology and it was ex post facto in it's design. Using statistical f and t tests to analyze observations and data from hypothesis one, there was enough evidence to support the alternative hypothesis. Using a statistical comparison of variances and means as well as f and t test statistics for hypotheses two and three, the study failed to reject the null hypothesis in favor of the alternative, meaning the tests were inconclusive. Conclusions reached by the study were that Jessie's mean activity level is decreasing conclusively and that her left and right eye, statistically speaking, are inconclusively not improving. The study recommends that the keepers continue to administer glaucoma-regulating medications to Jessie.

Poster Session 1

Aquatic Biology, Biology, Ecology & Insects

Kuss Science Center -3rd Floor

9:00-11:00 am

Poster Board No. 034

HYDRAULIC CONSTRAINTS ON STREAM MACROINVERTEBRATE COMMUNITIES IN THE LITTLE MIAMI RIVER, OHIO. Ian M. Barron, barronim@notes.udayton.edu, Kathleen R. Jennings, krj315@hotmail.com, Megan S. Shoda, shodameg@yahoo.com, Gustavo A. Diaz dazgusta@notes.udayton.edu, John C. Kurzawa, kurzawjc@notes.udayton.edu, Melanie I. Ajdaharian, ajdahami@notes.udayton.edu, Jon B. White, whitejob@notes.udayton.edu, Kim Galaska, galasky@notes.udayton.edu, M. Eric Benbow, benbowme@notes.udayton.edu, Albert J. Burky, albert.burky@notes.udayton.edu, 201 Lawnview Apt. 406, Dayton, OH 45409.

Flow dynamics govern aquatic ecosystems, affecting distribution and abundance of organisms. Hydraulic variables may be the most important, yet least understood environmental factor affecting the ecology of benthic organisms. The objectives of this study were to quantify flow heterogeneity and associated effects on benthic community structure within and between riffle ($N=5$) and run ($N=5$) benthic habitats in the Little Miami River, Ohio ($N39^\circ 45.834 W83^\circ 54.12$). It was hypothesized that flow velocities, species density, diversity and relative abundance would be inversely related between riffle and run habitats. In June and September 2008, a modified Surber sampler was used to collect six random benthic samples from a 100 m² grid within each habitat. Depth was measured and a SonTek FlowTracker was used to profile the water column velocity above each benthic sample. Samples were preserved in 70% ethanol and are currently being sorted and identified to family and functional feeding groups. One-way ANOVA will test the significance of flow on benthic communities between riffle and run habitats. This study will provide deeper insight into the ecological organization of streams, improve our ability to predict how flow alterations caused by human activities affect these ecosystems, and has the potential to guide water management in restoration efforts.

Poster Board No. 035

MACROINVERTEBRATE COMMUNITY RESPONSE TO WATER DIVERSIONS IN TORRENTIAL, TROPICAL HABITATS. Megan E. Shoda, shodamee@notes.udayton.edu, Kathleen R. Jennings, krj315@hotmail.com, M. Eric Benbow, benbow@notes.udayton.edu, Albert J. Burky, albert.burky@notes.udayton.edu, 4361 Bridgeport Dr, Dayton, OH 45440.

A legacy of water diversion exists in Hawaii, where water originally used to support native population needs has been co-opted for development, agriculture and tourism. This change in water usage has resulted in up to 97% of freshwater being diverted from natural stream flow in some Hawaiian streams. This study assesses the impact of reduced flow from water diversion on cascade habitats of four Maui streams: Waikapu, Iao, Waihe'e and Waiehu. Cascade habitats are characterized by shallow, torrential flow and support several endemic insect species. In July 2007 and May 2008, six cascades were sampled upstream and downstream of the first water diversion from the four streams: collections were made from a benthic, an amphibious and aerial microhabitat in addition to riparian locations. For 2008 there was lower total invertebrate abundance in downstream sites and an alteration in community structure associated with each sampling zone. Benthic macroinvertebrate density decreased significantly from upstream to downstream in Waihe'e River ($t = 2.472$; d.f. = 10; $p = 0.0330$), with a similar pattern found for Waikapu Stream amphibious communities ($t = 2.066$; d.f. = 10; $p = 0.0256$). Although not significant, there was a 75% and 19% decrease in downstream amphibious and benthic communities, respectively, in Waihe'e River, and a 29% decrease in downstream benthic communities of Waikapu Stream. These data provide a better understanding of endemic insect community structure changes in cascade habitats which are often neglected when assessing the overall effects of water withdrawal on stream ecosystems of Hawaii and other tropical archipelagoes.

Poster Board No. 036

STREAM SIZE EFFECTS ON BENTHIC COMMUNITY RESPONSE TO WATER WITHDRAWAL. Kathleen R. Gorbach, krj315@hotmail.com, Megan E. Shoda, shodameg@yahoo.com, Margaret M. Ernst, ernstmam@notes.udayton.edu, Anna Lisa Diaz, diazannl@notes.udayton.edu, M. Eric Benbow, benbowme@notes.udayton.edu, Albert J. Burky, albert.burky@notes.udayton.edu, 2125 W. Alex Bell Road, Dayton, OH 45459.

Around the world aquatic ecosystems are negatively affected by freshwater demands. On Maui, Hawaii, stream diversions historically used for sugarcane production are now further providing for economic growth and tourism. Four major West Maui streams, differing in size, were chosen to study the response of benthic communities to water withdrawal. It was hypothesized that stream size and flow velocity would be inversely related to benthic macroinvertebrate densities. In August 2007 and May 2008, a modified Surber sampler was used to randomly collect six riffle benthic samples within 100m study reaches upstream and downstream of the highest diversion in each stream. Water column velocity profiles above each sample and along 10 transects were measured using a SonTek FlowTracker, and also used to estimate total stream discharge. For overall stream discharge, two-way ANOVA found significant differences among watersheds ($F=1857$, $df=3$ $p<0.0001$), between upstream and downstream sites within each watershed ($F=7670$, $df=3$, $p<0.0001$) and an interaction ($F=1612$, $df=3$, $p<0.0001$) involving these main effects. This variation was associated with total macroinvertebrate density, which demonstrated significant main (watershed $F=5.254$, $df=3$, $p=0.0038$; site $F=7.131$, $df=1$, $p=0.01$) and interaction effects ($F=4.607$, $df=3$, $p=0.0073$). These results are possibly driven by flow riffle habitat velocities which significantly differed between upstream and downstream sites of each watershed (all $p<0.001$). These data suggest the importance of studying individual watersheds, as effects vary according to stream size and discharge, affecting communities via changes in riffle habitat velocity and variation.

Poster Board No. 037

METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS IN NORTHEASTERN OHIO. Thierry Delorme¹, tdelorme@kent.edu, Stacy Rose², srose@kent.edu, Julie Senita², jsenita@kent.edu, Cynthia Callahan³, Cynthia.Callahan@ACMHealth.org, Payman Nasr¹, pnsr@kent.edu, ¹Kent State University, Dept of Biological Sciences, Ashtabula, OH 44004, ²Kent State University, College of Nursing, Ashtabula,

OH 44004, and ³Infection Control, Ashtabula County Medical Ctr, Ashtabula, OH 44004.

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a major cause of skin infections in the United States affecting about 2 million people. The Ashtabula County Medical Center (ACMC) and Kent State University Ashtabula analyzed the rate of MRSA among Ohioans who sought medical attention at ACMC or its affiliates (e.g. physicians' offices) from January 2006 to December 2007. The study followed an increase in MRSA infections from 342 in 2006 to 605 in 2007 (population 102,703). This increase was particularly noticeable among youngsters (6 to 25 years) (+300%), the middle-aged (45 to 50 years) (+241%), and the elderly (86 to 90 years) (+224%). These MRSA increases were corroborated with uneven distributions of the major profiles of antibiotic resistances across population ages. Profiles pa26, pa30, pa62, and pa80 were predominant among the younger populations (6 to 25 years) (88% of the cases), and almost exclusively among outpatients (90%). In contrast, pa135 and pa97 were most abundant in elderly (71 to 90 years) (82% of the cases), and were the leading cause of infections in inpatients (70%) and in nursing home patients (72%). Each age group appeared to be more prone to infections caused by a few age-specific MRSA; this likelihood suggests a strong preponderance of transfers amongst individuals of the same age in schools, the workplace, and/or in nursing homes. This study raises concern over the increased rate of MRSA infections among Ohioans, especially younger individuals, and stresses the need for new strategies to prevent/control the spread of such resistant pathogens.

Poster Board No. 038

EFFECTS OF DIOXIN ON LIMB REGENERATION IN AMBYSTOMA TIGRINUM. Kurt Chonko, chonkkt@muc.edu, 1078 Amy Trl, Tallmadge, OH 44278, Leonard G. Epp, epllg@muc.edu, Mount Union College, 1972 Clark Ave, Alliance, OH 44601.

The environmental contaminant, dioxin (2,3,7,8 tetrachlorodibenzo-p-dioxin), inhibits Zebrafish caudal fin regeneration. Previous observations in our laboratory suggested this may also be true for amphibian limb regeneration although experimental work using Mexican axolotl (*Ambystoma mexicanum*) was equivocal. The purpose of this study is to determine the effects of dioxin on limb regeneration in *A. tigrinum*. Forelimbs of 10cm *A. tigrinum* were amputated above the elbow. Dioxin (200ng/g) was injected IP into experimental animals (n=5) at the time of amputation. Initial observations of regeneration indicate dioxin does not affect the rate at which limbs regenerate, when compared to control for sham-injected animals. Dioxin's effect on later stages of regeneration, e.g. digit formation has not yet been determined. Victoria blue staining will be performed following complete regeneration to assess morphological variations. To confirm our technique and the efficacy of our dioxin, a positive control will be carried out repeating published work on zebrafish caudal fin regeneration. These experiments may identify a model system for later studies investigating molecular mechanisms involved in the regulation of regeneration.

Poster Board No. 039

EFFECT OF MS-222 AND BENZOCAINE ANESTHESIA ON AMBYSTOMA TIGRINUM. Travis A. Todd, toddtra@muc.edu, MS 1556, Mount Union College, 1972 Clark Ave, Alliance, OH 44601, Leonard G. Epp, epllg@muc.edu, Biology Dept, Mount Union College, 1972 Clark Ave, Alliance, OH 44601.

Benzocaine is a preferred anesthetic for anesthetizing amphibians. It was previously observed in our laboratory that daily anesthetization of the Mexican axolotl (*Ambystoma mexicanum*) with this compound led to stunting of growth, morphological changes and possible inhibitory effects on limb regeneration. Therefore our laboratory has begun a comparative study of the efficacy of benzocaine and another commonly used anesthetic for cold-blooded vertebrates, MS-222, on a related amphibian, *Ambystoma tigrinum*, in order to determine if one of these agents might be less detrimental to treated animals. It appears that these compounds are equally effective at anesthesia at the concentrations tested (e.g. 0.05% for MS-222 and 0.1% for benzocaine), as determined by toe pinch responses and swimming behavior (n=5). The rate of onset of and recovery from anesthesia was found to be directly related to concentration for each agent. After daily anesthetization for 27 days, an effect of either agent on increase in weight or length of *A. tigrinum* (n=5) when compared to controls is not yet obvious. Effects on the onset of metamorphosis and timing and patterning of limb regeneration accompanying daily anesthetization with these compounds are also currently being observed.

Poster Board No. 040

EFFECT OF *LONICERA MAACKII* ON SOIL PROPERTIES IN SOUTHWESTERN OHIO. Sameer Rasa, rasas@xavier.edu, Ryan Butler, sweenyr@xavier.edu, Leslie O'Neil, leslieoneil@gmail.com, Dr. Brent Blair, blairb@xavier.edu, Xavier University, Dept of Biology, 3800 Victory Pkwy, Cincinnati, OH 45207.

Exotic plant species are a common component of terrestrial ecosystems today. Unfortunately they often negatively influence natural habitats causing species decline and sometimes extinctions. Many invasive plant species are able to gain dominance through altering their environment. *Lonicera maackii*, Amur Honeysuckle, is an invasive shrub in forests of Southern Ohio that has been shown to significantly reduce native herbaceous species growth in the forest understory. *L. maackii* is native to Asia and was first introduced, as an ornamental shrub, into the United States in the late 1800's. The hypothesis is that the success of *L. maackii* in Southern Ohio may be due to its ability to alter soil nutrient levels. The study was conducted at Mount Airy Forest, Cincinnati OH, where *L. maackii* varies greatly in abundance. To test the hypothesis, samples of soil were collected from areas dominated by *L. maackii* and areas free from *L. maackii* in the forest (N=40 per treatment). The soil samples collected from these areas are silty clay loam soil type from the Eden family. Currently the soil samples are being tested for nitrate, ammonium nitrogen, and phosphorus using standard soil analysis techniques, and pH using a 1:2 soil to water ratio. Data will be analyzed with t-tests using the SPSS statistical package. Observing the effect Honeysuckle has on the soil may provide an understanding of its proliferation in Southern Ohio.

Poster Board No. 041

BEHAVIORAL PATTERNS OF STOPLIGHT PARROTFISH, *SPARISOMA VIRIDE*, IN SAN SALVADOR, THE BAHAMAS. Nicole A. Spoerl, s10.nspoerl@wittenberg.edu, Jessica R. Tittl, s10.jtittl@wittenberg.edu, James M. Welch, jwelch@wittenberg.edu, 602 N Wittenberg Ave, Springfield, OH 45504.

Stoptlight parrotfish (*Sparisoma viride*) are large, brightly colored, tropical fish. They are dominant herbivores in reef habitats of the Caribbean and Atlantic Ocean. All stoptlight parrotfish are sequential hermaphrodites. Male (n=56) and female (n=48) stoptlight parrotfish were observed on reefs surrounding San Salvador, The Bahamas during May 2008, to examine behavioral differences between the sexes. Behaviors were categorized, and investigators counted the number of times the fish engaged in each behavior. These behaviors included hiding, eating, interspecific aggression, intraspecific aggression, cleaning station, patrolling, and retreating. There were significant differences in the behaviors of male and female stoptlight parrotfish ($\chi^2_6 = 37.53$; $P < 0.001$). Males were often found out in the open, defending their territory from other fish while they ate. The males only showed aggression to larger fish of other species. The males were usually found alone, but were sometimes observed with other males; in one case a group of sixteen males were observed swimming together. The females were typically found in groups of three to four; it was very uncommon to see a mature female alone. The mature females stayed close to the reef, but smaller females were seen swimming several meters from the reef. The mature females showed aggression towards other female stoptlight parrotfish, but never to other species of fish. This behavior by the mature females may be an effort to maintain their position close to the reef, because this area provides the most shelter from predators.

Poster Board No. 042

LIGHT MICROSCOPE ANALYSIS OF DANDELION (*TARAXACUM OFFICINALE*) TISSUES EXPOSED TO HEAVY METALS. Julie K. Ziegler, s09.jziegler@wittenberg.edu, Jaclyn G. Flickinger, s09.jflickinger@wittenberg.edu, Kevin M. Gribbins, kgribbins@wittenberg.edu, Matthew H. Collier, mcollier@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501.

Previous studies have shown that dandelions (*Taraxacum officinale* Weber; Asteraceae) can be metal accumulators, thus it was hypothesized that dandelions growing in urban metal polluted soils sequester and store excess metals in their vacuoles and/or bind excess metals to negatively charged cell wall components (e.g., cellulose and/or lignin). This hypothesis was tested by performing a series of reciprocal greenhouse planting experiments in which distinct dandelion clones (previously identified by DNA fingerprinting) sampled from urban polluted (relatively high Cu, Pb, and Zn soil concentrations) sites were grown in both unpolluted (nutrient solution only; control) and polluted (nutrient solution +

120 mg kg⁻¹ Cu and 260 mg kg⁻¹ Zn) media (N = 12 for each media type). Four weeks after metal exposure, leaf and taproot tissues (N = 12) were harvested from all surviving plants, dehydrated, infiltrated, and embedded in Spurr's plastic, sectioned using an ultramicrotome, and then examined using an American Optical Ultrastar® light microscope at 10X, 40X, and 100X magnifications. Organ cellular morphologies of dandelions grown in polluted media (N = 12) displayed evidence of extreme tissue necrosis and chlorosis when compared to control plants, but sequestered metals were not readily visible in specific cellular components via light microscopy (i.e., metals were not aggregated in cell vacuoles).

Poster Board No. 043

SPINY BRITTLE STARS' (*OPHIOCOMA PAUCIGRANULATA*) MOVEMENT AND DIRECTIONAL BEHAVIOR IN RELATION TO LIGHT AND PROTECTION. Alex Potapenko, s09.apotapenko@wittenberg.edu, Cassandra L. Childs, s11.cchilds@wittenberg.edu, Natalie Davidson, s09.ndavidson@wittenberg.edu, Kathy Reinsel, kreinsel@wittenberg.edu, Wittenberg University, Dept of Biology, 113 W. College Ave, Springfield, OH 45504.

Although echinoderms do not have visibly developed eyes, they still respond to light and are found in dark shelter. This study took place at Bonefish Bay in San Salvador, The Bahamas during the month of May 2008 to determine whether brittle stars use a dark structure for protection, or just for the absence of light. The experiment consisted of placing the brittle star in a testing area of its natural habitat with regions representing different conditions: protection with no light, protection with light, a shaded region with no protection, and open water (as a control region). Brittle stars were observed until they moved to a specific region or out of the testing area. The hypothesis was that brittle stars would move towards the protected, dark region more than the other regions in the testing area. Of the 96 brittle stars tested, 76 responded by moving into one of the designated regions. Significantly more brittle stars (51) moved to one of the dark areas rather than the protected, light region and control region ($X^2_3 = 10.27$; $p < 0.05$). Because brittle stars tended to move towards areas of darkness or low light, but not specifically toward shelter, the hypothesis was partially supported.

Poster Board No. 044

HABITAT USE AND SOCIAL INTERACTIONS OF ADULT AND JUVENILE SLIPPERY DICKS (*HALICHORES BIVITTATUS*) ON SAN SALVADOR, THE BAHAMAS. Danielle N. Remington, s10.dremington@wittenberg.edu, Kristin M. Quicksall, s10.kquicksall@wittenberg.edu, Kathleen A. Reinsel, kreinsel@wittenberg.edu, 625 Woodlawn Ave, Springfield, OH 45504.

The slippery dick is commonly found in the waters of San Salvador, in a wide range of marine habitats, from coral reef to sea grass beds, in depths of no more than 15 m. A null hypothesis of no difference in the behavior or habitat of juvenile and adult fish was tested. A total of 198 fish were observed along eleven 28 m transects in four locations in San Salvador. Each fish was observed for 5-7 minutes. Significantly more adults were observed in high energy waters and more juveniles in low energy waters ($\chi^2_1 = 25.08$; $p < 0.05$). Adult and juvenile slippery dicks were observed to use different habitats ($X^2_4 = 31.0789$; $p < 0.05$). Adults were observed in higher numbers in reef rubble and fringe reef whereas the juveniles were found in higher numbers in turtle grass. Adult slippery dicks swam within an arm's reach of the researcher a greater percentage of the time than juveniles ($X^2_1 = 87.4$; $p < 0.05$). Thus, the null hypothesis of no difference in the behavior or habitat of juvenile and adult fish was rejected. Juveniles lived in lower energy habitats and were less aggressive, whereas the adults lived in higher energy habitats and were more aggressive.

Poster Board No. 045

SHELL USE BY THE HERMIT CRAB *CLIBANARIUS TRICOLOR* AT TWO LOCATIONS ON SAN SALVADOR, THE BAHAMAS. Julie K. Ziegler, s09.jziegler@wittenberg.edu, Kaitlyn T. Sherrock, s10.ksherrock@wittenberg.edu, Anne M. Schultz, s10.aschultz@wittenberg.edu, Marie C. Dantio, s10.mdantio@wittenberg.edu, Kathleen A. Reinsel, kreinsel@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501.

Hermit crabs are decapod crustaceans that rely on empty gastropod shells for protection and shelter. The hermit crab's shell not only affects the reproduction of the hermit crab, but also growth and development. It was hypothesized that the shell use would not

vary between two similar sites on San Salvador: Graham's Harbor and Bonefish Bay. Graham's Harbor has a rocky shoreline, lower wave energy, and is adjacent to a scientific field station. Bonefish Bay has a rocky intertidal zone completely surrounded by water, higher wave energy, and is adjacent to a resort. Hermit crabs were systematically collected in May 2008 from both sites, counted, and identified in the field. The distribution of gastropod shells that hermit crabs inhabited at Graham's Harbor ($N = 2046$) was significantly different from the distribution of shells being occupied at Bonefish Bay ($N = 2156$; $\chi^2_9 = 2756.8$; $p < 0.05$). Hermit crabs occupied twenty-two shell species at Graham's Harbor but only ten species at Bonefish Bay. At Graham's Harbor, 23.36% of shells were Tan Minispotted DovesHELLS; 84.46% of shells at Bonefish Bay were Florida Ceriths. The hypothesis that there would be no difference in shell distribution between the two locations was rejected. The lower number of shell species at Bonefish Bay may be due to the higher wave energy which causes preferential selection of heavier shells for stabilization. The proximity of a resort might have a negative impact on the shell species because of the constant presence of people and their tendency to collect shells.

Poster Board No. 046

ECOLOGICAL IMPACTS OF LIONFISH (*PTEROIS* SPP.) AS AN INVASIVE SPECIES ON PREY POPULATIONS SURROUNDING SAN SALVADOR, THE BAHAMAS. Matthew J. Ghere, s09.mghere@wittenberg.edu, Graham R. Guerin, s10.gguerin@wittenberg.edu, Daniel P. Jackson, s10.djackson@wittenberg.edu, Joshua L. Lanzer, s10.jlanzer@wittenberg.edu, James M. Welch, jwelch@wittenberg.edu, Box 1184, Wittenberg University, PO Box 6100, Springfield, OH 45501.

Lionfish (*Pterois* spp.) are native to the Indo-Pacific region. These ambush predators have few natural predators. They feed on a variety of small marine fish and invertebrates such as crabs and shrimp. Over the past decade, invasive lionfish have established themselves along the Atlantic coast of North America and in The Bahamas. Reefs surrounding San Salvador were surveyed by scuba diving and snorkeling to examine how lionfish affect prey populations. Fairy basslets, *Gramma loreto*, were selected as the target prey fish because they occupied the same habitats as lionfish (overhangs and crevices) and because it was observed during initial surveys that there were drastic differences in fairy basslet populations from reef to reef. It was hypothesized that lionfish directly affect the fairy basslet population on each reef. Seven reefs were surveyed; in each survey, investigators swam approximately 380 meters of reef edge and counted lionfish and fairy basslets. There was a negative correlation between numbers of lionfish and fairy basslets on reefs that were surveyed ($r_s = -0.895$; $p < 0.001$). When no lionfish were on a reef ($n=1$), the fairy basslet population was 90. When lionfish were on a reef, the fairy basslet population decreased (range 74 to 0). Further, on reefs with two or more lionfish ($n=4$), there were no fairy basslets. Lionfish appear to have a direct impact on fairy basslet populations on reefs surrounding the island of San Salvador, The Bahamas.

Poster Board No. 047

GHOST CRAB, *OCYPODE QUADRATA*, BURROW OCCUPANCY RATES AND SLOPE EFFECTS ON MOVEMENT. Alyssa J. Fulwider, s10.ifulwider@wittenberg.edu, Tim L. Lewis, tlewis@wittenberg.edu, Box 3072, Wittenberg University, PO Box 6100, Springfield, OH 45501.

This study examined the burrowing properties and the effects of beach slope on the movement of ghost crab, *Ocyropsis quadrata*. The burrowing properties of ghost crabs have been documented by others, showing that burrow shape and location relative to shore are dependent on crab age and that every burrow contains one crab. The current study took place in May 2008 on San Salvador, The Bahamas, and investigated the effects that sandy slopes had on the movement and orientation of ghost crabs. These effects were tested by placing individual crabs, caught from Grahams Harbor and Bonefish Bay, in the center of a 1 m² wooden box with sand covering the bottom. Observations were conducted on the direction the crabs moved in relation to the factors presented to them: degree of slope, orientation of slope, beach structure, and water samples in the box (43 combined trials on 17 individual crabs). During the day, ghost crab burrows were dug up to reveal that only 2 of 39 burrows were occupied, contrary to previous published research. The movement data from the box indicated that over half of the crabs (27/43) tend to orient themselves north regardless of their location and surroundings. Sand sources or proximity to the sea water in the box had no effect on the ghost crabs.

Poster Board No. 048

A HISTOLOGICAL ANALYSIS OF THE OOGENIC CYCLE IN A PARTHENOGENIC SPECIES OF CAVE CRICKET, *HADENOECUS CUMBERLANDICUS*. Danielle B. Carey, s10.dcarey@wittenberg.edu, Kevin M. Gribbins, kgribbins@wittenberg.edu, Matthew H. Collier, mcollier@wittenberg.edu, Horton H. Hobbs III, hhobbs@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501-0720.

A population of the cave cricket *Hadenoecus cumberlandicus* (Orthoptera, Rhaphidophoridae), located in the isolated cave system Coon-in-the-Crack I in northeastern Kentucky, is comprised entirely of parthenogenic individuals. Nothing is known about this population's life history. A comparative analysis was conducted of the oogenic cycle specifically focusing on the histology of ovarioles collected monthly over a period during 2007-2008. Progression of vitellogenesis and the oogenic cycle are typically dependent on time of year and type of seasonal reproductive strategy employed by a species. Five to six crickets were collected monthly from May 2007 through August 2008, anesthetized using chloroform, and dissected to isolate ovarioles from the ovaries to determine when mature oocytes were produced within this parthenogenic population. Ovarioles were removed from all crickets, digital photographs were taken under a dissecting scope, measurements (length (mm), width (mm)) were taken using the software Image J, and volumes were calculated for each ovariole. Ovarioles were then fixed in glutaraldehyde, dehydrated in a graded series of ethanol, cleared in xylene, and embedded in paraffin for histological analysis. Ovarioles were sectioned (8µm), stained with toluidine blue and basic fuchsin, and examined using light microscopy to determine general histology and oogenic stage within the ovariole. Statistical analyses (ANOVA and regression) will next be used to determine if there is a correlation between egg size, number of eggs produced and egg weight, and between egg size, egg weight, and month.

Poster Board No. 049

A PRELIMINARY HISTOLOGICAL EVALUATION OF SPERMATOGENESIS IN THE SPINY LIZARD, *SCELOPORUS BICANTHALIS*. Marla L. Anzalone, s11.manzalone@wittenberg.edu, Erik H. Poldemann, s09.epoldemann@wittenberg.edu, (Dr. Kevin M. Gribbins, kgribbins@wittenberg.edu, Dept of Biology, Wittenberg University, 225 N. Fountain Avenue, Springfield, OH 45504.

Sceloporus bicantalis is a viviparous lizard that is endemic to the higher elevations of Mexico. Adult male *S. bicantalis* were collected in the mountains of Tuloca Mexico ($N=28$) for the months of January-March, 2008 and August-November, 2007. The testes were removed, fixed in glutaraldehyde, and dehydrated in a graded series of ethanol. The tissues were then embedded in EMBED-812, sectioned with an Ultramicrotome, stained with toluidine blue, and examined via light microscopy to determine the spermatogenic developmental strategy. In all months observed thus far, the testes have been spermiogenically active. This observation along with mature sperm in the lumina of the seminiferous tubules suggests that *S. bicantalis* may exhibit year-round spermatogenesis. It has been hypothesized in previous studies that *Sceloporus bicantalis* employs continuous spermatogenesis within a temperate montane region of Tuloca Mexico; this is unlike most reptiles, which exhibit seasonal spermatogenesis in this type of environment. Recently, seasonally breeding reptiles have provided evidence for a temporal germ cell development strategy similar to amphibians, where germ cells progress through spermatogenesis as a single population, which leads to a single spermiation event. This is much different than the spatial development found within the testis of other amniotes. Thus, we want to test the hypothesis that seasonality affects germ cell development strategy in the temperate lizard, *S. bicantalis*. Many mammals and birds show continuous spermatogenesis and employ a spatial germ cell development strategy. Thus, we want to test whether reptiles that practice continuous spermatogenesis have a mammalian-like spatial germ cell development, which is different than the typical temperate reptile, by observing the presence and structure of various stages of spermatogenesis in collected testis tissue throughout the year via light microscopy.

Poster Board No. 050

ELECTRON MICROSCOPIC IDENTIFICATION OF CELLULAR FEATURES HELPFUL WITH THE DETERMINATION OF A SPECIFIC TYPE OF TUMOR. Jessica L. Weist, s10.jweist@wittenberg.edu, Brenna Noll, s10.bnoll@wittenberg.edu, David L. Mason, dmason@wittenberg.edu, 734 Woodlawn Avenue, Springfield, OH 45504.

The main objective of this study is to determine the various cellular features that help in identifying different tumors. The use of an electron microscope is essential in being able to underlying cellular features such as hormone granules, and cytoskeleton structures that are expressed by certain cancers. The tumors that will be studied are tumors that are difficult to study under the low power of a light microscope. Even with oil emersion, certain structures that are tumor specific remain unseen. For example, rhabdomyosarcomas typically have cells which are packed with sarcomeres. These cells can be seen under the light microscope, and so can their contents. However, the muscle fibers are not readily apparent because they look very similar to other cytoskeleton structures, and so it advantageous to look at the cells under an EM scope in order to see that the fibers are definitely sarcomeres. This way medical treatment can be specifically tailored to that cancer. Prepared tissues from medical cases at the Community Hospital in Springfield, Ohio, will be examined. The cancers that will be studied include astrocytoma, pancreatic hormone tumors, rhabdomyosarcoma, amelanotic melanoma, leiomyosarcoma, pituitary hormone tumors, and Merkel cell tumors.

Poster Board No. 051

GERM CELL DEVELOPMENT STRATEGY WITHIN THE TESTES OF THE MEDITERRANEAN HOUSE GECKO, *HEMIDACTYLUS TURCICUS*. Erik H. Poldemann, s09.epoldemann@wittenberg.edu, Justin R. Rheubert, Justin.Rheubert@selu.edu, Dr. Kevin M. Gribbins, kgribbins@wittenberg.edu, Dept of Biology, Wittenberg University, 225 N Fountain Avenue, Springfield, OH 45504.

Adult male House Geckos, *Hemidactylus turcicus*, were collected from Louisiana during the months of January-December 2007 (N=24). The testes were removed, fixed in glutaraldehyde, dehydrated with ethanol, embedded in Epon812, sectioned with an ultramicrotome, stained with toluidine blue, and analyzed using light microscopy to determine the germ cell development strategy employed during spermatogenesis. Germ cell proliferation and the initiation of meiosis begin in October and the early events of spermiogenesis are first visualized in December in the gecko testis. The testis remains active in meiosis and spermiogenesis from January through June. Then a period of regression occurs from August-September, which is preeminently characterized by the release of incipient spermatocytes and spermatids and a decrease in the thickness of the seminiferous epithelium. Typically spermatocytes were absent or 5 or more germ cells were present within each month, which suggests no spatial relationships occur between developing germ cells within the testis of House Geckos. Mammalian testes are composed of a seminiferous epithelia in which the germ cells have spatial relationships between germ cells and multiple spermiation events. A more temporal germ cell development strategy exists within anurans in which germ cells develop in cysts as a single cohort and are released in a single spermiation event. House Geckos have a similar temporal developmental strategy within a structurally amniotic testis. The geckos' temporal development strategy supports previous research suggesting that the reptilian tubular testis and its pleisomorphic-like germ cell development strategy may be evolutionarily significant as far as testicular organization in amniotes.

Poster Board No. 052

TUMOR CELL TYPE IDENTIFICATION AT THE SUBCELLULAR LEVEL BY ELECTRON MICROSCOPY EMPLOYING ANTIGEN-SPECIFIC ANTIBODIES CONJUGATED TO COLLOIDAL GOLD. Brenna Noll, s09.bnoll@wittenberg.edu, Jessica Weist, David L. Mason, dmason@wittenberg.edu, Wittenberg University Box 720, Springfield, OH 45501.

Samples from approximately 300 cases of human cancers were obtained from hospitals in the Dayton Miami Valley, OH, to determine the usefulness of tumor cell type identification by examining colloidal gold conjugated to antigen-specific antibodies by electron microscope. Tissues were fixed in neutral buffer formalin (NBF), dehydrated, embedded in Spurr plastic, sectioned on an ultramicrotome, and placed onto nickel grids for immunostaining. To better expose the antigens, the sections were etched in 10% H₂O₂ and washed in a 0.1 M TRIS buffer. A specific primary antibody was applied, followed by protein-A conjugated to colloidal gold of a specific size. The grids were washed in buffer followed by 1% glutaraldehyde, post-stained in 4% osmium tetroxide, washed in water, and stained with 2% uranyl acetate. The results on approximately 15% of the cases revealed by immunoidentification a specific cellular feature that was helpful with the identification of each type of tumor: glial fibrillary acidic protein (GFAP) was detected in the malignant cells of an astrocytoma of the brain, prolactin in a pituitary gland tumor, adrenal corticotrophic hormone (ACTH) in a pituitary tumor, gastrin in a pancreatic gastrinoma,

insulin in a pancreatic insulinoma, glucagon in a pancreatic glucagonoma, and calcitonin in a medullary carcinoma of the thyroid.

Poster Board No. 053

SEX RATIO COMPARISON IN NORTHERN MOCKINGBIRD BROODS IN OHIO AND NORTH CAROLINA. Amsul Khanal, khanala@xavier.edu, Brett E. Schrand, schrandbe@xavier.edu, Christopher C. Stobart, chris.stobart@vanderbilt.edu, Dept of Biology, Xavier University, 3800 Victory Pkwy, Cincinnati, OH 45229-4331.

In birds, the sex ratio of offspring should reflect the reproductive value of and differential investment required to raise male and female chicks. To determine the sex ratios in nests of Northern Mockingbirds (*Mimus polyglottos*) in Ohio and in North Carolina, feathers were collected from nestlings to sample DNA, and the birds were weighed. The sex of birds is determined by sex chromosomes. Males are homogametic (having two Z chromosomes), and females are heterogametic (having one Z and one W chromosome). PCR was used to amplify a region on the sex chromosome that is different on the Z and the W chromosome. Gel electrophoresis was used to determine the sex of each nestling. An overall male-biased sex ratio in the Ohio population was found (75 males and 52 females; $X^2_1 = 4.165$, $p = 0.041$). A seasonal trend in sex ratios in the Ohio population with a greater proportion of male chicks fledging before 15 June than in broods fledging after 15 June was observed. In contrast, a female-biased sex ratio was found in the North Carolina population (24 females and 5 males; $X^2_1 = 12.4$, $p < 0.001$). Male chicks were heavier than female chicks ($p < 0.01$). Thus male chicks may represent a greater parental investment due to their greater size. Male chicks may benefit more than females from fledging early in the season. In the higher-density population in North Carolina, it may be adaptive to overproduce female chicks because females are more likely to disperse.

Poster Board No. 054

A CONFOCAL LASER SCANNING MICROSCOPY STUDY OF THE PENETRATION OF FLUORESCENT NANOSPHERES THROUGH THE CANINE ZONA PELLUCIDA. Matthew O. Lunn, lunnmato@notes.udayton.edu, Shirley J. Wright, Shirley.Wright@notes.udayton.edu, Dept of Biology, University of Dayton, 300 College Park Avenue, Dayton, OH 45469-2320.

Mammalian oocytes are surrounded by an extracellular glycoprotein matrix called the zona pellucida (ZP). Sperm must bind to and penetrate the ZP to fertilize the oocyte. In addition to its role in sperm-egg binding, the ZP may function as a barrier to pathogens even though it may contain pores. ZP structure and composition varies depending on the species. Surprisingly little is known about the ultrastructure of the ZP in companion animals. The objective of this study was to determine whether the canine ZP prevents nanospheres the size of canine viruses from penetration the ZP. Oocytes (n = 184) were isolated from ovaries from 21 dogs aged 6 months to 9 years. Oocytes were exposed to fluorescent nanospheres (24, 100, 210 nm), and confocal microscopy was used to determine how far the nanospheres penetrated the ZP. The 210 nm nanospheres penetrated the entire width of the ZP in only 24.6% of the oocytes (n = 57), whereas the 100 nm and the 24 nm nanospheres penetrated the ZP more often, 41.5% (n = 53 oocytes) and 86.3% (n = 74 oocytes), respectively. In some oocytes, most of the ZP was resistant to penetration, however, the nanospheres penetrated the ZP in discrete patches reminiscent of the path of transzonal processes of cumulus cells. Since the ZP inconsistently blocks nanospheres, *in vitro* fertilization is not a means to consistently produce viable, virus-free offspring from infected dogs and endangered canids. Funded by the AKC Canine Health Foundation.

Poster Board No. 055

EFFECTS OF PYRROLIDINE DITHIOCARBAMATE ON THE EXPRESSION OF POTENTIAL CELL-CYCLE REGULATORS OF *TOXOPLASMA GONDII*. Brittney K. Fey, bfey@wilmington.edu, Ashley L. Johnson, aljohnson@wilmington.edu, Jessica A. Marchetti, jmarchetti@wilmington.edu, and Douglas B. Woodmansee, doug_woodmansee@wilmington.edu, Dept of Biology, Wilmington College, 1870 Quaker Way, Wilmington, OH 45177.

Toxoplasma gondii is a pathogenic intracellular parasite belonging to the protistan Phylum Apicomplexa. The details of the cell-cycle control mechanisms of this parasite are only beginning to be studied. The compound pyrrolidine dithiocarbamate (PDTC) can induce a reversible cell-cycle arrest in *T. gondii* and PDTC-induced regulation of transcription from a gene suggests the gene's involvement in

cell cycle regulation. Human foreskin fibroblasts growing in 25cm² cell culture flasks were infected with *T. gondii* at a 1:1 parasite/host cell ratio. Infected cells were exposed to 50 µM PDTC for 12 hours. Infected cells not exposed to PDTC were used as controls. Total RNA was isolated from both types of cultures using commercially available kits. Transcription of 3 genes encoding potential cell cycle regulators were examined by reverse transcriptase-polymerase chain reactions using commercially available reagent kits and primer sets developed by us using sequence data obtained from the *T. gondii* genome sequencing project (www.toxodb.org). The genes examined were a 14-3-3^o homologue, a putative cyclin gene (TgCYC2), and a putative homologue of human ménage-a-tois protein (TgMAT1). mRNAs from all 3 genes were detected both in PDTC-treated cultures and controls suggesting that the drug does not completely block transcription of any of the genes. In progress are experiments to test if PDTC induces quantitative changes in transcription of the genes.

Poster Board No. 056

HERPETOLOGICAL SURVEY OF THE DIKE-14 DREDGE DISPOSAL SITE (CUYAHOGA COUNTY, OHIO). Michele E. Nelson, mnelson@bw.edu, R. Chris Stanton, cstanton@bw.edu, Baldwin-Wallace College, 275 Eastland Rd, 207 Findley Hall, Berea, OH 44017.

Dike 14 is a 35.2-hectare confined dredge disposal site located along Lake Erie in Cleveland, Ohio. Sediments from the Cuyahoga River were dredged and dumped in this facility from 1979 to 1999. Since 1999, the area has become home to a growing number of animals, but no study has been conducted on herpetological species inhabiting the site. The objectives of this project were to (1) document all herpetological species at Dike 14, (2) map the locations of each species' occurrence, and (3) make recommendations for the future of the area. In order to detect certain amphibians, spring calling surveys were conducted in March and April of 2008. During June, July and August of 2008, cover tins, cover boards, and turtle traps were deployed and checked twice per week. Despite these efforts, only one herpetological species was collected – the brown snake (*Storeria dekayi dekayi*). This species was found throughout Dike 14 but their activity level peaked on 9 July, when 110 individuals were collected. Mark-recapture data suggest that the actual population is approximately 182 individuals. It appears that Dike 14 provides appropriate habitat, adequate food sources and is mostly free of pollutants (based on a 2007 soil survey). Therefore, the low diversity of reptiles and amphibians is most likely due to roadways that prevent colonization. In order to increase species diversity, native species such as garter snakes, American toads and spring peepers should be translocated to Dike 14. These species would thrive given the types of habitats present at the site.

Poster Board No. 057

GASTROPOD SHORELINE BIODIVERSITY IN SAN SALVADOR, THE BAHAMAS. Matthew K. Eller, s09.meller@wittenberg.edu, Nicholas F. Ferrari, s09.nferrari@wittenberg.edu, Sergei A. Robinson, s09.srobinson@wittenberg.edu, Tim L. Lewis, tlewis@wittenberg.edu, Wittenberg University, Dept of Biology, Springfield, OH 45504.

The shorelines of San Salvador, The Bahamas, consist of both karstic limestone shores and calcareous sandy beaches. To investigate the biodiversity of gastropods in these intertidal areas, the species richness and evenness were calculated on the four cardinal faces of the island. Since San Salvador orients in a north-south direction, the four faces corresponded with four different oceanic exposures. The yellow zone provided optimal conditions to perform research due to the presence of tidal pools. One meter quadrants were placed every three meters along the transect until the transect line went outside the yellow zone. The biodiversity of gastropods among the faces of the island varied by direction of exposure: the western face had the lowest biodiversity according to Shannon and Simpson's indices ($H' = 1.09$, $D = 0.525$ respectively). However, the western face contained the highest species richness of 14. The three remaining sides were similar in the indices ranging between $H' = 1.37-1.54$ and $D = 0.287-0.296$, respectively. Also among the remaining faces, gastropod richness ranged from 8-9. These results could be due to environmental factors which might include wave action, sun exposure, submergence, and habitat. The biodiversity values shown may be compared to other isolated islands because San Salvador is the easternmost island of the Bahamas.

Poster Board No. 058

EFFECT OF WETNESS AND SURFACE MICROORGANISMS ON SHORLINE ZONATIONAL MOVEMENT OF NERITES, SAN SALVADOR, THE BAHAMAS. John T. Lusoski Jr, s09.jlusoski@wittenberg.edu, Samantha M. Imfeld, s11.simfeld@wittenberg.edu, Scott E. Morris, s10.smorris@wittenberg.edu, Timothy L. Lewis, tlewis@wittenberg.edu, Dept of Biology, Wittenberg University, PO Box 720, Springfield, OH 45501-0720.

Nerites (family: *Neritidae*) are small, herbivorous snails that forage along the tide line of rocky intertidal shores. Common nerites include: *Nerita tessellata* (checkered nerite), *N. versicolor* (four-tooth nerite), *N. peloranta* (blood-tooth nerite), *N. seabricosta* (coffee bean nerite), and *Puperita pupa* (zebra nerite). Intertidal tropical shores encompass multiple zones including the yellow, black, gray, and white zones. The coloration of each zone is determined by the microorganisms living on the rock surface (e.g. algae and bacteria). For this experiment, nerite movements through the intertidal zones were observed on San Salvador, The Bahamas. Over 9 trials, 86 nerites were placed into a simulated habitat at various water depths (dry, submerged in swash zone, and submerged ½ m deep). Nerite movement depended on the wetness of the surface and the microorganisms present. There was little movement in the dry trial; 71% of nerites stayed in the sand (overutilization $\chi^2 = 18.645$, $P < .0001$). High activity was observed when water was present: in semi-submerged 28% of nerites stayed in the sand (underutilization $\chi^2 = 3.635$, $P < .0001$) for submerged 24% of nerites stayed in the sand (underutilization $\chi^2 = 5.814$, $P < .0001$). The *P*-value shows that there is <.0001% probability that these data would be observed by random chance alone if there were no correlation between surface wetness and the movement of the nerites. Nerites preferred the yellow, black, and gray zones over the white zone. Nerites possibly moved in response to the microorganisms and food sources that inhabited the rocks, when dehydration was not a factor.

Poster Board No. 059

DO CHRISTMAS TREE WORMS, SPIROBRANCHUS GIGANTEUS, AND SPLIT-CROWN FEATHER DUSTERS, ANAMOBAEA ORSTEDII, MATCH THEIR SUBSTRATE? Kevin D. Swagler II, s10.kswagler@wittenberg.edu, Breanna L. Kimble, s10.bkimble@wittenberg.edu, Jim Welch, jwelch@wittenberg.edu, Biology Dept, Wittenberg University, 908 Woodlawn Ave, Springfield, OH 45502.

Christmas tree worms, *Spirobranchus giganteus*, and split-crown feather dusters, *Anamobaea orstedii*, are segmented worms that live burrowed in live coral, inside a calcium carbonate tube. Both have colorful branchiae (in spiral and fan shapes, respectively) that protrude from the tube. Branchiae allow for filter feeding and respiration. This study examines the correlation between the colors of branchiae and the organisms' variously colored substrates. The hypothesis was that Christmas tree worms and split-crown feather dusters match the color of their branchiae to that of their substrates. During May 2008, at several sites on San Salvador, The Bahamas, worms were surveyed and the colors of their branchiae and their substrates were recorded. The most common substrate for Christmas tree worms (156 of 165 worms) was yellow mustard hill coral, *Porites astreoides*, and the most common colors of their branchiae were peach, yellow, and orange (63 of 156). The mean number of worms of yellowish colors was significantly higher than the mean number of worms of other colors ($t = 442685$; 1 df; $p < < .0001$). The most common substrate for split-crown feather dusters was brown algae and sand (12 of 33 worms), and the most common branchiae colors of the dusters were brown/white, maroon/white, and purple/white (9 of 12). Both Christmas tree worms found on mustard hill coral and split-crown feather dusters found on brown algae and sand were more likely to match their substrates than worms found on other substrates (72 of 168). This likelihood could be due to larvae selectively settling onto substrates similar to their own coloration. Alternatively, worms that do not match the color of their substrate might experience higher predation levels.

Poster Board No. 060

THE EFFECTS OF TYPICAL ALCOHOL CONSUMPTION ON THE CEREBELLAR HEMISPHERES. Kevin D. Swagler II, s10.kswagler@wittenberg.edu, John T. Lusoski Jr, s09.jlusoski@wittenberg.edu, Cathy L. Pederson, cpederson@wittenberg.edu, Biology Dept, Wittenberg University, PO Box 720, Springfield, OH 45501.

There has been some contention recently about the effects of moderate alcohol consumption on cognition. One of the many areas of the brain that can be affected by alcohol use is the cerebellum, which controls balance and adjusts movements from information received from the motor cortex. It is hypothesized that with moderate alcohol consumption, the volume of cerebellar hemispheres will be smaller compared to those not using alcohol. Only women who consumed an average of one or more drinks every other day, the amount a typical social drinker would consume, were used in this study. Using 3D Brainstation software, the volumes of the twenty-two subjects' cerebellar hemispheres were calculated from twice-traced MRI images every sixth slice. After completing the tracings, the software calculated the area, which was then summed and multiplied by six to calculate the total volume. Then univariate analysis of variance (ANOVA) was run for age ($F(1,22)=0.938$; $p=0.344$), Wonderlic ($F(1,22)=0.102$; $p=0.753$), years of education ($F(1,22)=0.254$; $p=0.620$), pack-years smoking ($F(1,21)=0.058$; $p=0.813$), and average abuse (physical, emotional, sexual) ($F(1,22)=7.179$; $p=0.014$). By design, a significant difference in number of drinks per year was found ($F(1,22)=184.076$; $p<.001$). An ANCOVA was run for the volume of the cerebellar hemispheres using average abuse as a co-factor which resulted in no significant difference between groups ($F(1,22)=0.034$; $p=0.857$). This reveals that there is no significant difference between moderate levels of consumption and volume loss in the cerebellar hemispheres in this community-based sample of women.

Poster Board No. 061

COMPARISON OF ALLELOPATHIC EFFECTS OF THREE MIDWESTERN INVASIVE SPECIES. Crystal A. Wagner, cwagner@wilmington.edu, Kyle D. Titus, ktitus@wilmington.edu, Kendra A. Cipollini, kendra_cipollini@wilmington.edu, Wilmington College, 1870 Quaker Way, Wilmington, OH 45177.

Invasive plant species cause negative effects in new environments through a variety of mechanisms, one of which is allelopathy. Bush honeysuckle (*Lonicera maackii*), garlic mustard (*Alliaria petiolata*) and lesser celandine (*Ranunculus ficaria*) are three species which invade Midwestern forests. Allelopathy was investigated by making leaf extracts of each of these three species. In a fully factorial experiment, the effect of extract type (3 species) and extract concentration (0.1, 0.2 and 0.3 mg fresh leaf mass/ml distilled water) on germination, growth and reproduction of the model target plant *Arabidopsis thaliana* was investigated. Additionally, a control treatment was watered with distilled water. Each treatment and treatment combination was replicated 4 times ($N = 3 \text{ types} \times 3 \text{ concentrations} \times 4 \text{ replicates} + 4 \text{ control} = 40$). Analyses of Variances (ANOVAs) were performed on the measures of percent seed germination, final leaf diameter, number of siliques, days to first flower and seed mass. Germination of *A. thaliana* was significantly delayed ($P < 0.05$) by the two highest extract concentrations of *L. maackii* compared to the control. There were significantly ($P < 0.05$) less siliques when plants were treated with extracts of *L. maackii*. There was a trend ($P = 0.071$) for delayed flowering in plants treated with extracts of *R. ficaria*. These results confirm that *L. maackii* exhibits allelopathic effects on *A. thaliana*, while *A. petiolata* does not, as well as providing tentative preliminary evidence of the allelopathic potential of *R. ficaria*.

Poster Board No. 062

THE EFFECTS OF HUSBANDRY SITUATIONS ON THE LEVELS OF CORTISOL IN PERSIAN ONAGERS (*EQUUS HEMIONUS ONAGER*). Jessica B. Turner, jessicat@muskingum.edu, James L. Dooley Jr, jdooley@muskingum.edu, Mandi Vick, VickM@si.edu, Rupert Palme, Conservation Science Program, Muskingum College, 163 Stormont St, New Concord, OH 43762.

Endocrinology can provide important insights relative to the reproductive biology of at-risk species and therefore serves as an important arm in conservation efforts. Levels of cortisol can be elevated because of environmental and physiological stress occurrences. Prolonged stress can result in failure of reproductive function and it can negatively impact immune system development. The objective of this study is to see if husbandry situations can elevate or decrease cortisol in captive equids. Analysis was conducted on two groups of Onagers (*Equus hemionus onager*) while they were maintained in areas of minimum human interaction (pasture) and daily human interaction (yard). Fecal matter rather than blood samples was collected for analysis to reduce the stress of sampling. Cortisol levels of pasture animals were re-measured later after Onagers were returned to yards and then again after an additional two months in the yards (the recovery period). Eight samples from each animal were collected from each local. Cortisol was analyzed through enzyme immunoassays through the assay type double antibody sandwich ELISA. The fecal glucocorticoid

metabolite used was 11-oxo-aetiocholanone. Preliminary analyses indicate cortisol levels in yard samples were significantly higher in the yard relative to pasture and recovery samples. Sample group one had cortisol levels of 1966.899 ng/g present in the yard, and cortisol levels of 1530.414 ng/g after recovery ($p=.020$). Sample group two had cortisol levels of 1292.943 ng/g present in the pasture and cortisol levels of 2282.586 ng/g present in the yard ($p<.001$). Further data will be collected and analyzed, as the final analysis will compare the two group's results to see if there is consistency.

Poster Board No. 063

DARTER DIVERSITY AT THE WILDS, MUSKINGUM COUNTY, OHIO. Cessna Nichols, cessenac@muskingum.edu, James L. Dooley Jr, jdooley@muskingum.edu, Muskingum College, 163 Stormont St, New Concord, OH 43752.

Darters are fish that prefer high quality water, habitats, and are the smallest members of the family Percidae, ranging from 2.0cm to 11cm long. They are agile swimmers typically living on stream bottoms. However, less is known about the darters in comparison with their game species counterparts. Darters are habitat and water quality-sensitive and different substrates are used by different species of darters. The effects of changes in streambed types, concentrations of chemicals or minerals, movement patterns, and human introduction of competing species are still unclear. In this study, Miller creek, located at the Wilds (Muskingum County), was seined on three different occasions (July 4th, 5th and September 18th of 2008) to get an estimate of the species richness and abundance of darters. A seine net was placed downstream of a group of people who walk towards the net forcing the fish into the net. This site was selected because the stream runs through land that was formally surface-mined. Data from this site will be compared to data derived from sampling Salt Creek (an undisturbed stream) on May 2nd of 2008. Salt Creek was electro shocked. In this method, a mild electrical shock stuns the fish making them float or sink to the bottom of the stream. The fish are then collected downstream of the electro shocking equipment with a seine or dip net. All of the fish caught during this study were identified in the field and all live specimens were placed back into the streams. This work constitutes the first sampling of darter diversity at the Wilds and therefore can provide foundation data for future comparisons.

Poster Board No. 064

EFFECTS OF STRESS-INDUCED CHANGES IN THE HEMOLYMPH OF FRESHWATER UNIONID MUSSELS FROM EXPOSURE TO ANOXIC CONDITIONS. Kylie Johnson, kyliej@muskingum.edu, Brian Bergstrom, brianb@muskingum.edu, James L. Dooley, jdooley@muskingum.edu, Conservation Science Program, Muskingum College, 163 Stormont St, New Concord, OH 43762.

Freshwater mussels are considered to be a "keystone taxon" due to their critical functional roles and impacts on other organisms within aquatic ecosystems. In addition, bivalve mollusks have become of considerable interest in recent years as biological indicator species for use in environmental monitoring programs. Bivalve mollusks have demonstrated generally high tolerance levels to anoxia in invertebrate comparative studies, and their survival in anoxic conditions serves as an indicator for the presence of environmental stresses such as pollution. In this study, the stress-induced responses due to anoxic conditions in unionid mussels were studied by extracting hemolymph from the invertebrates using pericardial catheters after aerial exposure. Stress levels were determined as a function of catecholamine concentration via HPLC-EC. The first experimental test exposed a group of freshwater mussels to anoxic conditions for a 24-hour period, with the results showing a 40% increase in dopamine and a 94% increase in noradrenaline levels in the hemolymph after the 24-hour period when compared to time 0. These results suggest that the experimental conditions may have initially activated the stress response since these neurochemicals act as pre-cursors for adrenaline. This study will provide insight into the effects of stress-responses in freshwater mussels, of which little is currently known. The resistance capabilities of freshwater mussels to anoxic conditions will also present useful information for future use of unionids as biological indicators of stream and ecosystem quality.

Poster Board No. 065

SURVEY OF NON-MELLIFERA HYMENOPTERA POLLINATING FRUIT AND VEGETABLES IN OHIO. Roger N. Williams, williams.14@osu.edu, Dan S. Fickle, fickle.1@osu.edu, Danielle Keeler, dkeeler@bgsu.edu, Bowling Green State University, Dept of Entomology, Ohio State

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With the decline of honey bee populations throughout the world researchers are questioning whether pollinators such as bumble bees and other native bees can fill the pollination role; or, are they not able, due to disease, predation, loss of habitat, or the use of pesticides. In order to determine their ability to meet the task, we must first identify our native pollinators, quantify their numbers, and ascertain to what degree they are providing pollinator service in relation to domesticated honey bees. To address these questions, a study was conducted from 2006 to 2008 to establish both pollinator richness and also the frequency of flower visitation to various fruit and vegetable crops grown in Ohio. During the growing season, observations were made of flower visitation by honey bees (*Apis mellifera*), bumble bees (*Bombus* spp.), and other native bees (non-*mellifera*) to strawberries, blueberries, blackberries, raspberries, squash, and pumpkins. This observation consisted of counting the number of flower visits over a 5-minute period and assigning a percentage. The percentage of flower visitations from non-*mellifera* bees ranged from 3 to 100%. In order to determine the diversity of non-*mellifera* species performing pollination, voucher specimens were collected. The collection was by hand, and using a collection method comprised of colored plastic bowls containing soapy water placed within targeted crops. Through these methods, 35 species of hymenopterous pollinators were identified, belonging to the following families: Apidae, Andrenidae, Halictidae, and Megachilidae. Observations and identification of non-*mellifera* pollinators indicated that native pollinators are responsible for a major part of the pollination provided to strawberries, blueberries, and pumpkins.

Poster Board No. 066

OVIPOSITION PREFERENCE OF MACRODACTYLUS PULCHRIPES BLANCHARD (COLEOPTERA: SCARABAEIDAE) ON DIFFERENT SOIL REGIMES IN ECUADOR. Roger N. Williams, Williams.14@osu.edu, Marco Rueda, markorueda@latinmail.com, Patricio Gallegos, gallegos@fpapa.org.ec, Nuris M. Acosta, Acosta.26@osu.edu, Michael Ellis, ellis.7@osu.edu, Luis A. Canas, canas.4@osu.edu, The Ohio State University, 1680 Madison Ave, Wooster, OH 44691.

Macroductylus pulchripes Blanchard (Coleoptera: Scarabaeidae) is a serious pest of corn in San Jose de Minas, Ecuador. Farmers are very concerned about corn yield losses and are seeking manage solutions. However, very little is known about the behavior of this pest in Ecuador. Six soil mixtures representing different cropping conditions were replicated five times and evaluated for ovipositional preference and larval survival in 2004. The treatments included: fallow, fallow plus manure, fallow plus compost, cultivated, cultivated plus manure, cultivated plus compost. The study was conducted in a small, unheated greenhouse on the same farm; each plot was 0.096 m³. The number and location of adults within each plot were recorded for 5 consecutive days after the initial adult release and the progeny of those adults were excavated and counted at day 70. Adults *M. pulchripes* were significantly more abundant on all the fallow soils, with a mean of 97.1 adults compared to 33.1 for cultivated soils. Few larvae were collected from all treatments, however; larvae were significantly more abundant in cultivated and cultivated plus compost soils with an average of 5.2 larvae compared to a mean of 0.25 for the remaining treatments ($P=0.05$). These findings might suggest allowing ground to remain fallow around the field crop and not to cultivate those sites at the beginning of the rainy season when adults are searching for oviposition sites. However, more studies need to be conducted on the effect soil moisture on the oviposition preferences of *M. pulchripes*.

Poster Board No. 067

EVALUATION OF PLASTIC MULCH ON PINEAPPLE PRODUCTION. Roger N. Williams, Williams.14@osu.edu, Edgar Alvarado, ealvarado@earth.ac.cr, Alfonso Martinuz, pietrovartil@yahoo.com, Mauricio Avila, mavila@wisc.edu, Jose D. Quiros, joquiros@chiquita.com, Michael Ellis, ellis.7@osu.edu, Nuris M. Acosta, Acosta.26@osu.edu, The Ohio State University, 1680 Madison Ave, Wooster, OH 44691.

An increase in the production and demand for a better quality produce have motivated growers in Costa Rica to evaluate the use of plastic mulch in pineapple production to generate information on plant growth and fruit quality. The study was conducted at an organic farm of EARTH University in Limon, Costa Rica in 2005 and 2006. Three colors of plastic were used; transparent, silver, and black. They were compared to bare soil in a Randomized Complete Block design with four replications. Variables evaluated were 1) weight of plants six months after transplant, 2) fruit weight

at harvest, 3) plant mortality, 4) soil temperature at 10 cm depth taken at 14:00 h, and 5) weight of weeds on 0.5 m². Plants grown in plastic mulch were superior to those plants grown on bare soil with all the variables evaluated both years. Plant and fruit weights were significantly higher for transparent plastic compared to silver and black plastic; 1.58 vs 1.09 kg and 2.36 vs 2.19 kg, respectively ($P=0.05$). Plant mortality was 15 fold higher in bare soil than those covered by plastic mulches. Transparent plastic reached the highest soil temperature in both years, 36 and 28 °C, followed by black, silver and bare soil. All plastic mulch treatments had an excellent weed control compared to bare soil, averaging 2 and 60 g, respectively.

Poster Board No. 068

ORGANIC INSECT MANAGEMENT FOR VINEYARDS IN THE EASTERN UNITED STATES. Roger Williams, Williams.14@osu.edu, Thomas Troyer, djracertt03@aol.com, Dept of Entomology, Ohio State University, 1680 Madison Ave, Wooster, OH 44691.

Public interest has stimulated growth in organically grown fruit in the Eastern United States. To assist in this effort a study was begun in organic viticulture. Eastern vineyards tend to have serious arthropod problems, thus, good insect management is imperative. Most insect and disease problems can be controlled with pesticides, however, organic production is more complex, generally requiring more frequent spray applications. The arsenal of organic insect deterrents is greatly outnumbered by the broad spectrum synthetic pesticides which are not allowed by certification agencies. Since fewer efficacious pesticides are approved and available for organic growers than for conventional farming this study focused on finding and documenting efficacy of natural enemies, such as diseases, parasitoids, predators, beneficial nematodes, and cultural practices that are organically approved for control of the most common eastern grape pests. Ideally for organic management natural resistance to insects would be the ultimate management tool, however, such resistance has only been found in certain rootstocks for phylloxera. It has been found that several of the major pests can be successfully managed by using microorganisms which are approved by certification agencies. The insects and their organic controls are as follows; grape berry moth, *Bacillus thuringiensis*; adult Japanese beetles, *Metarhizium anisopliae* and *Beauveria bassiana*; Japanese beetle larvae, *Steinernema glaseri* and *Heterorhabditis bacteriophora*; rose chafer adults, trapped out with feeding attractant; multicolored Asian lady beetle, repellants such as NEM products. Hopefully this information will aid in the reduction of persistent pesticides in our environment.

Poster Board No. 069

MOLD ALLERGY-CONTROLLING MITES PRESENT ON THE MADAGASCAR HISSING-COCKROACH. Michael J. Chambers¹, s11.mchambers@wittenberg.edu, Justin L. Tank¹, s09.jtank@wittenberg.edu, Joshua B. Benoit², benoit.8@osu.edu, Jay A. Yoder¹, jyoder@wittenberg.edu, ¹Dept of Biology, Wittenberg University, Springfield, OH 45501, ²Dept of Entomology, The Ohio State University, Columbus, OH 43210.

Madagascar hissing-cockroaches, *Gromphadorhina portentosa*, are common in science classrooms, museums, and in households as pets. These cockroaches are a potent source of allergenic molds, raising serious health concerns given their widespread use and linkage to allergies and childhood asthma. Common fungi carried by these cockroaches are *Alternaria* sp., *Aspergillus* sp., *Cladosporium* sp., *Geotrichum* sp., *Mucor* sp., *Penicillium* sp., *Rhizopus* sp., and *Trichoderma* sp., all characterized by rapid vegetative growth and heavy spore production. This study tested the capacity of a symbiotic mite (*Androlaelaps schaeferi*) to regulate the fungal levels by means of external fungus culturing using two different media (Potato Dextrose Agar and Modified Melin Norkrans) comparing the number of fungal colonies on mite-free and mite-infested cockroaches as well as cockroaches loaded with known numbers of mites (N=3 replicates of 20 each). The presence of mites reduced the total number of surface fungi by 2/3 in adult female cockroaches, 1/3 in adult male cockroaches and 1/4 in final instar nymphal cockroaches. Fungus levels continued to drop when cockroaches were artificially infested with increasing loads of mites, suggesting that mites were responsible for the decrease. The same fungi were present on both cockroach colonies, indicating that mites result in an overall reduction of all fungal components, not a specific type of fungi. The mites do not eat the fungi, rather they eat cockroach saliva that the fungi need to grow. The mites may minimize the risk of fungal pathogens that could be encountered by these cockroaches in their native habitat may serve to reduce levels of molds associated with human allergies.

Poster Board No. 070

SUPPRESSING FUNGAL GROWTH BY ROUTINE TREATMENTS APPLIED TO HONEY BEE COLONIES IN RELATION TO INCREASED INCIDENCE OF BEE FUNGAL PATHOGENS. Brady S. Christensen, s11.bchristensen@wittenberg.edu, Travis J. Croxall, s11.tcroxall@wittenberg.edu, Jay A. Yoder, jyoder@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501.

Numerous fungi are found within honey bee colonies that are beneficial by facilitating the storage of bee bread and pollen. Other fungi are pathogenic, such as *Ascosphaera apis*, agent of chalkbrood, and *Aspergillus flavus*, agent of stonebrood. According to fungus ecology, if a fungus is suppressed, other fungi take over and exploit an unoccupied substrate. Here, formic acid and oxalic acid (parasitic mite control), along with high fructose corn syrup (feeding supplement) were used to examine effects of these compounds on growth rates of fungi regularly found in the colony environment. Eleven fungi (original bee isolates) were tested on potato dextrose agar, 30°C, total darkness, to simulate hive conditions using a trisecting line method to calculate radial growth rate (N=3 replicates of 45 measurements each). The fungi tested were *Absidia* sp., *Alternaria* sp., *A. apis*, *Asp. flavus*, *Asp. niger*, *Cladosporium cladosporioides*, *Fusarium* sp., *Mucor* sp., *Penicillium glabrum*, *Rhizopus* sp., and *Trichoderma* sp. Of the 11 fungi, six were sensitive to the organic acids (*Absidia* sp., *A. apis*, *Asp. flavus*, *Fusarium* sp., *Penicillium* sp., and *Mucor* sp.). Formic acid was the most suppressive (4-6 fold), followed by oxalic acid (2-3 fold) and then high fructose corn syrup (2 fold). Evidence suggests that altering fungal dynamics of honey bee colonies by use of these compounds can occur, leaving potential unoccupied substrate. This conclusion is backed by preliminary field observations revealing that honey bee colonies repeatedly treated with these compounds show increased incidence of fatality due to takeover by bee fungal pathogens.

Poster Board No. 071

LARVAL COMPETITION AS A MEANS OF PROMOTING SURVIVAL AND WATER CONSERVATION IN ADULTS OF THE SEED BEETLE. Justin L. Tank¹, s09.jtank@wittenberg.edu, Bethany R. Rohr¹, s10.brohr@wittenberg.edu, Daniel R. Buchan¹, s09.dbuchan@wittenberg.edu, Jay A. Yoder¹, jyoder@wittenberg.edu, George D. Keeney², keeney.1@osu.edu, ¹Dept of Biology, Wittenberg University, Springfield, OH 45501 and ²Dept of Entomology, The Ohio State University, Columbus, OH 43210.

The seed beetle, *Callosobruchus maculatus*, is one of the most widespread and serious stored grain pests throughout the world. Adult females lay eggs on the seed surfaces, larvae hatch, burrow inside, feed within the seeds, pupate, and the adult exits out of the empty seed coats. For one strain (South India), a distinct aggressive competition occurs among larvae within the seed where only one adult beetle prevails. Most strains of this beetle (eg; Brazil strain) have no larval competition and many adults emerge from a single seed. A water balance study was conducted on adults to determine how this behavior correlates with survival (replicates of 15; N=3). No difference between South India and Brazil strains was noted with regard to dehydration tolerance, and water conservation features, consistent with their ability to thrive in hot, dry storage bins. Neither a critical transition temperature (CTT) nor critical equilibrium humidity (CEH) were apparent, thereby safeguarding beetles against excessive lethal water loss as temperature rises. Furthermore, adults of South India strain were distinguished by an extended capacity to survive without food and water, attributed to a larger body size, resulting in a lower net transpiration rate with suppressed activation energy (E_a , permeability constant), and a lower percentage body water content due to a higher dry mass (fat). These modifications for water balance of the South India strain indicate the potential for greater persistence, expanding distribution and increased bouts of reproduction for adults of *C. maculatus* strains that competed as a larva.

Poster Board No. 072

EXTREME RESISTANCE TO HIGH TEMPERATURE IN THE RED VELVET MITE BY A GLANDULAR SECRETION FROM THE URNULAE. Justin L. Tank, s09.jtank@wittenberg.edu, Jay A. Yoder, jyoder@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501-0720.

Balaustium sp. mites are being considered for use in biological control, primarily against scale insects. Despite their small size, these mites display an impressive toleration to high temperatures and resistance to desiccation. They have been observed on metal

surfaces as hot as 50°C for up to 30 minutes suggesting that they may be able to be used for biological control in areas other than the Midwest. Our hypothesis is that a secretion from a large set of glands called urnulae (of unestablished function) on the dorsum of these mites provides a water-proofing barrier permitting them to tolerate high temperatures without succumbing to water or heat stress. In this study, net transpiration rate (N=75) and critical transition temperature (N=525) were determined comparing mites that had secreted with mites that had not secreted. Results showed that mites that had secreted (1.33%) lost water at approximately half the rate of mites that did not secrete (2.47%) and there was a 9°C increase in lethal permeability temperature (LPT, a temperature that if exceeded results in death by dehydration). Also in mites that had secreted, there was a decrease in Arrhenius frequency steric factor A as evidenced by a decrease in γ -intercept on an Arrhenius plot as well as a 10kJ/mol drop in activation energy (E_a), implying a water impermeable cuticular modification. The lack of a critical transition temperature (CTT), however, implies that urnulae secretion coating resists a phase change as the temperature permitting mites to handle high temperatures without succumbing to water and heat stress by preventing cuticular breakdown.

Poster Board No. 073

DISCOVERY OF AN AGGREGATION PHEROMONE IN THE CAVE CRICKET AND ITS IMPLICATIONS FOR THE CAVE ECOSYSTEM. Travis J. Croxall, s11.tcroxall@wittenberg.edu, Brady S. Christensen, s11.bchristensen@wittenberg.edu, Jay A. Yoder, jyoder@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501-0720.

Ceiling aggregations of *Hadenoeus cumberlandicus*, a cave cricket, are the backbone of many small cave ecosystems. These crickets are a keystone species in northern Kentucky caves where their guano is the primary energy source for ground-dwelling invertebrates that reside under cricket roost. Because of the clustering's importance, this study seeks to determine whether this behavior is guided by a pheromone, presumably located in feces (guano), by bioassays that were conducted on cave walls and in the laboratory. A two-choice 1m transect block design was utilized to test attraction to natural pheromone (cricket excreta) on filter paper targets, and uric acid (0.001M, 0.01M, 0.1M), the main component of insect feces, with observations at 1 and 6 hours (replicates of 10; N=4). Collections of natural pheromone were obtained by placing crickets in a cooler with filter paper discs and allowed to defecate for 48 hours. Over 70% of crickets were attracted to natural pheromone in all tests. Results with uric acid were inconsistent, and therefore uric acid is ruled out as the active ingredient. The cave cricket aggregation pheromone is not a sex pheromone because adults and nymphs responded similarly to excreta from each other and the population is parthenogenic. Rather, this pheromone functions to reduce water stress by concentrating crickets in areas of the cave with high relative humidity and reduced air currents. Additional features of this pheromone are long range detection, attraction and arrestment (reduced ambulatory activity) that lead and retain crickets at these highly selected sites in the cave.

Poster Board No. 074

INCREASED TEMPERATURE TOLERANCE BY DERMAL GLAND SECRETION AS A MECHANISM TO PREVENT HEAT DAMAGE DURING FEEDING IN THE BROWN DOG TICK. Brian Z. Hedges¹, s12.bhedges@wittenberg.edu, Justin L. Tank¹, s09.jtank@wittenberg.edu, Joshua B. Benoit², benoit.8@osu.edu, Jay A. Yoder¹, jyoder@wittenberg.edu, ¹Dept of Biology, Wittenberg University, Springfield OH 45501, ²Dept of Entomology, The Ohio State University, Columbus, OH 43210.

When brown dog ticks, *Rhipicephalus sanguineus*, are disturbed, they secrete droplets of fluid from dermal glands as a defense mechanism. These glands also secrete due to the pressure stimulation of engorgement, suggesting that release of this secretion may play a role during blood feeding, which occurs on mammals at 37°C for many days. In this study, ticks were forced to secrete (by pinching their legs with forceps) and then used to determine maximum temperatures for survival (1 hour heat shock coupled with a behavioral scoring system) and dehydration tolerance (water loss rate) (six test temperatures; replicates of 60 ticks/temperature; N=3). While the ability of ticks after secretion to retain water was not impacted, heat tolerance was improved. Heat shock survival rates in secreted ticks were higher than those in untreated (not secreted) controls (one hour at 56°C versus one hour at 50°C, respectively), and showed 80% decreases in injury response and two-fold increase in recovery rates. During prolonged

exposure (30 days) to host body temperature of 37°C, ticks that had secreted survived one week longer than untreated controls. Topically applied squalene (the main component of dermal gland secretion) failed to protect ticks from damage due to heat shock, implying that increase in heat tolerance after dermal gland secretion is attributed to the act of secreting, rather than chemical properties of the secretion itself. The results of this study indicate that secretion by dermal glands is critical to surviving high body temperatures experienced on the host during feeding.

Poster Board No. 075

INCREASED BEACHING OF MUSSELS FOLLOWING APPLICATION OF THE LAMPTRICIDE TFM (3-TRIFLUOROMETHYL-4-NITROPHENOL) IN THE GRAND RIVER AND CONNEAUT CREEK, OHIO. Joel P. Yankie, joel.yankie@otterbein.edu, Michael A. Hoggarth, mhoggarth@otterbein.edu, Dept of Life and Earth Sciences Otterbein College, Westerville, OH 43081.

The objective of this study was to determine sub-lethal effects of the lampricide TFM (3-trifluoromethyl-4-nitrophenol) on the freshwater mussel communities of the Grand River in Lake County and Conneaut Creek in Ashtabula County, Ohio. Lethargic freshwater mussel behavior has been documented in response to TFM; other sub-lethal effects may include increased susceptibility to beaching, reduced reproduction and underdevelopment. Mussel beaching rate was determined by collecting all beached mussel shells before and after lampricide treatment at three sites on Conneaut Creek and one site on the Grand River. Shells of dead mussels were also collected in the water. All shells collected from beach and water were identified, measured, and aged. Stream gage data were used to determine when a flooding event occurred and the maximum height of the flood. Mussel beaching was directly proportional to height of flooding event in both streams ($r^2=0.9986$, $p < 0.01$ for Conneaut Creek, and $r^2=0.7128$, $p < 0.05$ for the Grand River). Beaching increased 100 times in Conneaut Creek following lampricide treatment but did not increase above the 120 background mortalities in the Grand River. These mixed results may be due to the larger number of individuals in the Grand River than in Conneaut Creek. The more than 100 times more mussels in the Grand River may have masked the beaching effect by producing more beached mussels during pre-treatment flooding events.

Poster Board No. 076

ANTAGONIST PNEUMATIC MUSCLE AND SERVO MOTOR INTERACTION SIMULATING HUMAN PERFORMANCE OF KNEE EXTENSION TASK. Chandler A. Phillip, chandler.phillips@wright.edu, Jennifer L. Serres, serres.3@wright.edu, David B. Reynolds, david.reynolds@wright.edu, Stanley R. Mohler, stanley.mohler@wright.edu, Wright State School of Medicine, Dana B. Rogers, dnmrogers@prodigy.net, University of Dayton, Daniel W. Repperger, Daniel.Repperger@wpafb.af.mil, AFRL/RHCV, Wright-Patterson Air Force Base, Maria J. Gerschutz, gerschutz.4@wright.edu, Kara L. Muckley, muckley.2@wright.edu, Dept of Biomedical, Industrial & Human Factors Engineering, 207 Russ Ctr, Wright State University, 3640 Colonel Glenn Hwy, Dayton, OH 45435.

A proof-of-concept demonstration is described in which a D.C. servomotor (simulating the quadriceps muscle of a human operator) rotates a pulley through 90° of rotation (simulating knee extension). A pneumatic muscle actuator (PMA) generated an opposing force (antagonist) to the rotating pulley. One application of such an exercise device is for use in prolonged space flight. A commercially available PMA was utilized in this study and interacted with a D.C. servomotor. The PMA contracts in response to the desired internal pressure as determined from previous load-contraction-pressure experiments. An input voltage profile activates the D.C. servomotor resulting in an isokinetic (isovelocity) counterclockwise pulley rotation of 0-90° over 5 seconds (Phase I). The position of 90° is then held for 5 seconds (Phase II). Finally, there is an isokinetic clockwise pulley rotation of 90-0° over 5 seconds (Phase III). Each trial is replicated three times. Root mean square error (RMSE) values are used to evaluate the motor pulley position data collected (compared to the ideal position trajectory). For Phase I, when the PMA pressures (in kPa) were 300, 450 and 575, then the RMSE respectively (percent of total rotation) were 5.24, 6.25 and 4.59. For Phase II, at the same three PMA pressures, the percent-RMSE respectively were 2.81, 2.57 and 5.65. For Phase III, at the same three PMA pressures, the percent-RMSE respectively were 5.69, 2.63 and 3.30. This study presents a demonstration of a PMA device that can be useful exercise by providing resistive loads.

Poster Session 2

Multi-Discipline

Kuss Science Center - 2nd Floor

1:30-3:00 pm

Poster Board No. 001

PREPULSE INHIBITION OF THE ACOUSTIC STARTLE RESPONSE IN RODENTS EXPOSED TO POLYCHLORINATED BIPHENYLS. David E. Mankin, dmankin@bgsu.edu, Michael Stoffe, mstoffs@bgsu.edu, Kyle Shaw, shawkyl@bgsu.edu, Nicholas Baldwin, nicb@bgsu.edu, Lee A. Meserve, imeserv@bgsu.edu, Howard C. Cromwell, hcc@bgsu.edu, Departments of Biology and Psychology, Bowling Green State University, 1001 E Wooster St, Bowling Green, OH 43403.

The purpose of this study is to measure the prepulse inhibition (PPI) of the Acoustic Startle Response (ASR) in order to assess the difference in sensorimotor gating between rats that have been exposed to polychlorinated biphenyls (PCBs) or thiouracil, compared to those that have not. PCBs are contaminants that persist and accumulate in both the environment and the organisms that are exposed to them. Organisms that are known to have been exposed to PCBs, either prenatally or postnatally, express a hypothyroid condition. This results from the disruption of thyroid hormone synthesis, circulation, and feedback mechanisms. This disruption, in turn, has been implicated in various neuronal and behavioral impairments. Thiouracil is also used in order to induce a perinatal hypothyroid state. Evaluation of sensorimotor gating is completed by presenting a weaker stimulus (the prepulse) just prior to the presentation of a much stronger stimulus (the pulse) using different interval schedules. In addition to this, the ultrasonic vocalizations (USVs) being emitted by the rats during these PPI tests are also being recorded and analyzed. Rats use these vocalizations to communicate with conspecifics, and variations in these USVs can be utilized to predict affective states in the rodent model. It is expected that the rats that have been exposed to PCBs or thiouracil will have deficits in their sensorimotor gating abilities compared to those rats that have not been exposed. Impairments in sensorimotor gating abilities have been implicated in a variety of mental illnesses including schizophrenia and attention deficit hyperactivity disorder.

Poster Board No. 002

EXPRESSION OF LIPID DROPLET PROTEINS IN MONOCYTE-DERIVED MACROPHAGES. Michelle L. Hobbs, shelly.hobbs@otterbein.edu, Dept of Life/Earth Sciences & Dept of Chemistry and Biochemistry, 163 Sunset Dr, Westerville, OH 43081, Tracy M. Ander, ta282005@ohio.edu, College of Medicine, Ohio University, John T. Tansey, JTansey@otterbein.edu, Dept of Chemistry and Biochemistry, Otterbein College.

The molecular mechanisms underlying cholesterol storage in cells central to atherosclerosis remain unclear. The PAT proteins are a family of five related proteins involved in the shepherding and regulation of cellular lipid stores. This family was named for the three primary members, perilipin, adipophilin, and TIP-47. There are two other members that have been found recently, OXPAT and S3-12. Conflicting findings in the literature have identified perilipin in some but not all cases and adipophilin in all atheroma and cultured macrophage-like cell lines. It has been hypothesized that all of these proteins except perilipin are involved in the cholesterol storage in macrophage-derived foam cells, a central component in the progression of atherosclerosis. Multiple primary cultures of human macrophages were treated at varying stages of differentiation with quantified oxidized LDL to induce cholesterol storage. Cholesterol and protein assays were conducted to monitor lipid accumulation. Western blots revealed the increased presence of OXPAT, TIP-47, and adipophilin upon incubation with LDL. Perilipin A, however, was not found. S3-12 has yet to be tested. These results reveal a role for the PAT proteins in the pathogenesis of atherosclerosis.

Poster Board No. 003

BIODIVERSITY OF OHIO'S CAVES. Erin R. Hazelton¹, erin.hazelton@dnr.state.oh.us, Horton H Hobbs III², hobbs@wittenberg.edu, ¹Ohio Department of Natural Resources, Division of Natural Areas and Preserves, 2045 Morse Rd, Bldg F1,

Columbus, OH 43229 and ²Dept of Biology, Wittenberg University, Springfield, OH 45501.

The Wittenberg University Speleological Society and Ohio's Division of Natural Areas and Preserves partnered with the objective to complete bioinventories in 159 of Ohio's carbonate and 36 non-carbonate caves during 2007-2008 to help protect and manage Ohio's cave ecosystems. Methods included sight biological surveys, including presence/absence of hibernating bats, and placement of aquatic Dendy traps and terrestrial pit-fall traps (number per cave dependent upon habitat diversity). Invertebrate specimens were collected, preserved in 70% ethyl alcohol, and sent to experts for identification. Although Ohio's dolomite and limestone caves are not as numerous or extensive as those in some neighboring states, they play a vital role in the life history of many organisms including twelve state-listed species, four of which are site-specific endemics. Several unidentified species, including a pseudoscorpion, two cave beetles, and two cave spiders are likely undescribed troglolobiotic species. New Ohio records were recorded for the aquatic isopod *Caecidotea brevicauda* Forbes and the cave spider, *Phanetta subterranea* Emerton. However, the majority of caves surveyed hosted a similar group of species, many of which are troglloxenes. Based on results from 2007-2008 bat hibernacula surveys, relatively few bats use carbonate caves in western Ohio for hibernation purposes. On average, more hibernating bats were documented in sandstone rock shelters of Hocking County (9 bats per cave, N=5) than in carbonate caves (8 bats per cave, N=18). Additional research is needed to determine the importance of non-carbonate rock shelters and caves as habitat for bats and other cavernicoles.

Poster Board No. 004

IDENTIFICATION OF NOVEL MICROBES FROM LOW-GRADE OIL-CONTAMINATED SITES REVEALED SELECTION FOR METABOLICALLY-VERSATILE HYDROCARBONOLASTIC DEGRADERS. Mina S. Makary, mina.makary@otterbein.edu, Amy E. Jessen-Marshall, ajessen-marshall@otterbein.edu, Otterbein College, SMC Box 12255, One Otterbein College, Westerville, OH 43081.

The increased global consumption of petroleum has meant an increase in hydrocarbon pollution. The purpose of this work is to investigate the effects of hydrocarbon-contamination in local soils by characterizing hydrocarbonoclastic degraders. Soils (N=8) from control sites and areas visually-contaminated with oil on Otterbein College campus were inoculated onto hydrocarbon-selective media. Biochemical testing of sixteen bacterial isolates led to general classification with further genus species identification of thirteen strains determined by 16S rRNA gene sequencing, submitted to GenBank® database. These include novel strains of *Cellomonas*, and *Flavobacteria* as well as several organisms that may represent new species with the probable closest relative being species of *Chryseobacterium*. Through characterization of the isolates' bioremediation potentials by growth curve analysis, the degraders demonstrated ability to degrade hexane, cyclohexane, toluene, *iso*-amyl alcohol, *n*-amyl alcohol, and *tert*-amyl alcohol. The two most flexible degraders, *Bacillus* and *Pseudomonas* strains, had the fastest generation time for three out of six hydrocarbons tested. Degraders grew fastest on hexanes, slowest on *tert*-amyl alcohol and toluene, with no growth on amyl alcohols. Overall, as chain branching, aromaticity and/or hydroxyl groups are introduced, hydrocarbon metabolism slows. Degraders from oil-contaminated sites degraded aromatics such as toluene better than degraders from control sites, reflecting a possible effect of long-term contamination on degrader selection. This study contributes to the field by identifying novel strains that have potential to be useful for bioremediation of sites contaminated with hydrocarbons. Further implications of this work should examine co-metabolic relationships and include the development of efficient hydrocarbonoclastic microbial consortia of the identified isolates.

Poster Board No. 005

BASE EXCISION REPAIR AND MISMATCH REPAIR OF OXIDATIVE DAMAGE TO DNA. Justin R. Wolf, wolfj@findlay.edu, Kelly N. Vennekotter, vennekotterk@findlay.edu, Michael Edelbrock PhD, edelbrock@findlay.edu, The University of Findlay, 1000 N Main St, Findlay, OH 45840.

Oxidative damage of DNA is a cellular event which can be corrected through either Base Excision Repair (BER) or Mismatch Repair (MMR). The inability of a cell to repair oxidative damage can lead to carcinogenesis. Previous investigation of site-specific repair of oxidative lesions, indicate that these two pathways are tightly regulated. We hypothesize that different cell types vary in their ability to effectively repair DNA. An *in vitro* repair model was developed to test this hypothesis. A plasmid DNA substrate

containing an 8oxoG:A mismatched lesion was designed and constructed. The plasmid was introduced into three strains of bacteria, MUT Y-, MUT M-, and NR9161, and repair efficiency was measured. Efficiency of repair can be observed by gel electrophoresis of fragment lengths resulting from endonuclease cleavage by SspI and NaeI. Results indicate that the BER deficient (MUT Y-) bacteria was unable to efficiently repair the defective DNA substrate (<50%) while the wild type bacteria showed robust repair (>90%). We hypothesize that MMR deficient bacteria (NR9161) and BER deficient bacteria (MUT Y-, MUT M-) will exhibit variation in their repair capabilities. Further, detection of repair differences, between these bacterial strains, will be measurable using proportional statistics (n>30 colonies for each strain). Currently, repair data is being collected. Should bacterial DNA repair rates differ between the deficient bacterial strains, we will expand our repair model using nuclear proteins collected from human cancer cell lines.

Poster Board No. 006

ANALYSIS OF SILVER FIBER MICRO-COMPRESSION SOCK CIRCULATORY PROPERTIES VIA BIOELECTRICAL IMPEDANCE ANALYSIS. Benjamin A. Schmitt¹, schmitt.16@wright.edu, 4 W Stonington St, Fairfield, OH 45014, David B. Reynolds¹, david.reynolds@wright.edu, Julia Parakkat², Julia.Parakkat@WPAFB.AF.MIL, ¹Dept of Biomedical, Industrial & Human Factors Engineering, Wright State University, Dayton OH, 45435, ²AFRL/RHPA Wright Patterson Air Force Base, Dayton, OH.

Venous thromboembolism, particularly deep vein thrombosis (DVT), has greater incidence aboard long flights (>8 hours) due to increased blood pooling associated with immobility. Compression stockings have been used in the past as a means to reduce the complications of DVT. In this study, silver fiber micro-compression socks were evaluated for their ability to mitigate blood pooling. Subjects (n=46) were seated in mock F-16 cockpits for three, four-hour testing periods to simulate the effects of long-duration flight. Subjects were exposed to a total of three conditions: (1) no sock, (2) standard compression sock, and (3) silver fiber compression sock. Bioelectrical impedance analysis (BIA) data, consisting of resistance and reactance, measured by electrodes on one of the lower extremities was continuously collected during each test period using the Quantum-II Desktop system developed by RJL Systems. Impedance values were found to increase for all three conditions. The sock conditions were compared using a paired t-test with a significance level of 0.05. The standard compression sock condition (p<0.001) and the silver compression sock condition (p=0.001) resulted in significantly higher impedance than the no sock condition. No statistical differences were found between the standard compression sock and the silver compression sock conditions (p=0.179). Because changes in impedance are inversely proportional to changes in conductive fluid volume, higher final impedance values are indicative of a reduction in conductive fluids in the lower extremity being measured. The data suggests the compression sock conditions had greater ability to mitigate blood pooling than the no sock condition.

Poster Board No. 007

COMPARING OCT4 PRESENCE IN BLASTOCYSTS OF TWO MOUSE STRAINS. Bliss Magella, blissmagella@yahoo.com, Donald Troike, don_troike@wilmington.edu, Pyle Box 829, 1870 Quaker Way, Wilmington College, Wilmington, OH 45177.

C57BL/6 mouse blastocysts have been used by others to successfully produce sustainable colonies of mouse embryonic stem cells (ESC) in culture, whereas blastocysts from random bred mice, such as ICR, have failed to produce sustainable colonies. ESC can be identified by the presence of Oct4 protein in their nuclei. Differentiation is preceded by a decline in Oct4. It is hypothesized that the level of Oct4 in blastocysts from random bred mice may already be declining compared to C57BL/6 strains by the implantation stage, leading to their inability to form ESCs in culture. To test this hypothesis the percentage of Oct4 negative cells was determined after *in vitro* implantation of C57BL/6 and ICR blastocysts. DAPI was used to stain the nuclei of the implanted blastomeres, while Oct4 immunofluorescent staining was used to determine the presence of Oct4 in the blastomeres. Twelve implanted blastocysts of each strain were stained and counted. The percentage of unstained (differentiated) blastomeres in the ICR strain was 19±11; the percentage of unstained blastomeres in the C57BL/6 strain was 21±8. No difference in the percentage of Oct4 negative cells was observed between implanted C57BL/6 blastocysts and ICR blastocysts (p=0.51). Results indicate that there must be another factor responsible for the failure of ICR

mouse blastocysts to serve as a source for a sustainable ESC colony.

Poster Board No. 008

COMPARING THE EFFECTS OF DHEA AND DHEA-ACETATE ON SERUM SODIUM LEVELS IN MALE MICE. Randi L. Schneider, rschneider@wilmington.edu, Ashley Dillion, adillion@wilmington.edu, Donald Troike, don_troike@wilmington.edu, Dept. of Biology, Wilmington College, 1870 Quaker Way, Pyle Box 1079, Wilmington, OH 45177.

Dehydroepiandrosterone, DHEA, is a steroid hormone whose level peaks in a person's thirties and declines thereafter. For this reason it is marketed over-the-counter as an anti-aging supplement. Its structure is similar to the mineralocorticoid aldosterone. Similar steroids, such as corticosterone and progesterone are known to increase serum sodium levels. This is especially true of testosterone. An earlier study in this laboratory using DHEA-acetate has shown a similar effect, but results using DHEA have been varied. The purpose of this study is to compare directly the effects of DHEA to DHEA-acetate on the serum sodium levels in male mice. Groups of 6 male mice each received by gavage (volume = 0.5ml) the following treatments: vegetable oil alone to serve as the vehicle control, vegetable oil containing 1mg of DHEA-acetate, vegetable oil containing 0.87mg of DHEA (its molar equivalent), or vegetable oil containing 1.0 mg of hydrocortisone to serve as a positive control. Tail-vein blood was collected immediately after gavage for baseline analysis and again ten hours after the gavage. The blood will be separated by centrifugation and serum will be collected and diluted to levels appropriate for sodium analysis by atomic emission spectroscopy according to the procedures manual. A Kruskal-Wallis ANOVA test was used to determine the significance of the results because they were not in a normal distribution. This test was able to determine significance in relationships between the groups. A p-value of 0.05 is considered significant.

Poster Board No. 009

SYNTHESIS OF A NOVEL OXIDATIVE CATALYST. J David Gatz, jdgatz@owu.edu, Kim A Lance, kalance@owu.edu, Ohio Wesleyan University, 61 S Sandusky St, Delaware, OH 43015.

Society has become more conscious of its impacts on the environment and is turning to the field of green chemistry, in particular, to develop solutions. Motivated by cytochrome P-450's oxidative abilities to destroy toxins in the liver and kidneys, a robust iron(III) macrocyclic ligand complex was synthesized that when coupled with hydrogen peroxide, could replace the use of harmful halogens used to purify water. The synthesis was accomplished by reacting diphenylglyoximate with copper(II) acetate, which formed a proton-linked copper(II) bis-diphenylglyoximate complex. This was subsequently reacted with boron trifluoride and formed a boron difluoride-linked complex with spectroscopy consistent with the literature. The complex was then successfully demetallated, and further reacted with iron(III) chloride and formed the desired iron(III) macrocycle ligand complex. The product was characterized through the methods available, and then stored until more data can be obtained. These results will then be used to confirm the product's formation. Upon successful synthesis, the product will then be tested for its oxidative ability with hydrogen peroxide.

Poster Board No. 010

PLANNING FOR FLOOD RISK UNDER THE CHANGING CLIMATE. Dennis V. Eck, eckdennv@notes.udayton.edu, Shuang-Ye Wu, shuang-ye.wu@notes.udayton.edu, 147 Plumwood Rd #112, Dayton, OH 45409.

Flooding was a common event in the City of Dayton, prior to 1913. Dayton is located at the confluence of four major rivers. The potential for increased flood risk is only going to increase with future climate change. The IPCC's most recent assessment reports a projected 10-20% increase of precipitation in this region. This study aims to assess how flood risk changes under different climate scenarios and how land use practices change the scenarios through the following steps. (1) Develop statistical models to downscale results of major climate models and to relate precipitation with annual river peak flow. These models show that the peak flow for the future 100-year flood will increase 20-30% in the Upper Great Miami Watershed. (2) Map present and future floodplain by statistical correlation based on the increased flood magnitude, and model in GIS how such extent will change with future climate change for the Dayton area. (3) Assess the social vulnerability of people who are exposed to flood risk, based on census data, to examine whether the socio-economically disadvantaged are disproportionately

affected by the increase of flood risk due to climate change. (4) Assess how flood risk will differ under different land use planning scenarios. Results will be shared with local land use and resource planners to get input on the kind of climate information needed, such that study results can be incorporated into the local planning processes for a sustainable future.

Poster Board No. 011

ROLE OF PLEXINS IN THE DEVELOPMENT OF MOTOR NEURONS IN ZEBRAFISH. Tracy E. Dohn, s09_tdohn@wittenberg.edu, Michelle L. McWhorter, mmcwhorter@wittenberg.edu, Wittenberg University, PO Box 6100, Springfield, OH 45501

The *plexin* genes have been shown to play a role as repulsive signaling cues for the axons of motor neurons as they pathfind during development to direct the axons along the correct pathway to the target muscle. A loss of function study in zebrafish (*Danio rerio*) was used to investigate the role of *plexinB1-A* and *plexinB1-B* genes in directing the motor neuron axon development. Small oligonucleotides, called morpholinos, that bind complementary to pre-mRNA at intron/exon boundaries were injected into two cell stage embryos. These morpholinos are designed to cause mRNA splicing abnormalities and ultimately render the gene product non-functional; this technique is called knockdown. The mRNA was isolated and amplified using RT-PCR from wild-type (WT) and morphant (MO) embryos at 27 hr post fertilization (hpf). RT-PCR experiments show that *plexinB1-A* and *plexinB1-B* genes are expressed at 27 hpf, (the time of motor axon growth), and the morpholino effectively caused mRNA splicing abnormalities in 50% of the transcripts produced. As a result of splicing abnormalities, nonfunctional PlexinB1-A or PlexinB1-B proteins are likely produced. The phenotype of 64 MO embryos and 50 WT embryos was analyzed through labeling with Znp-1 antibody at 27 hpf. The *plexinB1-A* MO embryos, knocked-down to 50% active, showed no motor axon defects when compared to WT embryos. The results show that embryos do not have axon pathfinding defects at 50% active *plexinB1-A*. Future experiments will investigate the phenotype of motor axons when the *plexinB1-B* and *plexinB1-A* genes are knocked-down more than 50% activity.

Poster Board No. 012

AGROECOSYSTEM EFFECT ON SOYBEAN INSECT PREDATOR DENSITY. Alan P. Sundermeier, sundermeier.5@osu.edu, Ohio State University Extension, 639 Dunbridge Rd Ste 1, Bowling Green, OH 43402.

Agroecosystems which include edge habitats adjacent to soybean fields have the potential to provide resources and refuge for a wide diversity of beneficial insects, such as pollinators, predators and parasitoids. The objective of this study was to document predatory insects that may have the potential for regulation of the soybean aphid, *Aphis glycines*. Data were collected from 18 Northwest Ohio soybean fields that had edge habitats which consisted of a wooded area (complex) compared to edge habitat that consisted of grass species (simple). Eighteen fields were sampled every two weeks from June through August by using a sweep net to capture insects present. In each soybean field, three locations were sampled, the edge of the field, 50 feet into the field, and 150 feet into the field. Multicolored Asian ladybird beetle (MALB) *Harmonia axyridis*, populations increased 116% from a low (6) near simple edge habitats to (7) at the center of soybean fields. However in a complex edge habitat, MALB populations decreased 60% from a high (20) near edge habitat compared to (12) near center of field. Lacewing, *Chrysoperia carnea*, populations were not affected by type of edge habitat. More lacewing was found on edge habitat regardless of type. Lacewing population decreased 70% (from 78 to 55) as counts were taken at interior field locations. Lacewing insects were 58 counts higher density compared to MALB population density at the same edge habitat.

Poster Board No. 013

GENETIC BASIS OF INHERITED BRINDLE COAT COLOR IN HORSES. Heather Holl, heather.holl@otterbein.edu, Otterbein College, SMC 11817, Westerville, OH 43081.

Brindle coat color in horses is defined as dark vertical stripes of pigment on a lighter background. Two brindled horses found in the USA were determined to display their unique phenotype due to chimerism but others have inherited their brindling from their parents. The goal of this project is to examine twenty individuals from Washington, Missouri, California, and Texas who are believed to be non-chimeric to determine a genetic cause, to understand the molecular basis of brindling, and potentially create a test for the presence of a brindle allele. The agouti gene was selected as a

candidate gene because of changes found in agouti alleles of Normande brindle cattle and molted agouti mice. The agouti locus in brindle (N=20) and control (N=10) individuals will be tested for insertion or deletion mutations and three previously identified single nucleotide polymorphisms (sections of DNA where only one basepair is found to be different among individuals). DNA is extracted from equine mane hair root samples, amplified using polymerase chain reaction, and analyzed using gel electrophoresis and DNA sequencing. Preliminary experiments have successfully amplified and sequenced several equine control samples.

Poster Board No. 014

PROJECTING FUTURE TRENDS IN EXTREME PRECIPITATION FOR THE GREAT MIAMI RIVER WATERSHED, OHIO. Ann M. Syrowski, syrowsam@notes.udayton.edu, Shuang-Ye Wu, shuang-ye.wu@notes.udayton.edu, University of Dayton, 300 College Park, Dayton, OH 45469.

Dayton, Ohio is located at the confluence of four major rivers, the Miami...The city is particularly vulnerable to flooding. The frequency and magnitude of flooding is closely related to extreme precipitation events. With the potential of a warming climate, extreme precipitation events may fluctuate, becoming either more or less frequent. This study aims to project future trends in extreme precipitation events in the Great Miami River watershed which drains at the city of Dayton. First, using the records of daily precipitation data from the stations within the watershed, the historical trends for extreme precipitation events in the past 100 years were established. Results indicated an increase in extreme precipitation events in the north-northwest region of Ohio and a decrease extreme precipitation to the southwest for approximately the past one-hundred years. Seasonal variations in precipitation were also examined. Second, the daily precipitation data output from four major general circulation models (GCMs) for the 20th century was compared with the known data to evaluate the accuracy of the models and correct the biases. Finally, any bias correction will be applied to the 21st century runs of the GCMs to make projections on future extreme precipitation trends for the study area.

Poster Board No. 015

MAP OF THE SURFICIAL GEOLOGY OF THE FINDLAY 30 X 60 MINUTE QUADRANGLE. Douglas L. Shrake, doug.shrake@dnr.state.oh.us, E.R. Venteris, G.E. Larsen, M.P. Angle, R.R. Pavey, Ohio Department of Natural Resources, Division of Geological Survey, 2045 Morse Rd C-2, Columbus, OH 43229-6693.

The surficial geology map of the Findlay 30 x 60 minute quadrangle shows the complex geologic history representative of the transition from the Maumee Lake Plains physiographic region along its northern border southward into the Central Ohio Clayey Till Plain and eastward into the Bellevue-Castalia Karst Plain. The map covers a geographic region containing most of Hancock, Wood, Sandusky, Seneca, and portions of Putnam, Henry, Fulton, and Lucas Counties, Ohio. Data to generate the vertical stratigraphic sequences or stacks for each map polygon came from geologists' interpretation of county soil surveys, water-well logs, Ohio Department of Transportation, Ohio Environmental Protection Agency, and County Engineer boring logs, oil and gas well logs, fieldwork, and published and unpublished information from the Ohio Division of Geological Survey, as well as other sources. This map was generated using only ArcGIS software. The switch from using paper and Mylar drafts with digital compilation to totally digital compilation significantly increased both the speed and accuracy of the mapping process. Pre-Lake Erie proglacial lakes are indicated by numerous lacustrine or patchy lacustrine clayey deposits in the northeast quarter of the map and the numerous beach ridges mapped throughout the map. The northwest corner of the map contains a portion of the area known as the Oak Openings Region. The Oak Openings Region is distinctive geologically due to the significant amount of sand deposits located there and for the topography the sand has been worked into over time by water and wind action. The southern half of the map is dominated by the east-west trending Defiance Moraine. The central portion of the map is topographically distinctive due to exposed bedrock knobs and ridges. Mapping was partially funded by a U.S. Geological Survey STATEMAP grant.

Poster Board No. 016

CAVE EXPLORATION USING ELECTRICAL RESISTIVITY GROUND IMAGING (ERGI). Michael J. Zaleha, mzaleha@wittenberg.edu, John B. Ritter, jritter@wittenberg.edu, Daniel R. McElwain, s10.dmcElwain@wittenberg.edu, Kelly A. Shaw, s11.kshaw@wittenberg.edu, Heidi M Tlachac, ce.htlachac@wittenberg.edu, Dept of Geology,

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ERGI is a technique for acquiring pseudo-geologic profiles of the shallow subsurface. ERGI records currents that are injected into the ground and the induced voltages near the surface, and subsequently calculates the electrical resistivity of materials at various depths and distances along a profile. Air-filled caves in limestone are readily detected by ERGI because air is a poor conductor of electrical current and exhibits very high resistivities relative to surrounding limestone. An ERGI survey was conducted adjacent to Diamond Caverns, a commercial cave in west-central Kentucky. The goal was to explore the Cavern's potential relation to an adjacent sinkhole, which was previously enlarged to reveal a large sediment-filled passage to the northeast. Four profiles, using a dipole-dipole array, revealed multiple cave passages trending parallel to, but not connected to, the main Diamond passage. Using an electrode spacing of 6 m, the maximum depth of the profiles ranged from 30-40 m. Resistivity values for limestone locally ranged from 500-4000 ohm-m. Interpreted cave passages exhibited resistivities greater than 11,000 ohm-m. Passage shapes were tabular with widths as great as 14 m and maximum heights of 10 m, consistent with Diamond Cavern passage. The floor of the passages defined by ERGI occur between 187-203 m above sea level (9-19 m below the surface) and ceiling elevations range from 194-210 m (5-10 m below the surface), both within the known range of elevations for the commercial passages. The scale and elevation of the interpreted passages suggest that they formed contemporaneously with Diamond Caverns.

Poster Board No. 017

NUTRIENT LIMITATION OF PHYTOPLANKTON ASSEMBLAGES IN LAKE ERIE'S CENTRAL BASIN. Dustin J. Chandler, dchandi1@kent.edu, Robert T. Heath, rheath@kent.edu, Kent State University, Dept of Biological Sciences, 256 Cunningham Hall, Kent, OH 44242.

In the early 1970's, high inputs of P into Lake Erie led to excessive phytoplankton growth and zones of hypoxia. The Great Lakes Water Quality Agreement of 1978 has worked to eliminate "dead zones" by limiting the amount of P loading into Lake Erie. This management strategy is based on the assumption that phytoplankton are growth-limited by P availability. Though P loading limits have remained low, the zones of hypoxia have started to return, suggesting that the management strategy may no longer be tenable. The purpose of this study was to determine whether Lake Erie phytoplankton assemblages are P-limited, N-limited, both or neither. Epilimnetic water samples were collected from five sites in the Central Basin on July 11, 2008, three sites near shore on August 18, 2008, and four sites in the Central Basin on September 1, 2008. Nutrient amendment bioassays were performed by amending 100 mL water samples with NaH₂PO₄ or NH₄Cl, both or neither; tests were done in triplicate. Chlorophyll *a* concentrations were measured after a seven-day incubation period within an environmental growth chamber. Phytoplankton growth was three times greater in samples receiving both N and P amendments than in samples receiving amendments of N, P, or neither. Phytoplankton growth in samples receiving N or P was not significantly different from samples receiving no amendment (t-test, $p < 0.05$). These results suggest that phytoplankton growth in Lake Erie is frequently co-limited by the availability of N and P; no evidence that phytoplankton assemblages are strongly P-limited alone was noted. This implies that ecosystem management strategies in Lake Erie may need to be reconsidered and that further investigation of phytoplankton nutrient limitation status is warranted.

Poster Board No. 018

MRSA CARRIER STATE IN CONTACT SPORT ATHLETES VS NON CONTACT SPORT ATHLETES AND NON ATHLETE STUDENTS. Christina M Abboud, mma@woh.rr.com, Tippecanoe High School, 748 Oak Lea Dr, Tipp City, OH 45371.

MRSA infections commonly occur in hospitals and other healthcare settings; however, these infections are becoming more prevalent in the community setting. Data from a prospective study in 2003, suggests that 12% of clinical MRSA infections are community-acquired. One factor associated with the spread of MRSA includes close skin-to-skin contact. It is therefore hypothesized that students participating in contact sports have a higher prevalence of MRSA than students in non contact sports and non athlete students. The goal of the study is to determine if participation in contact sports increases the risk of MRSA carrier state. Nasal swabs were obtained from three groups of high school students; contact sport athletes, non-contact sport athletes and non-athlete students. The nasal swabs were then inoculated on Tryptic Soy Agar plates. The presence of Staphylococcus was confirmed by a

catalase test. *Staphylococcus aureus* was identified visually by a coagulase test. Bacterial colonies identified as *Staphylococcus aureus* were further tested for MRSA with Oxacillin screening plates. Of the thirty-two contact sport athletes tested, 9 were positive for *Staphylococcus aureus* and none were identified as MRSA. Thirty non-contact sport athletes were tested, 3 were positive for *Staphylococcus aureus* and none were identified as MRSA. Twenty-five non-athlete students were tested, 5 were positive for *Staphylococcus aureus* and 1 was identified as MRSA. These results show there is no major difference in the MRSA nasal carrier state of contact sport athletes as compared to non-contact sport athletes within the general student population in a high school setting.

Poster Board No. 019

IDENTIFICATION OF MICROSATELLITE SEQUENCES IN THE GENOME OF SCIRPUS ANCISTROCHAETUS.

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Scirpus ancistrochaetus, more commonly known as Northeastern Bulrush, is an endangered emergent sedge species found in the northeastern United States. With fewer than 75 documented populations ranging from West Virginia to Massachusetts, conservation managers are concerned with trying to find methods of protecting the genetic diversity of the species. Most of the populations of *Scirpus ancistrochaetus* can be found in Pennsylvania. This study was conducted to determine what microsatellite sequences are present in *Scirpus ancistrochaetus* and to develop a strategy for developing genetic diversity probes. More specifically, using literature and experimentation, work was done to determine which microsatellite sequences are present in *Scirpus ancistrochaetus*. Genomic DNA from 8 different populations of *Scirpus ancistrochaetus* were surveyed for the presence or absence of microsatellite sequences. The microsatellite sequences studied were: (GA)_n, (AT)_n, (AGC)_n, (ACC)_n, (ATG)_n, (AAG)_n, (AGG)_n, and (ATC)_n. Using Dot blot hybridization with 20-24 mer DIG labeled microsatellite probes, we found that all of the above microsatellites were present in all studied locations with the exception of (AT)_n in the Tussey Mountain and Three Square populations. These sequences will be used to develop genetic diversity probes in a future study.

Poster Board No. 020

DEVELOPING RAPD MARKERS FOR USE IN STUDYING SCIRPUS ANCISTROCHAETUS GENETIC DIVERSITY. Zac VanGundy, zvanguddy@wilmington.edu, Kendra Cipollini, Douglas J. Burks, Dept of Biology, Wilmington College, 1870 Quaker Way, Wilmington, OH 45177.

Scirpus ancistrochaetus is an endangered species which is limited to about 60 different populations in the northeastern United States. The goal of this study was to find RAPD primers that would reveal the genetic diversity within and between populations of *Scirpus ancistrochaetus*. Random amplified polymorphic DNA, or RAPD, is a PCR or polymerase chain reaction that shows genetic markers that can be used for the determination of genetic diversity. Genomic DNA from 5 widely dispersed populations of *Scirpus ancistrochaetus* in Eastern Pennsylvania were used in this study. Eleven RAPD primers, random sequences 10 nucleotides in length were tested. Ten of the tested primers gave at least one band that revealed differences in the 5 tested populations. We conclude that RAPDs have potential to determine genetic diversity in *Scirpus ancistrochaetus*. The next step in studying genetic diversity *Scirpus ancistrochaetus* will be to optimize the PCR conditions for amplification of each of the primers and to demonstrate the reproducibility of band presence in multiple trials.

Poster Board No. 021

USE OF SCHOENOPLECTUS AMERICANUS MICROSATELLITES TO DETECT SEQUENCES IN SCIRPUS ANCISTROCHAETUS. Sarah A. Girod, sgirod@wilmington.edu, Kendra A. Cipollini, Douglas J. Burks, 1870 Quaker Way, Pyle Box 487, Wilmington, OH 45177.

In the present study, microsatellite markers developed for *Schoenoplectus americanus* were tested to identify microsatellite sequences in *Scirpus ancistrochaetus*, northeastern bulrush for use in genetic diversity studies. The sequences detected will be used to develop a set of microsatellite markers specifically for *S. ancistrochaetus*, which will then help determine the genetic diversity of this species. This is especially important due to the fact that this is an endangered species that is currently undergoing conservation efforts. Previous research has shown that microsatellite markers can be transferable among species of the

same genus. However, the markers tested in this study are in the same family of *S. ancistrochaetus*, Cyperaceae. Four different sites were tested for band presence and diversity among sites. Sixteen microsatellite markers were used; 15 of these led to band amplification in *S. ancistrochaetus*. Six of the microsatellite primers that amplified bands showed diversity among the sites. Further research of these markers as well as other microsatellite tests will confirm if the microsatellites from *S. americanus* are sufficient study genetic diversity in *S. ancistrochaetus*.

Poster Board No. 022

SYNCHRONIZING THE CELL CYCLE OF TOXOPLASMA GONDII. Jade E. Bloom, jebloom@wilmington.edu, Whitney M. Houser, Douglas J. Burks, Department of Biology, Wilmington College, 1870 Quaker Way, Wilmington, OH 45177.

Toxoplasmosis is an infection of *Toxoplasma gondii*, an apicomplexan parasite whose cell cycle is not fully understood. Molecules that are present during specific stages during the tachyzoite cell cycle need to be isolated and characterized to investigate the cell cycle more thoroughly. A synchronized cell cycle is necessary. Three different potential synchronizing methods were used on cells infected with *Toxoplasma gondii*: pyrrolidine dithiocarbamate (PDT), Etoposide, and natural synchrony. HFF monolayers, grown in Minimal Eagle's Medium, were infected with *Toxoplasma gondii* for one hour. The treatment, if necessary, were applied for six hours, rinsed off, and samples were collected every hour for fifteen hours. Samples were fixed and stained, and the numbers of tachyzoites cells per vacuole were counted. Three replicates with fifty vacuoles per sample being counted were used to determine synchronization. Preliminary results indicate that Etoposide is the best drug for synchronizing the cells.

Poster Board No. 023

THE RELATIONSHIP BETWEEN SELF-DEFEATING BEHAVIOR AND POTENTIAL CHANGES IN THE VOLUME OF THE LEFT AMYGDALA. Charles Breitstadt, s09.cbreitstadt@wittenberg.edu, Shelley Barnes, s07.sbarnes@wittenberg.edu, Cathy L. Pederson, cpederson@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501.

Self-defeating behavior describes intentional behavior which often results in fear of social exclusion and loneliness. The amygdala, situated within the limbic system, is a key component in the fear circuitry. This study determined the relationship between the volume of the left amygdala of all participants and self-defeating behavior. It was hypothesized that the left amygdala would be smaller in volume when compared to the left amygdala of the control group. The control group (n=11) had a self-defeating behavior score of 0-30 while the study participants (n=11) had scores of 85-102, both values determined via the Millon Clinical Multiaxial Inventory-III. The left amygdala was traced twice in each horizontal slice from MRI scans. The average area was determined, and then summed to calculate the total volume. The two study groups were not significantly different for demographic variables including age, intelligence, number of drinks consumed per year, pack years smoking, and average abuse scores (p > .05). By design, the groups had a significant difference for the self-defeating behavior score (p < .001). No significant difference was found in the volume of the amygdala between groups, F (1, 21) < 1, p < .05, nor was there a significant correlation between self-defeating behavior score and the volume of the left amygdala, r = .25, p > .05. The matching of abuse scores between groups is unusual in this type of study, and might explain the lack of significant findings in the present study.

Poster Board No. 024

FEMALES WITH A HISTORY OF CHILDHOOD PHYSICAL AND SEXUAL ABUSE SHOW SMALLER HIPPOCAMPAL VOLUMES THROUGH MEASUREMENT OF MRIS. Amanda R. Hedrick, s10.ahedrick@wittenberg.edu, Amber Pearson, s09.apearson@wittenberg.edu, Cathy L. Pederson, cpederson@wittenberg.edu, Wittenberg University, Dept of Biology, Springfield, OH 45501.

Childhood sexual and physical abuse is a prevalent problem in our society today. The purpose of this study was to compare the volume of the hippocampus in participants who have experienced childhood sexual and physical abuse versus normal controls. Located in the temporal lobe of the brain, the hippocampus is primarily involved in converting short term memories into long term memory for storage elsewhere in the brain. Based on Childhood Trauma Questionnaire scores, ten women were placed into the abuse group (scores ≤ 16) and another ten into the control group (scores ≥ 5). The hypothesis

was that sexual and physical abuse would be linked with smaller hippocampal volume. Demographic matching between groups resulted in no significant differences for age, body mass index, emotional abuse, years of education, number of drinks per year, and pack years smoking ($p > .05$). By design, significant differences were found between groups in sexual abuse scores ($F(1, 20) = 165.690$; $p < .001$) and physical abuse scores ($F(1, 20) = 5.524$; $p = .03$). Using 3D BrainStation, the right hippocampus was traced in the sagittal plane. Average area of each slice was calculated and summed to obtain the total volume of the hippocampus. There was a significant difference in the mean volume of the right hippocampus ($F(1, 20) = 4.873$; $p = .04$). The results of our study indicate that our hypothesis was correct; childhood sexual and physical abuse does appear to decrease hippocampus volumes in this community based sample of women.

Poster Board No. 025

HYPOTHALAMUS VOLUMES IN A COMMUNITY BASED SAMPLE OF WOMEN WITH POSTTRAUMATIC STRESS DISORDER SECONDARY TO CHILDHOOD ABUSE.

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Child abuse is an epidemic sweeping the nation, leaving children to cope with long term detrimental effects including the development of posttraumatic stress disorder (PTSD). The purpose of this study was to determine whether the volume of the hypothalamus, an integral part of the hypothalamic-pituitary-adrenal axis implicated in PTSD, was significantly larger in women who suffer from PTSD secondary to childhood abuse ($n=27$) as compared to women who were abused but did not develop PTSD ($n=20$) and normal controls ($n=20$). The hypothalamus was traced in the axial plane using 3D BrainStation software. The average area of each slice was calculated and summed to obtain the total hypothalamic volume. Demographic matching between groups resulted in no significant differences for age, Wonderlic score (IQ), number of drinks per year, and pack years smoking ($p > 0.05$). There was no significant difference in the mean volume of the left hypothalamus ($F(1, 67) = 0.925$; $p = 0.4$) or the right hypothalamus ($F(1, 67) = 2.6$; $p = 0.08$) between the three groups. There was also no significance in the mean volume of the left hypothalamus as percent of cerebral volume ($F(1, 67) = 1.3$; $p = 0.27$) or the right hypothalamus as percent of cerebral volume ($F(1, 67) = 2.8$; $p = 0.07$). The results of our study indicate that PTSD secondary to child abuse did not appear to affect the volume of the hypothalamus in this community based sample of women.

Poster Board No. 026

ANALYSIS OF INSECTIVOROUS BAT GUANO TO DETERMINE LEVELS OF CRUDE PROTEIN AND TOTAL MINERAL CONTENT. **Mark E. Headings**¹, headings.1@osu.edu, **Shah Rahnema**², rahnama.1@osu.edu, ^{1,2}**The Ohio State University Agricultural Technical Institute, 1328 Dover Rd, Wooster, OH 44691.**

The little brown bat, *Myotis lucifugus*, is a common inhabitant in many parts of North America. This insectivore reportedly feeds upon a variety of insect species, especially from aquatic environments, including midges, caddisflies, mayflies, gnats, mosquitoes, and also beetles, wasps, moths, etc. This investigation determined the levels of crude protein and total mineral content in fecal material deposited by these bats at their roosting site. Approximately 453.6 kgs of guano were removed from a roosting site in the steeple of a local church building in 2006. This represented bat fecal deposits over many years. Subsequently, approximately 6.8 kgs of guano were removed in 2007 and 12.7 kgs in 2008. Bat numbers at this roosting site vary from year to year; however, in recent years, the recorded estimates range from 1775 in 2004 to 1000 in 2008. Material from the 453.6 kg lot of guano collected in 2006 was analyzed for dry matter, crude protein, and total mineral content. On a 100% dry matter basis, crude protein, analyzed by the Kjeldahl method, yielded 72.76 %; and total mineral content, determined by oxidizing samples in a muffle furnace for four hours at 600°C, yielded 27.89%. This investigation suggests that some protein and minerals in the diet of bats, which consists of insects, are not being utilized by their bodies and are consequently expelled in their feces.

Poster Board No. 027

A HISTOLOGICAL EXAMINATION OF SEEDS TAKEN FROM TEN ENDANGERED ORCHID (ORCHIDACEAE) TAXA USING SCANNING ELECTRON MICROSCOPY. **Samantha M. Imfeld**¹, s11.simfeld@wittenberg.edu, **Kevin M. Gribbins**¹, kgribbins@wittenberg.edu, **Matthew**

H. Collier¹, mcollier@wittenberg.edu, **Lawrence W. Zettler**², lwzettle@hilltop.ic.edu, ¹**Dept of Biology, Wittenberg University, Springfield, OH 45501-0720 and** ²**Dept of Biology, The Illinois College, Jacksonville, IL 62650.**

The Orchidaceae is one of the largest and most diverse plant families in the world (~20,000 species), but individuals occupying this group are extremely limited to where they can survive. This limitation derives from the inability of orchids to fully utilize their seed food reserves for germination, embryogenesis, and seedling development. The purpose of this study was to examine orchid seed ultrastructure representing ten different endangered taxa to determine if seed morphology may be related to habitat type and/or limitations. Seeds from the following species were used: *Cleistes bifaria* var. *divaricata*, *Encyclia tampensis*, *Epidendrum nocturnum*, *Isotria medeoloides*, *Habenaria repens*, *Liparis elata*, *L. hawaiiensis*, *Platanthera holochila*, *P. integrilabia*, and *P. leucophaea*. Whole orchid seeds ($N \geq 25$ /species) were dehydrated in an ethanol gradient, platinum sputter-coated, and viewed with a Hitachi S-2460N scanning electron microscope. All seeds displayed a consistent morphology, featuring a highly sculpted, multi-faceted seed coat with 2-6 μm regularly spaced ridges on the surface. Consistently, the spaces between ridges were most narrow for the epiphytic species (*E. nocturnum*, *E. tampensis*, *L. elata* and *L. hawaiiensis*) with ridges for terrestrial orchids being more widely spaced. Size of seed (length) varied between 100-250 μm with the epiphytes being the longest and most slender and the terrestrials being more compressed. This seed ultrastructure for epiphytes is consistent with their need for greater permeability to water for germination.

Poster Board No. 028

EFFECTS OF MANAGED GOAT GRAZING ON EARLY SUCCESSIONAL PLANT COMMUNITIES ON ELEUTHERA ISLAND, THE BAHAMAS: CONSERVATION IMPLICATIONS FOR THE KIRTLAND'S WARBLER. **Claire K. Larkin**, larkincc@muohio.edu, **Charles Kwit**, ckwit@wittenberg.edu, **Dept of Botany, Miami University, Oxford, OH 45056.**

Composition of early successional plant communities can be a function of disturbance type and subsequent perturbations. Understanding the consequences of such perturbations may be important for conservation efforts. The purpose of this study is to examine how goat grazing affects plant community composition in early successional coppice patches (> 1 ha) on Eleuthera Island, The Bahamas. The line-intercept method (50-150 m) was used to survey percent cover of all tree and shrub species in the shrub layer and woody vs. non-woody species in the ground-cover layer in eight mechanically cleared patches (hereafter, 'cleared') and in eight patches that were mechanically cleared and subsequently grazed by goats (hereafter, 'cleared-and-goat-grazed'). Non-metric multidimensional scaling (NMDS) and multiple response permutations were used to construct ordinations and test whether cleared patches differed from cleared-and-goat-grazed patches. Resulting NMDS ordinations showed separation between cleared and cleared-and-goat-grazed patches for the ground-cover layer, likely due to a higher percent cover of woody ground cover in cleared-and-goat-grazed patches. Multi-response permutations showed significant differences between treatments for species composition in both the shrub ($\Delta = 0.0008$) and ground-cover ($\Delta = 0.0012$) layers. *Lantana* spp. shrub cover is higher in cleared-and-goat-grazed patches than in cleared patches, and thus likely contributes to the significant difference in community composition between treatments. Because *Lantana* spp. plants are associated with the presence of Kirtland's Warbler home ranges, and *Lantana* spp. fruits are likely an important component of the Kirtland's Warblers' diets in The Bahamas, our findings suggest that goats may be critical for the conservation of this threatened bird.

Poster Board No. 029

RECOVERY EFFORTS OF ORCHID ENDOMYCORRHIZAL FUNGI FROM MUSEUM SPECIMENS. **Andrew J. Pille**¹,

s11.apille@wittenberg.edu, **Michael J. Chambers**¹, mchambers@wittenberg.edu, **Brady S. Christensen**¹, s11.bchristensen@wittenberg.edu, **Travis J. Croxall**¹, s11.tcroxall@wittenberg.edu, **Matthew H. Collier**¹, mcollier@wittenberg.edu, **Jay A. Yoder**¹, jyoder@wittenberg.edu, **Lawrence W. Zettler**², lwzettle@ic.edu, ¹**Dept of Biology, Wittenberg University, Springfield, OH 45501,** ²**Dept of Biology, Illinois College, Jacksonville, IL 62650.**

Orchids are prized and coveted by the public and horticulturists for their showy flowers. Many orchid species are Federally-endangered

or threatened. The requirement for highly specific mycorrhizal fungi as an absolute nutritional requirement by the orchid to stimulate germination and seedling development makes cultivation of orchids difficult from seed. Isolation, preservation, and cataloging of orchid mycorrhizal fungi are at the heart of orchid conservation. To determine whether herbarium specimens represent a potential source of fungi, orchid root sections were analyzed by internal fungus culturing (N=3 replicates of 8 samples/orchid on three different agar media). Briefly, root samples were surface sterilized with mild bleach (0.05%), cut into sections for embedding, and hyphal tips subcultured. Fungal identification was based on macroscopic and microscopic characteristics; i.e., conidia. A total of 11 different orchid species were analyzed, spanning collections from 1884-1982, from the Jacob's Herbarium (Wittenberg University), along with living orchids (*Phalaenopsis* sp.) as a positive control. No fungi were recovered from the herbarium specimens (N > 750 plates). As confirmation of our culturing technique, mycorrhiza was recovered from the live orchid and this isolate was successful at germinating orchid seed. Thus, herbarium specimens do not represent a reliable repository for orchid root mycorrhizae. Therefore, emphasis on orchid conservation needs to be aimed at retrieving live material rather than relying on archived specimens.

Poster Board No. 030

DETERMINATION OF METAL STORAGE SITES IN THE ROOT AND LEAF TISSUES OF NORTH AMERICAN DANDELIONS (*TARAXACUM OFFICINALE*). Jaclyn G. Flickinger, s09_jflickinger@wittenberg.edu, Julie Ziegler, s09_jziegler@wittenberg.edu, Dr. Kevin Gribbins, kgribbins@wittenberg.edu, Dr. Matthew Collier, mcollier@wittenberg.edu, Wittenberg University, Dept of Biology, 2 Ferncliff Pl, Springfield, OH 45504.

Given that previous studies have shown that dandelions (*Taraxacum officinale* Weber; Asteraceae) can be metal accumulators, it was hypothesized that plants growing in urban metal polluted soils sequester and store excess metals in their vacuoles and/or bind excess metals to negatively charged cell wall components (e.g., cellulose, lignin, etc.). This hypothesis was tested by performing a series of reciprocal greenhouse planting experiments in which distinct dandelion clones (previously identified by DNA fingerprinting) sampled from urban polluted (relatively high Cu, Pb and Zn soil concentrations) sites were grown in both unpolluted (nutrient solution only; control) and polluted (nutrient solution + 120 mg kg⁻¹ Cu and 260 mg kg⁻¹ Zn) media (N = 12 for each media type). Four weeks after metal exposure leaf and taproot tissues were harvested from all surviving plants and were post-fixed using osmium tetroxide, dehydrated, infiltrated and embedded in Spurr's plastic, sectioned using an ultramicrotome and examined with a transmission electron microscope. Organ cellular morphologies of dandelions grown in polluted media (N = 12) displayed evidence of extreme tissue necrosis (hypertrophy and deterioration of most organelles) when compared to control plants, but sequestered metals were not readily visible in specific cellular components (i.e., metals were not aggregated in cell vacuoles).

Poster Board No. 031

THE EFFECT OF ALTERING PAPPUS LENGTH ON GERMINATION IN NORTH AMERICAN DANDELION (*TARAXACUM OFFICINALE*) SEEDS. Jessica R. Mobley, s09_ismobley@wittenberg.edu, Matthew H. Collier, mcollier@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501-0720.

Seed ultrastructure was examined in relation to germination (appearance of the radicle) of North American dandelion (*Taraxacum officinale*) seeds. Based on previous dandelion rearing studies, a correlation between how intact the dandelion seed is and its ability to germinate was observed. With the pappus (an awn-like modification of the calyx) completely removed there was a significant decrease in the total number of seeds that germinated and an increase in the time for seeds to germinate. Seeds with a partial pappus were observed in this study to see if similar germination trends were detected. Seeds from thirty-three different dandelion plants were germinated under six treatment conditions (N = 10 seeds from each plant per treatment): pappus completely intact (control), pappus minus the awn, 75% of the pappus intact, 50% of the pappus intact, 25% of the pappus intact, and the pappus completely removed. Results indicated no difference in mean number of germinated seeds across the treatments ($P = 0.117$), but showed a significant difference in the mean time to germination across treatments ($P = 0.001$). These results suggest that time to germination is increased if the pappus is removed or altered. We intend to replicate our study using different dandelion populations and also determine whether genetic differences in seed germination exist across different dandelion clonal lineages.

Poster Board No. 032

CONCENTRATION OF CU, FE, PB, AND ZN IN DANDELIONS (*TARAXACUM OFFICINALE*; ASTERACEAE) GROWING IN CENTRAL OHIO URBAN POLLUTED SOILS. Natalie A. Davidson, s09.ndavidson@wittenberg.edu, Matthew H. Collier, mcollier@wittenberg.edu, Dept of Biology, Wittenberg University, Springfield, OH 45501-0720.

This study determined the ability of North American dandelions (*Taraxacum officinale*) to take up and sequester Cu, Fe, Pb, and Zn from urban polluted soils. Soil samples (N = 2 per site) and dandelion leaves (N = 40 per site) were collected from 3 polluted urban sites (e.g., near railroad tracks or overpasses) and from 2 relatively unpolluted sites in Springfield, Ohio (39.94N, -83.78W). Following collection, soil samples were dried and acid digested using 4M HNO₃ to extract total soil metals. Dandelion leaves were rinsed, oven dried, and ashed in a muffle furnace at 550°C before also being acid digested with 4M HNO₃. The concentrations of Cu, Fe, Pb, and Zn in soil and leaf extracts were determined through flame atomic absorption spectrometry. Mean concentration of soil metals in urban polluted sites were: Cu = 48.58 mg kg⁻¹, Fe = 11858.03 mg kg⁻¹, Pb = 17.23 mg kg⁻¹, and Zn = 174.20 mg kg⁻¹, while mean leaf metal concentrations were: Cu = 11.27 mg kg⁻¹, Fe = 2417.39 mg kg⁻¹, Pb = 2.38 mg kg⁻¹, and Zn = 35.79 mg kg⁻¹. Overall, when compared to soil and leaf metal concentrations from unpolluted sites, it was determined that dandelions growing in contaminated urban soils can take up and sequester soil borne metals at reasonably high concentrations. It is hopeful that dandelions will prove to be a model organism for future research regarding the effects of anthropogenic pollution on plant population genetic structure and the mechanism(s) of metal tolerance in higher plants.

Poster Session 3

Pre-College Students

Kuss Science Center – 3rd Floor

1:30-3:00 pm

Poster Board No. 034

HYDROGEN GAS FROM AMERICAN COCKROACHES. Matthew Tan, ztan@cinci.rr.com, 8308 Cherrydale Ct, Mason OH 45040 (Mason Middle School).

Bio-hydrogen generation by microbes such as those living inside termite guts has been investigated by scientists for its potential as an energy efficient way of fuel production through fermentation. This study proposed that American common cockroaches (*Periplaneta americana*) could be induced to produce hydrogen, if fed a specific diet. The hypothesis was that feeding the insect different kinds of food would shift the microbial populations inside the insect's guts, causing hydrogen generation. American cockroaches released hydrogen in 12 hours when fed only honey (1000 ppm hydrogen) or table sugar (100 ppm hydrogen). Cockroaches fed pineapple fruits generated over 1000 ppm hydrogen in 24 hours. Incubation of cockroaches with guts cut open and housed in sealed glass bottles generated 9000 ppm hydrogen in 48 hours. Cockroaches on a regular diet did not release hydrogen. Also, American termites (*Zootermopsis angusticollis*) fed wood and paper did not release hydrogen. Incubation of termites with guts cut open in sealed glass bottles generated over 2000 ppm hydrogen. This work has discovered that hydrogen can be produced from American common cockroaches at a level comparable to (or even higher than) that from the termites which have so far been the main focus of researchers.

Poster Board No. 035

REPAIRING AMERICA'S AGING CONCRETE HIGHWAY BRIDGES WITH BIO-COMPOSITES. Raymond Tan, raymond.tan.09@gmail.com, 8308 Cherrydale Ct, Mason, OH 45040 (Mason High School).

America's aging concrete highway bridges need to be repaired to prevent further deterioration which may pose public safety hazards. The objective of this work is to determine if cement bio-composites may be used to repair concrete bridges. It is hypothesized that cement may form composites with biomaterials such as wood sawdust, or rice starch powders. It is further hypothesized that the cement bio-composites may be reinforced with cross-linking polymers, such as polyisocyanate, for strength build-up. The tensile strength, which is very important for concrete bridges, was tested by an Instron machine. The compressive strength was measured by a hydraulic press. It was discovered that cement bio-composite from 2% gelatinous rice powder, cross-linked with 5%

polyisocyanate, had a tensile strength of 322 lb./inch while the control cement had a tensile strength of 198 lb./inch. The compressive strength of this bio-composite was 2123 psi which was comparable with the compressive strength of the control cement of 1953 psi. Adding sawdust or rice particles directly into the cement, without cross-linkers, decreased the compressive strength properties. Adding polyisocyanate alone into the cement, without biomaterials, destroyed the strength properties completely (below instrument reading scales). This study demonstrated that cross-linked cement bio-composites might be used for repairing concrete bridges, providing improved strength properties.

Poster Board No. 036

DOES HEREDITY INFLUENCE FINGERPRINT PATTERNS? Allison K. Caruso, alliecaruso@yahoo.com, 8090 Laurel Lake Ct, Liberty Twnshp, OH 45044 (Hopewell JS).

A fingerprint is the dirt, oil, ink, or other substance from friction ridges of fingers that are transferred to a surface. Fingerprinting is the process of identification based on the impressions made by the ends of fingers and thumbs. Each fingerprint is unique, playing a role in identifying and capturing criminals, solving crimes, and keeping important government buildings safe. Heredity is the passing of genes from one generation to the next. Traits are characteristics passed down through the genes. Some characteristics are hair color, eye color, nose shape, and perhaps fingerprints. The purpose of this project was to determine if the pattern of fingerprints is linked to one's heredity. The hypothesis is that heredity does not determine the patterns of fingerprints. Eight families, ranging from four to six people per family, were fingerprinted using the right thumb. Each family consisted of a mother, a father, and their children. The total number of members fingerprinted was 41. The prints were closely examined to compare the detail of arches, loops and whorls to see if any similarities existed within a family. The results of this experiment show only two out of the eight families may have a possible correlation between heredity and fingerprints. Conclusion is that, heredity does not have a link to fingerprints. Fingerprints are created when in the mother's womb.

Poster Board No. 037

DO THE SEASONS DETERMINE THE TREATMENT OF ACID MINE DRAINAGE? Rebecca K. McGrail, rmcgrail1@sbcglobal.net, 366 Westwood Dr, Steubenville, OH 43953 (Steubenville Catholic Central High School).

The research goals of this study were to determine 1) if season affected the treatment of acid mine drainage (AMD) and 2) which filtering agent was able to return the AMD closest to normal stream conditions during each season. It was hypothesized that activated carbon would return AMD closest to normal stream conditions in summer/autumn due to its quick drainage rate and high porosity; sand would return AMD closest to normal stream conditions in winter/spring due to its slow drainage rate and fine granules. The diversion well, filled with 1 L of filter material and a 40 cm piece of cheesecloth near the outflow pipe, was inserted into the drainage area. 12 L of water were collected for filter carbon and limestone; 2 L were collected for sand. Samples of unaffected stream water, affected stream water, and AMD were collected. Each sample was tested for dissolved oxygen and pH; 100 mL were collected and tested for conductivity, total acidity, total alkalinity, and total dissolved solids. In autumn, sand increased pH by 0.07 mol/L, conductivity by 9 $\mu\text{s/cm}$, dissolved oxygen by 2.2 mg/L, and total dissolved solids by 3 ppm and lowered total acidity by 20 mg/L. In winter/spring, sand increased pH by 0.06 mol/L, dissolved oxygen by 1.6 mg/L, and total dissolved solids by 2 ppm and lowered total acidity by 15 mg/L, total alkalinity by 15 ppm, and conductivity 1 $\mu\text{s/cm}$. Season does not determine the treatment for AMD. Sand shows the most potential as an over-all treatment for AMD; this leads to the rejection of the hypothesis. However, summer results were not obtained.

Poster Board No. 038

ASPIRIN TABLET DISSOLUTION. John M Lammers, kljllammers@bright.net, 12737 Rd 12, Ottawa, OH 45875 (Ottawa-Glandorf High School).

This project investigates how different dissolution rates change the effectiveness of aspirin tablets. First, vinegar was chosen to represent stomach fluid, water, to represent the intestine, and vinegar with added Mylanta® to correspond to a person taking Mylanta® with the aspirin. Then, both enteric coated and regular aspirin tablets were placed in each solution. Finally, dissolution rates were measured. All of the regular aspirin tablets dissolved in forty seconds in all solutions. The enteric coated tablets did not dissolve in the vinegar solution due to its acid resistant coating. They did, however, dissolve in the water solution. In the five milliliter

Mylanta® solution with 100 milliliters of vinegar, the enteric coated tablets dissolved only after ten hours. This solution was tested with litmus paper and was found acidic. A solution with twenty milliliters of Mylanta® with 100 milliliters of vinegar was made. The Sunmark® tablet dissolved in an hour while the Ecotrin® never dissolved. This could be due to a crack or pore in the tablet, different manufacturing procedures, or the ingredients in the Mylanta® could have disrupted the enteric coating. All of the Mylanta® with vinegar solutions were acidic, so the Mylanta® did not turn the vinegar more basic as hypothesized. Therefore, for quick pain relief or during a heart attack, regular aspirin ought to be taken. Enteric coated tablets would be taken for long term use, such as stroke or blood clot prevention, to protect the stomach.

Poster Board No. 039

WHICH TYPE OF CUP KEEPS HOT COFFEE WARM LONGEST: PAPER, PLASTIC, OR STYROFOAM? Justine M. Bensus, jmbensus@comcast.net, 2738 Christian Place Rd, East Liverpool, OH 43920 (Steubenville Catholic Central High School).

The title of the project is "Which type of cup keeps hot coffee warm longest: paper, plastic, or styrofoam?" The purpose of this project was to see if a paper, plastic, or styrofoam cup acted as a better insulator from heat being lost to the environment. It was hypothesized that the styrofoam cup would keep the coffee warmest for the longest period of time because of its ability to insulate heat. The materials used for this experiment were 1,450mL of filtered water, 45 mL of coffee grinds, 1 coffee maker, 1 paper cup, 1 plastic cup, 1 styrofoam cup, 1 ceramic coffee mug, 1 cooking thermometer, and metric measuring utensils. After 1,450mL of coffee were brewed, 200mL of the 79 °C coffee was immediately poured into each type of cup, using the ceramic coffee mug as the control. At intervals of five minutes for thirty minutes, the temperature of the coffee in each cup was recorded. The final average temperature of the coffee in the paper cup was 42 °C, and the final average temperature of the coffee in the plastic cup was 43 °C. The coffee in the styrofoam cup resulted at the warmest final average temperature of 45 °C, while the coffee in the control for this experiment, the ceramic coffee mug, resulted at a final average temperature of 40 °C. From the experimentation, the hypothesis was accepted as correct in that the styrofoam cup kept the coffee warmer over the thirty minutes of experimentation.

Poster Board No. 040

ROCKET FINDER: PART II, FINDING THE RANGE. Cherylyn M. Geers, cherylyn.geers@gmail.com, 3721 Dust Commander Dr, Hamilton, OH 45011-5525 (Home Schooled Student).

The goal of this long-term project is to create a system to locate model rockets after they have been launched. This section of the project focused on predicting and measuring the signal level of the transmitter for various antenna heights at two distances. Predicting the magnitude of the signal level is necessary to determine if the received signal level is large enough to be detected by the receiver. The antennas constructed and tested were a standard dipole and two helically wound dipoles. The range equation was used to predict signal levels at 6 and 30.5 meters. The transmitting antennas were at five different heights: on the ground (≈ 0 m), 0.038 m, 0.09 m, 0.25 m and 0.52 m. The receiving log periodic antenna was placed at .3 m and 1 m. A signal generator connected to the receiving antenna determined the gain, which was recorded for each combination in each of five runs of data. The antennas were tested on a large asphalt parking lot as well as a grassy surface which is commonly used as a model rocket launch site. The average difference between the values given by the equation and the actual values is 4.5 dB. This is generally characteristic of all the antennas. The experimental results are far better modeled by the range equation than the free space equation, which doesn't include the heights of the antennas.

Poster Board No. 041

ACID NEUTRALIZATION: A COMPARISON BETWEEN OVER-THE-COUNTER TREATMENTS AND HOME-REMEDIES. Michael J. Frankart, buck_fan_osu@yahoo.com, 5044 Brookhill Ln, Lima OH 45807 (Lima Central Catholic High School).

Two trials were conducted to determine whether antacids or home-remedies work more effectively to neutralize acid, the commonly understood cause of heartburn. The hypothesis was, if over-the-counter medicines are formulated with proper levels of alkaline, they will be more effective than home-remedies in achieving neutral pH of 7.0 with acid, the commonly understood cause of heartburn. The first trial used eight 500 ml beakers filled with 125 ml of 0.1

mol hydrochloric acid-HCl. For two control beakers, water and 1.0 mol NaOH were added. Recommended antacid dosages (Maalox®, Pepcid Complete®, Tums®) and home-remedies (baking soda, milk, tea) were placed in the remaining beakers. The pH measurements were taken every fifteen minutes for one hour. For the second trial, two controls and six remedies were put into eight 500 ml beakers with pH indicators. After recording each solution's initial pH (H₂O-1.0, NaOH-12.0, Pepcid Complete®-1.6, Tums®-2.8, Maalox®-1.0, Tea-1.0, Baking Soda-8.0, Milk-2.0), HCl was added into each solution until 7.0 pH was reached. Total ml needed to achieve pH of 7.0 was recorded for each beaker (H₂O-0, NaOH-325, Pepcid Complete®-8, Tums®-18, Maalox®-7.5, Tea-0, Baking Soda-317, Milk-0). For trial one, the calcium carbonate USP product neutralized the acid 22% more effectively (average pH-5.5 for Tums®, 4.5 for Pepcid Complete® throughout trial) than non-USP calcium carbonate products. For trial two, the calcium carbonate USP product used 22 ml HCl per 1.0 pH change versus 8.0 ml for Pepcid Complete®. The conclusion is that these antacids are more effective in neutralizing acids than home-remedies in these trials.

Poster Board No. 042

THE EFFECT OF SOUND ON *HIPPODAMIA CONVERGENS* AND *DROSOPHILA HYDEI*. Jacob M Oet, jacob_oet@yahoo.com, 6738 Forest Glen Ave, Solon, OH 44139 (University School).

The experiment involved observing reactions of *Hippodamia convergens* ladybugs and *Drosophila hydei* pomace flies to sound. The purpose was to find whether *H. convergens* and *D. hydei* move toward sound, and whether a frequency could be found that attracts *H. convergens* and not *D. hydei*. The hypothesis was that *H. convergens* ladybugs and *D. hydei* pomace flies would exhibit motion in response to specific frequencies, and that their reaction would differ. The materials were: 6,000 of each species, the Relative Movement Measurement Scale (RMMS), a tone generator, fishing weights, a camera, and six plastic containers. Two studies were made measuring the insects' reaction to different frequencies. In study 1, frequencies from 1 kHz to 20 kHz (1 kHz increments) were played for 30 seconds. The reaction was the amount of movement toward the sound, from one to five (five being the highest). The results were that both species moved toward 1 kHz, only *H. convergens* moved toward 2 kHz, and neither moved toward 3 kHz and above. This confirmed the hypothesis. Study 2 attempted to find the frequency that maximized the movement difference between the two species. In study 2, randomized frequencies from 0.1 kHz to 2 kHz (.1 kHz increments) were played for 240 seconds. The RMMS measured insect reaction by the movement of the rotation arm vs. the fixed arm. The results were that the most different reactions were at 1 kHz and 1.8 kHz. This has potential use in agriculture as an alternative to pesticides, attracting beneficial *H. convergens* without attracting harmful *D. hydei*.

Poster Board No. 043

EFFECTS OF THE TEGULA ON FLIGHT CONTROL DURING ODOR-TRACKING IN THE MOTH *MANDUCA SEXTA*. Kathy Guo, kguo2010@gmail.com, Jennifer Avondet, jla16@case.edu, Mark A. Willis, maw27@case.edu, 23814 Edgehill Dr, Beachwood OH 44122. (Hathaway Brown School).

The tegula is a small knob-shaped sensory structure in insects, located where the forewing or hindwing meets the body. Although locusts use the tegula in flight control, nothing is known about how the tegula affects the flight of the moth *Manduca sexta*. Previous experiments on locusts showed that surgically removing the tegulae affected their ability to fly and gain altitude. The goal of this study was to determine the effect of a similar manipulation of the tegula on moth flight. The working hypothesis is that, as in locusts, the tegulae have an affect on the flight control of this moth. Five surgical treatments were used to test the hypothesis in the freely flying male *M. sexta*: 1) bilateral ablation of both forewing tegulae, 2) unilateral ablation of one forewing tegula, 3) bilateral ablation of both hindwing tegulae, 4) unilateral ablation of one hindwing tegula, and 5) the ablation of all four tegulae. Further, an intact control was employed. Individuals in these six cases were challenged to fly in two different environments: still air, and a wind-borne pheromone plume. There were 21 individuals in each treatment group. Moths with total tegulae ablation showed less controlled flight. In addition, moths with no tegulae spent 61.5±42.2% of their flight time below the altitude of the release stand, a significantly larger proportion than the control moths 25.2±30.6 (two-way analysis of variance).

Poster Board No. 044

THE EFFECTS OF SOCIO-CULTURAL FACTORS ON LISTENERS' PERCEPTION OF THE ACCENTEDNESS OF NON-NATIVE SPEAKERS OF ENGLISH. Shaadee M. Samimy, sms92@columbus.rr.com, 909 Werner

Way, Worthington, OH 43085. (Thomas Worthington High School)

This study examined the effects of socio-cultural factors on listeners' evaluation of non-native speakers of English in two categories: accentedness and comprehensibility. The listeners were 21 high school sophomores who and their parents were born in the United States. This precaution was taken to eliminate any exposure of the listeners to accented English on a regular basis at home. The listeners were divided into two groups: 1) the video group watched 4 video clips of the speakers and 2) the audio group listened to the same speakers without watching the video. The speakers were 3 non-native speakers of English, each with a different ethnic background, and 1 native speaker. The speakers were selected to have one of 4 levels of accented English: 1) light accent, 2) heavy accent, 3) moderate accent, and 4) native-speaker. The level was determined by the researcher and a professor in Applied Linguistics at Ohio State University. The hypothesis was that the visual group would be more critical in evaluation because it would make assumptions based on the socio-cultural factor. The result was that both groups evaluated the speakers with relatively similar ratings, with the exception of the evaluation of "strength of accent", where the video group was clearly more critical. This indicates that visual representation is no longer an influence to bias native speakers one way or the other but instead, exposure to media or the existing racial demographics is such that the youngest generation is becoming more accustomed to hearing accented English.

Poster Board No. 045

SUBMARINE HYDRODYNAMICS. Bryan P. Grove, Supremuler3@aol.com, 55 College Hill Terrace Springboro, OH 45066 (Dayton Christian High School).

The purpose of the project was to discover whether or not the conning tower of a submarine creates drag affecting the submarine's speed and efficiency when the submarine is not completely submerged. The project tested two submarine model designs, one with a conning tower, one without. Both submarine models are based on the Virginia class submarine, using a scale approximately 1:30. Five models were made for each design and each model was tested twice inside a water tunnel. The results were that the model with the conning tower had an average force of 2.10X10⁶N of pull per hour and the one without the conning tower had an average of 1.74X10⁶N of pull per hour. The data were then converted into Joules per year. This was calculated to demonstrate the difference in energy consumed over a one year period between the two submarine designs. The difference between the two submarine models was 3.058X10⁹ of Joules per year based on a 100% yearly use of the submarine. The data supported the conclusion that the model without a conning tower was more efficient based upon approximately 20% less energy consumed by the model without the tower. The purpose of the conning tower is for reconnaissance and as a tool to break through the ice sheets in the polar regions. With the invention of satellite surveillance, and new ice breaking and fiber optic technologies modern submarine designs may not include a conning tower. If more tests were performed, the outcome could be supported.

Poster Board No. 046

TOTAL CD11B+, CD11C+, AND F4/80+ CELL POPULATIONS ARE INCREASED IN THE CAWS MOUSE MODEL OF KAWASAKI DISEASE (KD) SUGGESTING A ROLE FOR MACROPHAGES AND DENDRITIC CELLS (DCS) IN THE PATHOGENESIS OF CORONARY ANGIITIS AND AORTITIS. Alexa Magyari, amagyari11@hb.edu¹, Ingrid Tomanova Soltys², M.D., Joy Whitbred², Nora Singer, M.D.², ¹Hathaway Brown School, 19600 North Park Boulevard, Shaker Heights, OH 44122, ²University Hospitals Case Medical Center, Cleveland OH 44106.

Kawasaki Disease (KD) is a childhood vasculitis associated with coronary arteritis. 25% of untreated patients will develop coronary artery aneurysms. It is the most common cause of acquired heart disease in children. Candida Albicans Water Soluble fraction (CAWS) immunization in mice presents with similar vascular inflammation. The objectives include analyzing the pathogenesis of the disease model, identifying cell populations involved in the inflammation, and eventually developing targeted therapy. Six to 12 week-old wild-type mice were immunized with CAWS and sacrificed 21-28 days later. Hearts were embedded and sectioned. Splenocyte populations were analyzed by flow cytometry. H&E staining and confocal microscopy of heart sections were used to detect the influx of inflammatory cells and elastin damage. The results showed that splenomegaly was a characteristic feature of the mouse model

with affected mice exhibiting enlarged spleens averaging 0.160 grams versus 0.080 grams in control mice. Histology illustrated that over 70% of immunized mice developed coronary aortitis and arteritis. Affected mice showed increased total CD11b+ (24.3% ± 4.9 vs. 7.4% ± 0.1, $p < 0.01$) and CD11b+/CD11c+ (4.6% ± 1.1 vs. 2.3% ± 0.5, $p < 0.05$) and CD11b+/F480+ (9.0% ± 4.4 vs. 4.4% ± 0.6, $p < 0.0112$) populations compared with mock-immunized controls. Staining of cells isolated from cardiac lesions suggested the presence of cells expressing CD11b and/or CD11c, and was virtually undetectable in non-immunized mice. CAWS immunization induces mouse coronary arteritis, aortitis, splenomegaly, and alters immune composition in the spleen. The results suggest that the CAWS model may mimic features of KD and human aortitis and thus may be useful in studying basic mechanisms of susceptibility and damage.

Poster Board No. 047

THE EFFECT OF DRAG ON STREAMLINED MODEL CARS. Michael P. Kreiser, mk0092@yahoo.com, 4204 Maystar Way, Hilliard, OH 43026. (Saint Agatha School)

This study examines how the aerodynamic front-end design of a model car impacts the drag of a vehicle. There are three research questions centering on plane-adjustments between vertical (1), horizontal (2), and a combination of the two planes above (3). The three corresponding hypotheses predict a difference (front plane of zero performing the best). Best is defined as having the largest time. The topics undertaken in a review of literature are drag, drag coefficient, automobiles, wind tunnels, and properties of physics. The study's identified/tested independent variables include areas of adjustment of both planes and a combination of the two planes. A prototype wind tunnel was designed and successfully pilot tested. Models from all three experiments were tested. Data indicated that in experiment one, the 16 sq. in. model performed the best (3.47s), followed by the zero sq. in. model (3.14s), and the 32 sq. in. model (2.51s). In experiment two, the 16 sq. in. model performed best (4.67s), followed by the zero sq. in. model (3.00s), and the 32 sq. in. model (2.51s). In experiment three, the combination of the 16 sq. in. models performed best (4.38s), followed by the combinations of the zero sq. in. model (3.04s), and the 32 sq. in. models (2.70s). As a result of the data, all three hypotheses were rejected. As an application, knowledge gained from the experiment demonstrates that objects with small front faces and sides not extremely flared out will perform the best.

Poster Board No. 048

RIGHT BRAIN/ LEFT BRAIN: THE GENDER DISCREPANCY. Miranda E. Cunningham, GolfMec1@aol.com, 9229 Upper Lewisburg Salem Rd, Brookville, OH 45309 (Dayton Christian High School).

The dominance of one cerebral hemisphere over the other develops gradually throughout the first ten years of life. Human brain understanding and overall retention has been found to be impacted by gender. The hypothesis was that males characteristically develop the left brain as evidence in their use of logic and order/pattern perception. The perception was that females are typically more right brained and perform better than men on almost every type of memory test. Women have increased neurological connection between both hemispheres allowing them the ability to rapidly process information. A group of ten females and ten males ranging in ages sixteen-eighteen were assembled. Each of the three trials that were conducted consisted of ten males and ten females (n=20). During the first trial, the participants viewed a sequence of five numbers for ten seconds and were then asked to write down the numbers they could recall. This process was repeated with a sequence of five shapes and then with a combination of five numbers and shapes. The process was repeated to include in the second trial with eight of each category was viewed for twenty seconds and then in a third trial a set of twelve of each category each was viewed for forty seconds. Trial one (numbers only) males recalled 55% and females 45%; trial two (shapes only) males recalled 39% and females 61%; trial three (numbers and shapes) the males recalled 44% and females 56%. Female recall was clearly higher validating that gender does impact memory.

Poster Board No. 049

THE CROP WHICH PREVENTS THE LEAST AMOUNT OF EROSION. Logan R. Eades, eades@mechanicsburg.k12.oh.us, 6134 SR 187, Mechanicsburg, OH 43044 (Mechanicsburg Jr/Sr HS).

Erosion is the process of carrying away weathered materials. Erosion is a gradual and continuous process caused by wind, rain, waves, streams and glaciers. There are many different kinds of

erosions. An example of sheet erosion is caused by water run off. Accelerated erosion is caused by man's misuse of the land. Finally another example of erosion is stream erosion which is caused by the fast moving stream. Farmers have learned to use conservation practices to help prevent and/or reduce erosion. The following are ways to help prevent erosion: plowing across a slope, grass waterways, planting trees, creating channels, and strip farming. Erosion of four different crops was tested for a month. Water was sprinkled over the four different crops and the runoff was collected and measured after each trial. It is hypothesized that grass crop would have the least amount of erosion. Preliminary data showed that the wheat crop had the least amount of erosion. For the first few trials the wheat and the grass had very little erosion compared to the soybean and the corn crop. The initial data showed that the wheat crop may contain a more intertwined root structure compared to the other three crops and less distance away from each particular plant which could help in absorbing more of the water.

Poster Board No. 050

KING RECYCLER THE WORM PART IV. Sarah J. Raies, mkraies@roadrunner.com 2915 Noddin Way, Portsmouth, OH 45662 (Portsmouth Junior High School).

This project was to determine if an earthworm, - *Lumbricus, species* - *Lumbricus Terrestris*, would regenerate itself after being cut in half or in thirds. This project also examined the effect of food scraps in the soil on the regeneration process. The purpose of this study was to understand how the earthworm is able to regenerate and survive in the soil. The hypothesis was that a worm segment that includes the clitellum would regenerate and that having food added to the soil would speed up the process. Eight worms were cut on a dissecting tray and put in separate containers of soil. Four worms had food scraps added to the soil and four worms had no food added. The worms were watered daily to keep proper moisture. Every four days the worms were observed and measured for regeneration growth. The worm segments containing the head and clitellum increased in length from 3" to 5" after 16 days. The worm segments that had either the head or clitellum had no increase in length or the worm died. The worm segments with both head and clitellum present that had food scraps in the soil also increased from 3" to 5" in 16 days. The hypothesis was incorrect. The food did not increase the regeneration process and it is necessary for the head to be present with the clitellum for regeneration to take place.

Poster Board No. 051

CHORD PROGRESSION PATTERNS IN CLASSICAL MUSIC ASSOCIATED WITH THE HORROR FILM GENRE. Elizabeth L. Wainwright, amartin@uakron.edu, 834 Mentor Rd, Akron OH 44303. (Litchfield Middle School).

Music affects human emotions, but do mathematical similarities in musical pieces correlate with specific feelings? This experiment used MIDI numbers and Hertz frequencies to analyze three classical pieces associated with horror films (Bach's *Tocatta in Dm*, Rachmaninoff's *Prelude in C#m*, and Holst's *Mars, Bringer of War*) and one non-horror classical piece in a minor key (Beethoven's *Für Elise*) as a control. It identifies the chord sequences for the 360 best-known 32nd beats in each piece. Assigning MIDI numbers to each variable enabled manipulation of the data in order to examine both the numeric average of each chord and the intervals between each note in a single chord. The hypothesis was that different pieces of music evoking the same emotions in the listener have similar chords and chord progressions. Analysis of the results determined that a mathematical pattern was evident. As expected, the three pieces had some mathematical similarities to one another, which were not evident in the control. The horror music averaged 43.9% diminished 7th chords while the control had 0%. The most conclusive evidence of mathematical similarities came from an unexpected concordance between the two graphs displaying the MIDI numbers and averages for each individual piece. Seventh chords occurred 63% more often at higher Hertz frequencies than lower ones. There was no concordance between the control's graphs. Therefore, different pieces of music evoking horror have very specific similar chords and chord progressions, as the original hypothesis indicates.

Poster Board No. 052

SINGLE POLE PULSE MOTOR DATA ANALYSIS. Jonathan J. Stone, innestone@aol.com, 2009 Verde Ave, Akron, OH 44314 (St. Vincent-St. Mary High School).

This is the third year of an ongoing investigation into the design, construction, and performance of single pole pulse motors. This year's hypothesis was that the improvement of the data collection

and analysis of the previous year's data will validate the 2007 hypothesis. The purpose of the 2008 project was to improve the data collection methods and recalculate the 2006 and 2007 motor data. The new rpm data were collected with an adjustable speed strobe light, and voltage was provided by an adjustable DC power supply. These instruments were used to calculate whether modification to the motor design exhibited measurable differences to the rpm and voltage use. The 2006 design required 12 volts to achieve 800 rpm while the basic 2007 design required only 6 volts to reach 800 rpm, and, at 9 volts, reached 1200 rpm. The enhanced 2007 design placed two 3mm glass beads on the (12 wraps/1 inch in diameter) armature leads, reduced cradle loops to 2 mm and the added a second magnet; this improved armature stability, keeping it centered between the magnets. This reduced voltage usage to 1 volt at .6 amps to achieve 1000 rpm, and, at 6 volts, reached a maximum of 1800 rpm. The final results were compiled from a minimum of four trials per engine. When the data collection methods were improved and the prior year's data were reanalyzed they validated that the improvements in motor design resulted in a reduction of voltage usage by a minimum of 6 volts and an increase in rpm of 1000.

Poster Board No. 053

AT WHAT ANGLE IS A SOLAR PANEL MOST EFFICIENT IN OHIO? Priyanka Sekhar, 4191 Autumn Creek Dr, Springfield, OH 45504 (Ridgewood Middle School).

Solar panels are frequently used to power public buildings such as rest areas in southern states like Florida and Texas, but not Ohio. The primary goal was to understand the reasons for not using solar panels in colder climates such as in Ohio. The experiment was designed to test the efficiency of a solar panel at fixed angles. The hypothesis was that more current would be produced when the panel was placed horizontally at zero degrees to the horizon. The angle that the panel made with a horizontal plane was changed to four fixed settings and the amount of current and voltage produced by the panel was measured. The temperature and weather conditions were recorded. The angles were 0, 45, 65, and 90 degrees toward the sun. The experiment was conducted on Saturdays in December, January, and February. The solar panel produced an average of 27.322, 32.665, 34.811, and 26.217 milliamperes of current at tilt angles of 0, 45, 65, and 90 degree angles respectively. Of the angles tested, the solar panel produced more current when at the 65 degree angle. It was also observed that more current was produced when facing south around 1:00PM EST. The panel was able to produce 28% of its maximum capacity. It appears cloud cover played a role in decreasing the efficiency of solar panels in winter months, more than the colder temperatures. Therefore, cloud cover in Ohio is an important factor in influencing the efficiency of solar panels.

Poster Board No. 054

TRACKING GEOMAGNETIC STORMS USING A GLOBAL POSITIONING SYSTEM. Lauren B. McCane, karatekid0718@hotmail.com, 1057 Sutton Road, Cincinnati, OH 45230 (Anderson High School).

The purpose of this experiment was to determine if the measurements from a global positioning system (GPS) were directly proportional to the amount of geomagnetic activity. The hypothesis was that the latitude, longitude and altitude would all be directly proportional to the amount of geomagnetic activity. Data were taken from the GPS three times daily for twenty days. The three places after the decimal point were the ones that were recorded because the actual degree never changes. Every day had a different set of results from data collection. For example, on January 1st, 2008, at eleven in the morning, the longitude measurement with the WAAS correction was .315, the latitude measurement was .698 and the altitude measurement was 695 feet. Without the WAAS correction, the longitude was .314, the latitude was .698 and the altitude was 695 feet. There were very little differences in the data on this day and the Space Environment Center Storm Archive showed no geomagnetic storm activity on this day. Analysis of the data from all twenty days showed that only altitude and latitude were directly proportional to the amount of geomagnetic activity, while longitude was not. The graphs constructed for altitude and latitude showed a linear trend, while the longitude had a bell curve in its graph. In conclusion, the altitude and latitude measurements of a GPS are directly proportional to the amount of geomagnetic activity.

Poster Board No. 055

DA VINCI'S DESIGN. Victoria L. Redden, vlredde@live.com, 130 New Hampshire Dr, Ashland, KY 41101 (St. Joseph Central High School).

Leonardo da Vinci was a scientist and an artist. Among inventions developed by this genius were shoes that can walk on water as well as the parachute. He also built a variety of bridges, including a very unique design that can actually support itself. This bridge was built to resist forces and to be put together easily as was to take apart. The bridge was also designed to be constructed simply with materials found by the riverbank. This self-supporting bridge, also called the safety bridge, was built to be a strong bridge used in military forces, but is it stronger than the bridges that are commonly used today? Contrary to the hypothesis stated, this bridge is not stronger than bridges used today. It was tested on four factors to determine its strength: tension, compression, shear, and load. This bridge design did extremely well in load. It was ranked first out of the 6 bridges tested. However, it was ranked sixth out of six in both tension and shear; and was ranked fifth out of six in compression. Although it failed in the majority of the tests done, it had remarkable strength in load - which was the primary factor considered of bridge design at the time it was constructed. Further, this presentation will discuss the creative designs by Leonardo da Vinci from a historical perspective.

Poster Board No. 056

USING JET STREAMS TO INTERPRET HURRICANE ACTIVITIES. Tushar Goswami, goswamifamily@sbcglobal.net, 2183 Bassett Ct, Beavercreek, OH 45434 (Ferguson Middle School).

The experimenter chose a project which involves jet stream influence on hurricanes because it can assist meteorologists predict whether tropical storms will turn into hurricanes. If a correlation exists, jet streams maps could be used to plot a predicted course for a hurricane which will, in turn, help issue alerts and protect lives. The research used jet streams maps around the United States and assessed the data for the following hurricanes: Ivan, Rita, Jeanne, Wilma, Katrina, and Frances. Data were: tabulated and plotted for each of the following conditions for all the hurricanes speed of jet stream and hurricane and the distance traveled by the hurricane through a nine-day period. The outcome of this research project showed that the jet stream will directly influence the speed and direction of the hurricane. Hurricane Wilma had an inland jet stream speed ranging from, 30-65 miles per hour, which was the strongest of all the hurricanes studied and moved the hurricane away from the mainland Florida to dissipate harmlessly over the Atlantic Ocean. The experimenter hypothesized that this speed will be beneficial to redirect hurricanes and their destructive energy. In five other cases jet stream speed was found to be much lower, less than 30 miles per hour, causing enormous destruction and loss of life in the golf coast. This study shows that the path of a hurricane is not strongly affected by the path of the jet stream, but that there is a relationship between jet stream speed and forward speed of the hurricane. Above a certain speed the jet streams push the hurricane away from a land mass; below that speed the hurricanes come ashore causing damage to property and requiring evacuation. This study provides a prediction model of the hurricane intensity.

Poster Board No. 057

IMMUNOFLUORESCENCE ANALYSIS OF A NEURONAL FEEDING AND OBESITY CIRCUIT REGULATED BY THE PROTEIN SYNDECAN-3, Diana A. Basali, dbasali10@hb.edu, Ofer Reizes reizeso@ccf.org, Cleveland Clinic, 27739 S Woodland Rd, Pepper Pike, OH 44124 (Hathaway Brown School).

Effective management of obesity has become an important clinical focus because this disease is an epidemic in Western society. This project focuses on a neuronal circuit in the hypothalamus, a region of the brain that regulates feeding and body weight. This circuit is comprised of appetite and satiety neurons that integrate energy needs and balance each other. A key component in the wiring of this circuit is the protein syndecan-3. Previous research from the Reizes lab indicated that loss of the syndecan-3 gene leads to changes in the wiring of this circuit resulting in an increase in satiety inputs over appetite inputs. These studies tested the hypothesis that syndecan-3 deficient mice have increased neuronal satiety signaling. Activation of neuronal signaling was assayed using immunofluorescence staining for the c-fos protein. Syndecan-3 deficient mice and control wild type mice were injected with a satiety peptide and neuronal activation was assessed. Brain sections from wild type and syndecan-3 deficient mice were prepared for immunofluorescence staining for c-fos. At 2 hours, female syndecan-3 deficient mice had 160 ± 10 activated neurons whereas wild type mice had 100 ± 20 activated neurons. In males, at 2 hours, syndecan-3 deficient mice had 170 ± 30 activated neurons while the wild type mice had 140 ± 10 activated neurons. The difference in the number of c-fos positive neurons between the syndecan-3 deficient and wild type mice was statistically significant (p < 0.05) based on a t test. These data suggest that the brain

circuits in syndecan-3 deficient mice are wired to be hyper-responsive to satiety signals. Ultimately, these studies may lead to new therapeutic approaches to help combat obesity.

Poster Board No. 058

SOLUBILITY OF CARBON DIOXIDE IN WATER AT VARIOUS TEMPERATURES. Samer A. Alkhalili, suzanwadi@yahoo.com, 4691 Fairway Ln, Sylvania, OH 43560 (Toledo Islamic Academy).

A solution of carbon dioxide and water creates carbonic acid. Since carbon dioxide exists in the air, it can be absorbed by surface waters, rain or snow. The rain will carry carbon dioxide into oceans as carbonic acid, lowering the pH and resulting in ocean acidification. This project measured the effect of temperature on the solubility of carbon dioxide. It was hypothesized that increasing the temperature will decrease the solubility of carbon dioxide in water and vice versa. A bottle of Seltzer water was subdivided into three 1-L beakers. One beaker was placed in the ice-water bath at 0°C, the second in water at room temperature at 22°C and the third in a warm water bath at 71°C until the required temperature was reached. Using an eye dropper, ten samples of Seltzer water at each temperature were titrated using 2.0 M sodium hydroxide solution and the indicator phenolphthalein. The number of drops of sodium hydroxide solution required for neutralization at each temperature was recorded and used to measure the amount of carbonic acid in each sample. The average number of drops of sodium hydroxide was 46 drops at 0°C, 34 drops at 22°C and 14 drops at 71°C. The results demonstrated that the average number of drops of sodium hydroxide required for neutralization in a warm water bath at 71°C was less than that at room temperature. Furthermore, the average number of drops of sodium hydroxide required for neutralization in an ice bath was more than that at room temperature. The results supported the hypothesis that increasing the temperature will decrease the solubility of carbon dioxide in water and vice versa. As the temperature decreases, carbon dioxide becomes more soluble in water and the quantity of carbonic acid increases, thus reducing the negative effect of carbon dioxide on global warming while increasing the level of ocean acidification.

Poster Board No. 059

EXPOSURE TO HIGH GLUCOSE KILLS HEART CELLS. Himanshu Savardekar, nds@columbus.rr.com, 5888 IvyStone Ct, Dublin, OH 43016 (John Sells Middle School).

Diabetes is a major health problem in the US with about 20.8 million children and adults affected by it. This is equivalent to about 7% of the entire country's population. Diabetes is associated with high blood glucose levels and is known to affect heart function. In spite of a lot of research, the exact effects of high blood glucose on heart cells is not completely understood. The purpose of this study was to determine the effects of high glucose on heart cells. Here we tested the hypothesis that exposure to high glucose kills isolated heart cells. We also tested the hypothesis that vitamin C treatment protects the heart cells against glucose induced cell death. Isolated heart cells were plated in 96 well plates (40,000cells/well). The cells were then treated with various concentrations of glucose for 24 hours (n=8 wells/treatment group). After the 24 h treatment the number of cells alive in each well was determined by Crystal Violet assay. In short, the cells were washed and fixed with formalin. Cells were then incubated with crystal violet dye for 10 min and then excess dye was washed. The dye bound to the cells was solubilized with sodium-citrate solution and the intensity of the color was measured at 590 nanometer (nm) using a plate reader (spectrophotometer). Additionally, the protective effects of Vitamin C were also tested using same methods. There was an increase in cell death after exposure to increasing concentrations of glucose. The mean cell death in a glucose concentration of 200 mg/dL is 1.43 with a standard error of 2.63, mean cell death in a glucose concentration of 300 mg/dL is 9 with a standard error of 5.19, mean cell death in a glucose concentration of 400 mg/dL is 13.79 with a standard error of 3.4, mean cell death in a glucose concentration of 500 mg/dL is 12.83 with a standard error of 4.02, mean cell death in a glucose concentration of 600 mg/dL is 20.01 with a standard error of 4.58. Furthermore, following incubation with Vitamin C, heart cell death was reduced. The mean cell death in a glucose concentration of 400 mg/dL and Vitamin C is 7.96 with a standard error of 2.81 and mean cell death in a glucose concentration of 600 mg/dL and Vitamin C is 9.32 with a standard error of 3.6. Exposure to high glucose kills heart cells in a concentration dependent manner. If these cells were treated with vitamin C supplementation they were protected from glucose toxicity. The direct effects of high glucose on isolated heart cells may explain some of the detrimental effects of high glucose during diabetes related heart disease. Moreover, vitamin C supplementation may protect the heart cells from harmful

effects of high glucose. Further studies to define the effects of high glucose in animal models and related mechanisms are warranted.

Poster Board No. 060

HOW FIRE AFFECTS THE STRUCTURAL INTEGRITY OF FLOOR JOISTS. Autumn Grace Peterson, bajac@cinci.rr.com, 223 West Stoneridge Drive, Milford, OH 45150 (St. Andrew Middle School).

The purpose of this experiment was to compare the structural integrity of a floor structure with solid wood joists to one with manufactured wooden I-joists while under fire. The hypothesis was that the solid joist structure would maintain its structural integrity longer. An I-joist is shaped like an "I" and is made from cheaper and lighter material. Its center (web) is made of OSB wood and is 1.25 cm thick. Its ends (flanges) are glued to the web with 4.5x7.0 cm² studs. The solid joist is 5.1 cm thick, which is 4 times greater than the web. The experiment consisted of two tests. In the first test, a torch was aimed at the side of the joist, and the time to burn a hole through its cross section was measured. One trial was run for each joist type. The hypothesis was the I-joist would burn through faster because its web is 25% the thickness of the solid joist. A hole burned through the solid joist in 75 minutes compared to 10 minutes for the I-joist, which was 13% of the solid joist time. In the second test, a 95 kg load was centered on a 122x61 cm² floor structure supported at its ends with a fire burning beneath it. One trial was run for each structure. The hypothesis was that the I-joist structure would collapse in less time because its web would burn through first. The solid joist collapsed in 30 minutes compared to 12.5 minutes for the I-joist, which was 42% of the solid joist time. In conclusion, it was determined that a floor structure built with solid joists appears to be safer under fire.

Poster Board No. 061

PRELIMINARY COMPARISON OF BONE MINERAL DENSITIES BETWEEN YOUTH WITH AND WITHOUT PREVIOUS FOREARM FRACTURES. John Wieser, swieser@woh.rr.com, 1385 Shoreview Dr, Lima, OH 45805 (Lima Central Catholic High School).

This study determined if individuals with previous forearm fractures had a lower bone mineral density (BMD) compared to an individual's BMD without a previous forearm fracture. Curiosity about an individual who sustained a wrist fracture while another enduring a similar accident did not, prompted this research. The hypothesis was that individuals with previous forearm fractures would have a lower BMD compared to individuals without previous forearm fractures. Participants, ranging from 5-16 years with previous forearm fractures, were obtained through the orthopedic practice of Dr. Michael Wieser, and were asked to test with a friend of similar body size and age without a previous forearm fracture. Sixteen individuals with previous forearm fractures were contacted with 6 participating; 4 engaged friends without previous forearm fractures. Ten individuals, four males and two females with previous forearm fractures and three males and one female without, recorded height and weight, as well as, daily averages for milk product consumption, carbonated beverage consumption, length of sun exposure, and length of exercise. Dual-Energy X-Ray (DEXA) Scans were obtained on ten subjects and interpreted by Dr. Michael Wieser to determine BMD. DEXA Scans revealed a lower BMD in four of the six participants (0.807, 0.902, 0.941, 0.944) with a previous forearm fracture compared to three of the four participants (0.936, 1.017, 1.076, 1.096) without. Thus, the preliminary conclusion, based on limited data (N=10), weakly supports the hypothesis.

Poster Board No. 062

MISSE 2 PEACE POLYMERS GROUND-LABORATORY TO IN-SPACE ATOMIC OXYGEN EROSION CORRELATION. Arielle H. Stambler, astambler10@hb.edu, Karen E. Inoshita, kinoshita10@hb.edu, 21921 Shaker Blvd, Shaker Hts, OH 44122 (Hathaway Brown School).

In low Earth orbit (LEO), atomic oxygen (AO) erosion is a serious threat to spacecraft. Although spaceflight experiments are ideal for determining LEO environmental durability of spacecraft materials, ground-laboratory testing is often used for erosion yield (volume loss of material per oxygen atom) evaluation. Differences exist between AO exposure in LEO and in ground-laboratory facilities, such as the radio-frequency plasma asher used in this experiment. For example, AO arrives from all directions in the asher whereas it arrives from one direction in LEO, which could cause variations in erosion. In an effort to improve ground-based testing accuracy, ground-laboratory to LEO AO erosion correlation experiments were conducted. In these tests, the plasma AO erosion yields of 39 polymers, the Polymer Erosion and Contamination Experiment (PEACE) Polymers, were determined. Some of the polymers tested include Kapton H, Teflon FEP, and Polyethylene.

The plasma erosion yields were compared to spaceflight data from the Materials International Space Station Experiment 2 (MISSE 2) PEACE Polymers experiment taken to the International Space Station during STS-105 and retrieved during STS-114. The range of erosion yields was 5.1×10^{-25} to 2.6×10^{-23} cm³/atom in the asher and 1.01×10^{-25} to 9.14×10^{-24} cm³/atom in LEO. The erosion yields of all polymers were higher in the plasma than in space. The asher to LEO erosion yield ratios ranged from 1.0 to 37.1, but most of the polymers had ratios between 1.0 and 3.0. Polymers with unusual surface morphologies (such as fabric) or those containing AO durable material, had particularly high ratios. The asher to LEO erosion yield ratios will allow more accurate in-space materials performance predictions to be made based on asher durability evaluation.

Poster Board No. 063

PRELIMINARY OBSERVATION OF THE EFFECT OF CIGARETTE SMOKE ON CHRYSANTHEMUMS. Aaron M. Patrick, tvblazebaseball@yahoo.com, 1882 Wear Miller Rd, Eldorado, OH (Tri-County North High School).

The objective of this experiment was to investigate which substance was harmful to the plant Chrysanthemum, commonly known as Mums: burning tobacco paper (paper used to wrap the tobacco for a cigarette) or burning raw tobacco. The goal of this project was to determine if the burning tobacco paper affected the plants the same as the burning tobacco. It was hypothesized that the two plants exposed to the burning tobacco paper would die slower than the plants exposed to the burning raw tobacco. Materials for this experiment included: eight plants (Chrysanthemums, same age of 5 months and size of 14 cm), four plastic tubs with lids (18" x 14" x 12"), three votive glass cups, four packs of Camel cigarettes, water, rocks and a butane lighter. The method used involved placement of two plants and one glass cup into each of three tubs. In the fourth tub, no glass cup was needed as it served as a control. Two intact cigarettes were lit and placed in tub number one. Raw tobacco from two cigarettes (0.8 grams) was lit and placed in tub number two. Tobacco paper from two cigarettes was lit and placed in tub number three. A lid was placed on the tubs and each was set aside for ten minutes as the burning progressed. Observations included the color of the leaves (scaled from green to brown) and the height of the plants (measured in centimeters). After six weeks of repeated burning and exposure to smoke, the data showed effects to foliage but not to height of the experimental plants while the control plants showed sustained foliage and height increase (from 14 cm to 17 cm).

Poster Board No. 064

THE EFFECTS OF FAMILIARITY ON FREQUENCY OF LAUGHTER IN GROUPS. Dylan C Byers, Enigmax2113@yahoo.com, 3312 Waldmar Rd, Toledo, OH 43615 (Sylvania Southview High School).

Laughter has been shown to be an important part of human bonding and social interactions. Although it has been shown to play a large role in attraction and relationships, it is still unclear whether laughter is more important for becoming familiar with people or for maintaining relationships. Therefore, the purpose of this study was to determine whether people laugh more often in the company of those they are familiar with or those they are not familiar with. The hypothesis was that people would laugh more often around those they know well, because they would be more comfortable around those people. The second hypothesis was that laughter lasting for longer than one second would show more of a relationship with familiarity than laughter lasting less than one second, because shorter laughter is often not as genuine. A group of high school volunteers (N=64) from three psychology classes was chosen for the experiment, and their levels of familiarity with each other were determined through a survey in which they rated each other on a scale of one to five. The subjects were divided into groups with varying degrees of overall familiarity as defined by the averages of their ratings for each other. They then participated in group activities and their frequencies of long laughter (duration > one second) and short laughter (duration < one second) were recorded. Both hypotheses were supported. The long laughter showed a positive correlation with familiarity ($R = .5411$, $p = .0304$) and the short laughter showed a strong trend toward correlation. The format of the survey and the conditions under which the subjects were observed may have contributed to the lack of a strong correlation.

Poster Board No. 065

THE EFFECT OF HEAT ON POLYCARBONATE BABY BOTTLES. Paulina M. Eberts, peberts@earthlink.net, 165 Erie Rd, Columbus, OH 43214 (Immaculate Conception School).

This project investigated if microwaving a polycarbonate baby bottle will leach out Bisphenol-A into water. Bisphenol-A is a chemical in some plastics that imitates hormones such as estrogen that can affect human growth and may be linked to obesity. Previous studies show that Bisphenol-A can leach out at levels of around 5 parts per billion (ppb) under extreme heat conditions. This project investigated if there was a similar effect under typical heat conditions when the baby bottles were utilized this way for over a month. The hypothesis was, if polycarbonate baby bottles are heated to create lukewarm water (37-41 degrees C) typically used for baby formula, then organic carbon molecules will not leach out at detected levels. Because of the cost, dissolved organic carbon (DOC) was used as an analog for Bisphenol-A. Also, parts per million (ppm) were used to cut the costs. There may 2-3 ppm of DOC in regular tap water, so numerous controls were taken. The amount of DOC was 0.26 mg/L higher in the microwaved bottle than in the control in the first sample, most likely due to residue left from manufacturing. The remaining 3 sets of paired samples were within 10% of each other; 5% is the lab's error, so they were indistinguishable. A final microwaved and control sample were analyzed at ppb using a gas chromatograph mass spectrometer. Bisphenol-A did not show up, including Bisphenol-A-d3 used as a lab surrogate. The water was chlorinated, which is typical of drinking water, and the chlorine likely caused any Bisphenol-A that might have been present to degrade.

Poster Board No. 066

THE IMMUNOSUPPRESSIVE POTENTIAL OF MESENCHYMAL STEM CELLS IN TREATING GVHD. Elizabeth A. Zale, ezale10@gmail.com, Luis Solchaga, Hathaway Brown School, 19600 N Park Blvd, Shaker Heights, OH 44122.

Graft-versus-host-disease (GVHD) is a complication of allogeneic hematopoietic stem cell transplants, occurring when donor immune cells attack the host. GVHD results in damage to the liver, skin, intestinal tract, lungs, etc. Mesenchymal stem cells (MSCs) are multipotent adult stem cells, derived from bone marrow that, when appropriately stimulated, have been shown to inhibit immune alloreactivity through secretion of cytokines. This property makes MSCs very attractive as a treatment alternative for GVHD. The purpose of these experiments was to characterize the immunosuppressive effects of MSCs grown for different periods of time and under different conditions. MSCs from 6 different donors were grown for up to 90 days with or without fibroblast growth factor (FGF) supplementation. At different times in this culture period, aliquots of MSCs were stimulated with peripheral blood mononuclear cells (PBMCs) or interleukin-1b (IL-1b) to generate conditioned medium. These conditioned media, containing immunosuppressive cytokines, were tested in EliSpots. EliSpot is an assay where the inflammatory cytokines secreted by stimulated immune cells are detected by immunochemistry as colored spots in the bottom of the test wells, each well containing as low as 0 spots to as high as 1000. The immunosuppressive ability of each conditioned medium was determined by the reduction in the number of spots compared to control medium. In an experiment including 4 different EliSpot assays control cells stimulated by PBMCs demonstrated 45 - 55% inhibition of activation at all passages while PBMC-stimulated FGF-treated cells exhibited 55% inhibition in early passages, but only 30 - 35% inhibition in later passages. IL-1b-stimulated cells in both treatment groups presented 55 - 60% inhibition. Our data indicate minimal differences between FGF-treated and control MSCs especially when stimulated with IL-1b. However cells that had been in culture for a longer period (passages 7, 10, and 13), with each passage of a cell culture lasting around a week, had around 10 - 20% less immunosuppressive potential than those tested earlier (passages 1 and 3).

Poster Board No. 067

STABILITY OF GAS-FILLED LIPID MICROBUBBLES FOR USE IN DRUG DELIVERY. Rebecca L. Forcier¹, rebecca.forcier@gmail.com, Agata A. Exner², Agata.Exner@case.edu, 12267 Delamere Dr, Cleveland Heights, OH 44106, ²Case Western Reserve University, Dept of Radiology, Cleveland, OH 44106 (Hathaway Brown School).

It is hypothesized that intravenously-injected gas-filled bubbles made from biocompatible phospholipids can favorably alter drug delivery methods for treatment of tumors. One possible application would surround a drug-filled nanoparticle with these bubbles. When the nanovehicle, directed by attached antibodies, reaches the tumor, ultrasound waves could burst the bubbles, allowing the particle to enter the tumor tissue. Another potential application involves bubble destruction to help control drug release from polymer drug implants. This project examines the properties of perfluorocarbon (C₃F₈) gas-filled lipid nanobubbles and microbubbles and how they are affected by factors such as temperature and

solvent. The current study aims to evaluate the stability, defined as concentration maintenance, of such bubbles when suspended in water at varied temperatures. Bubbles were formulated by mechanical shaking of lipid / C₃F₈ mixtures in water. Bubble solutions (n=4) were exposed to average temperatures of 37, 24, and 4 degrees Celsius. Samples were withdrawn every 15 minutes for the first hour and periodically up to 84 hours, then photographed using a microscope at 200x magnification and a hemacytometer. The pictures were analyzed to determine bubble concentrations. Between t=1 hour and t=12 hours, bubble concentration decreased by 99.4%, 70.2%, and 23.3% for solutions at 37, 24, and 4 degrees Celsius, respectively. The reduction in bubble concentration with increased temperature indicates that bubbles are less stable at higher temperatures. Future tests will study bubble stability at additional timepoints and when suspended in phosphate-buffered saline, effective ultrasound parameters for bubble destruction, and ultrasound disruption's effects on surrounding cells.

Poster Board No. 068

HEMATogenous TRANSMISSION OF DIVERSE ORAL BACTERIA TO MURINE PLACENTA: POSSIBLE ROLE OF ORAL CAVITY AS A POTENTIAL SOURCE OF INTRAUTERINE INFECTION. Rochelle A. Dumm, rocadumm@gmail.com, 2624 Meadoway Dr, Beachwood, OH 44122 (Hathaway Brown School).

This project utilizes a pregnant murine model to study the hematogenous transmission of oral bacteria to the placenta that could result in intra-amniotic infection and inflammation, and eventually preterm birth (PTB). A total of 5 impregnated CF1 mice were injected with pooled human saliva intravenously through the tail after 16 days of gestation. After 24 hours, the placentas were obtained, and salivary and placental bacteria were collected and identified using both culturing and culture-independent methods. In the culturing method, bacteria from saliva and placenta were plated on blood agar plates followed by incubation under anaerobic conditions. The chromosomal DNA was extracted and the 16S rRNA gene was amplified using PCR for DNA sequence analysis to identify the species. In the culture-independent method, the bacterial DNA was isolated and the 16S rRNA gene was amplified using PCR to identify the species. The bacterial species identified from the pooled saliva were the following: 1 *Gemella*, 1 *Leptotrichia*, 1 *Megasphaera*, 5 *Neisseria*, 3 *Prevotella*, 2 *Porphyromonas*, 5 *Streptococcus*, and 2 *Veillonella*. The identified bacteria from placenta from the 5 CF1 mice were the following: 46 *Neisseria*, 7 *Veillonella*, and 11 *Streptococcus*, all of which are considered commensal organisms in the human mouth and have previously been associated with intra-uterine infections leading to PTB. This study indicates that select bacterial species (specifically *Neisseria ssp.*, *Veillonella ssp.*, and *Streptococcus ssp.*) can colonize in murine placenta and asserts that bacterial species may translocate from the oral cavity to placenta and potentially cause PTB.

Poster Board No. 069

UTILIZATION OF ORGANIC PHOSPHORUS BY CYANOBACTERIA. Grace Miner, gminer@bgsu.edu, 554 Wallace Ave, Bowling Green, OH 43402 (Bowling Green High School).

In freshwater systems, phosphorus (P) is often the primary factor in limiting cyanobacterial growth. As an adaptive strategy to combat P deficiency, cyanobacteria may have evolved mechanisms to utilize phosphonates like glyphosate (Roundup®), which has a stable carbon-to-phosphorus bond (C-P). Water samples were collected from the Western Basin of Lake Erie, and 2 µM of P in the form of glyphosate or potassium phosphate (inorganic) were added to assess relative growth. It is hypothesized that cyanobacteria can activate the mechanisms allowing the bacteria to utilize phosphonates when in a P limited environment. Experimentation revealed that cyanobacteria within the algal population of Lake Erie have the ability to utilize glyphosate as the sole phosphorus source. The water samples treated with glyphosate had significantly greater growth than the control (repeated measure ANOVA, and Tukey's HSD test p<0.05). Glyphosate-augmented samples grew 19% more (i.e., optical density) than control samples. These data suggest that when inorganic phosphorus is limiting in Lake Erie, some cyanobacteria can utilize organic sources and this may cause shifts in phytoplankton community assemblage.

Poster Board No. 070

HOW THE CARE AND HANDLING OF CELL PHONES CAN PREVENT HEALTH RISKS. Karen A. Kruger, mskruzer@aol.com, 12493 Bentbrook Dr, Chesterland, OH 44026 (West Geauga High School).

Staphylococcus aureus infections, antibiotic resistance, and preventing the spread of illness within schools are critical. If high

school students use cell phones throughout the school day and the phones are not properly disinfected, then skin infections can spread between students within the school. Sterile swabs were taken from 20 high school students' cell phones in the morning and cultured to identify pathogens brought into the school. The phones were then disinfected with alcohol wipes. Four phones carried *methicillin sensitive Staphylococcus aureus* (MSSA), one carried *Acinetobacter baumannii/calcoaceticus*. Swabs from the same 20 phones were cultured in the afternoon to identify pathogens acquired within the school. One phone tested positive for MSSA. A 21-question survey was completed by 178 high school students for information on cell phone habits/cleaning, skin infection awareness, Band-Aid® practices for cuts/abrasions, and hand hygiene. Students used their phones 18+ times/day (71.8%), shared phones 1-3 times/day (63.0%), understood what skin infections are (84.7%), and knew that they could spread disease through schools (96.1%). Ironically, students do not practice precautions to prevent staph infections; they do not cover small cuts/abrasions (49.6%), sufficiently wash hands (83.4%), or clean athletic equipment/surfaces before usage (49.4%). Staph infections are increasingly prevalent in schools, communities, and hospitals. Simple changes in daily routines are necessary to reduce susceptibility to infections. Effectively washing hands with soap and water/antibacterial gels, disinfecting environmental surfaces including cell phones, and not sharing towels/personal care items are preventions that should be routinely practiced.

Poster Board No. 071

STREAM TESTING: CHEMICAL COMPARISONS OF THE OHIO RIVER TO ITS TRIBUTARIES. Robert G. Hinshaw, geh@zoominternet.net, 33 Roman Harbor, Proctorville, OH 45669 (Fairland High School).

In Lawrence County in southeastern Ohio, six tributaries and a site on the Ohio river were tested for water quality. The purpose of this experiment was to determine if the tributaries were adding to, or diluting, the levels of selected parameters in the Ohio River. It was hypothesized that the tributaries would have lower levels of *E. coli*, turbidity, and nitrates, and more favorable levels of dissolved oxygen, water temperature and pH than the Ohio River, thereby diluting its pollution. The method of testing used was to sample different chemical parameters using a HACH testing kit to determine a water-quality rating for the stream. To do this, the water-quality index developed by River Watchers, which weights each parameter and assigns them different quality values according to standard levels, was used. The chemical parameters were dissolved oxygen, *E. coli*, pH, water temperature, nitrate, and turbidity. Each site was tested three times over the course of five months, July through November, in the afternoon to gain an average water-quality rating. The Ohio River had an average water-quality rating of 89% while the tested tributaries had ratings of 64, 71, 74, 76, 80, and 80% bringing the tributary average to 74%. The Ohio River also had the highest rating of all the sites in each parameter except for nitrates, where there was only a 1% difference, and turbidity. The results showed the hypothesis was incorrect. The tributaries tested were adding to the concentration of pollution in the Ohio River, not diluting it.

Poster Board No. 072

EVALUATING A FUEL CELL SYSTEM'S EFFICIENCY (ENERGY OUTPUT DIVIDED BY ENERGY INPUT) FOR INCREASING AMOUNTS OF MASS LIFTED BY THE FUEL CELL SYSTEM. Sean T. Redmond, sredmond001@cinci.rr.com, 119 Pheasant Lake Dr, Loveland, OH 45140.

The purpose of this project was to verify if a fuel cell system's efficiency would vary if its energy was used to lift increasing levels of mass. It was hypothesized that increasing the mass lifted by the fuel cell system would cause the efficiency of the fuel cell system to decrease. The fuel cell system consists of a PEM fuel cell, electric motor, gear box, shaft with pulley, and string attached to masses. In the experiment 6 different masses were employed. Each mass was used in 3 trials. In each trial, the fuel cell system lifted each mass 5 times and the total height of all the lifts was measured to evaluate the energy output of the fuel cell system as measured by the potential energy of the lift. The amount of fuel used for all of the lifts was determined to discover the energy input for that trial. The measurements used in this experiment were the total height of the lifts in centimeters, the volume of fuel in the fuel cell's tank in milliliters, and the amount of mass lifted by the fuel cell system in grams. The calculated variables were the amount of energy output and the amount of energy input of the fuel cell system in joules. The results of the experimentation revealed that the average efficiency associated with each mass lifted were as follows: 8.96% at 60 grams, 9.82% at 80 grams, 10.32% at 100 grams, 12.13% at 120 grams, 11.86% at 140 grams, and 12.00% at

160 grams. The results indicate that as the amount of mass lifted by the fuel cell system increased, the corresponding efficiency also increased, until an inflection point was reached at 120 grams, where the efficiency leveled off. The results indicate that the hypothesis should be rejected. Instead of decreasing, the efficiency increased with the increase of mass lifted.

Poster Board No. 073

COMPRESSIVE STRENGTH: IS LONGER STRONGER?
**Sarah K. Mayo, panthers10@zoominternet.net,
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 (Chesapeake High School).**

A Pratt Through Truss bridge was constructed out of cardboard (solid bars and hollow tubes). Focusing on compressive forces in the hollow tubes, the hypothesis is that increasing the length of the structural members may cause a reduction in compressive strength. Test specimens were twelve hollow tubes (N=12) – three each of four different lengths (10mm X 10mm X 16.2cm, 10mm X 10mm X 14.2cm, 10mm X 10mm X 12.2cm, 10mm X 10mm X 10.2cm). Experimental testing was conducted using a home-built wooden lever machine with an adjustable post that could apply a variable load. Specimens were individually clamped to the lever machine, and load (sand) was added to a bucket until the specimen failed. Failure was defined as the moment the specimen buckled. The weight of the sand was then plotted. The weight of the bucket/sand that caused each specimen to fail was converted to a force using the equation W (weight of the object) = mass (mass in kg) X g (acceleration of gravity, 9.81 meters/sec²). The mass was expressed in kilograms, therefore, the weight (W) was in newtons. The principle of the lever was applied using the equation T (unknown internal force/tensile strength) = W (weight of the bucket and sand) L_2/L_1 (L_2 and L_1 being measured directly from testing machine) to determine the force in each test specimen at failure. Trials (N=3) determined the compressive strength of the 10mm X 10mm X 16.2cm tubes to be 35.50N (newtons), 32.17N, and 38.23N. The compressive strength of the 10mm X 10mm X 14.2cm tubes was 40.35N, 45.23N, and 41.39N. The compressive strength of the 10mm X 10mm X 12.2cm tubes was 48.63N, 50.02N, and 51.66N. The compressive strength of the 10mm X 10mm X 10.2cm tubes was 54.34N, 56.64N, and 54.92N. Experimental results demonstrated that increasing the length of the structural members from 10.2cm to 16.2cm reduced compressive strength by 56.7 percent.

Poster Board No. 074

WHICH MATERIAL CAUSES THE LEAST FRICTION?
**Anna K. Mayo, mayo16@zoominternet.net, 309
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 (Chesapeake Middle School).**

Friction is a property which makes objects resist movement across surfaces. An adjustable ramp and protractor measuring device were constructed to test friction between two surfaces. The hypothesis of this experiment was that smooth surfaces would produce the least amount of friction. A wooden block was wrapped in fourteen different materials (N=14) and placed at the top of the ramp. The ramp was then gradually inclined until the block moved downward. At the point of slippage, the ramp's angle of inclination was recorded. The experiment was repeated four times with each material. Data revealed the angles of inclination (in degrees) for the materials to be: the magazine cover were 16, 17, 19, and 19; the aluminum foil were 20, 20, 21, and 21; the plastic bag were 22, 22, 23 and 24; the saran wrap were 25, 25, 25, and 26; the wax paper were 24, 26, 26, and 26; the newspaper were 28, 28, 28, and 28; regular fine sandpaper were 45, 45, 46 and 47; regular medium sandpaper were 40, 40, 41, and 41; regular coarse sandpaper were 33, 33, 35 and 36; emery fine sandpaper were 42, 42, 43, and 45; emery medium sandpaper were 38, 40, 41, 44; emery coarse sandpaper were 36, 40, 47, and 50; cloth was 44, 44, 45, and 46; paper towel were 42, 45, 45, and 47. The ramp's angle of inclination was smaller for smooth surfaces than for rough surfaces thus supporting the original hypothesis.

Poster Board No. 075

**COMPARATIVE ANALYSIS OF WATER QUALITY OF
 THE BLANCHARD AND AUGLAIZE RIVERS IN
 PUTNAM COUNTY, OHIO. Brittany L. Schroeder,
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 Continental, OH 45831 (Miller City HS).**

Water quality can be tested by measuring values including temperature, pH, dissolved oxygen, and turbidity. These can then be used to calculate a water quality index. Experimental testing involved the comparison of these water qualities in the Blanchard and Auglaize Rivers in Putnam County, OH. Water samples were collected from each of three points along both rivers on the same date in Putnam County (n=18). The water was then tested by

temperature probe, dissolved oxygen kit, pH paper and turbidity stick. Four hypotheses were made prior to collection of the samples. Hypothesis 1: There is a difference in the water temperature of the Blanchard and Auglaize Rivers. Hypothesis 2: There is a difference in the water dissolved oxygen levels of the Blanchard and Auglaize Rivers. Hypothesis 3: There is a difference in the water turbidity of the Blanchard and Auglaize Rivers. Hypothesis 4: There is a difference in the water quality index of the Blanchard and Auglaize Rivers. Temperature ranged from 17.15 to 18.36 degrees C in the Blanchard and 18.36 to 19.88 degrees C in the Auglaize. Blanchard dissolved oxygen levels ranged from 5 to 8 whereas in the Auglaize they ranged from 8 to 9. Turbidity measurements in the Blanchard were from 7.6 to 14, whereas in the Auglaize they were from 11.5 to 20.25. Water quality values for the Blanchard went from 49.38 to 67.13, whereas in the Auglaize the range was from 66.67 to 71.84. Statistical analysis was done using a two sample t test. Hypothesis 1 was accepted with there being a difference in water temperature between the Blanchard and Auglaize Rivers ($T=5.2417$, $df=8$, $P=0.0008$). Hypothesis 2 was accepted with there being a difference in the dissolved oxygen levels of Blanchard and Auglaize Rivers ($T=4.8112$, $df=8$, $P=0.0013$). Hypothesis 3 was accepted with there being a difference in the turbidity of the Blanchard and Auglaize Rivers ($T=3.7600$, $df=8$, $P=0.0054$). Hypothesis 4 was accepted with there being a difference in the water quality index of the Blanchard and Auglaize Rivers ($T=5.4263$, $df=8$, $P=0.0006$). Further testing of additional water quality values is indicated along the Blanchard and Auglaize Rivers. Future sampling may assist in directing cleanup efforts along these bodies of water.

Poster Board No. 076

DOES EXERCISE IMPROVE ONE'S MEMORY?
**Kathleen E. Cooper, mcooper0956@wowway.com,
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 Lady of Perpetual Help School).**

The objective of this project was to see if exercise improves one's memory. Exercise is hypothesized to improve one's memory. For this experiment, a stopwatch, 64 math tests, sixteen 7th grade students – eight males and eight females – a notebook, pens, and pencils were used. First, four female students took a timed math test. Thirty minutes later, the girls retook the same timed test. During those thirty minutes, they were allowed to talk to one another. The next day before gym class the same females repeated the test. After thirty minutes of playing basketball, the girls took the timed test a second time. Then, four males took the test. The boys were allowed to talk for thirty minutes and then were given the timed test again. On the next gym day, the same four males retook the timed test before and after thirty minutes of basketball. The results are as follows: The students' times were reduced noticeably after exercise. The students' times also decreased after talking, but not as significantly as after exercising. The hypothesis was accepted. This experiment demonstrated that exercise improves memory. Exercise enhances the delivery of oxygen to the body and to the brain. Because exercise is repetitive, it brings fresh oxygen into the muscles, which is distributed by the blood and infused in the brain. The heart performs more efficiently. Exercise also increases the number of red blood cells, allowing blood to carry more oxygen. Oxygen helps the brain function more efficiently, improving memory and cognitive processes.

Poster Board No. 077

**SEDIMENT OXYGEN DEMAND IN LAKE ERIE. Keely
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Thermal stratification in Lake Erie during the summer months causes a variety of water quality problems including hypoxia. This project measured the depletion of oxygen and the rates of that depletion in the central basin of Lake Erie. Two procedures were used; whole core incubations were done in ten samples and oxygen microelectrode profiling was done in two samples. Whole core incubations involved the collection of short (~15 cm) sediment cores in BOD bottles with removable bottoms and then were sealed and incubated in a constant temperature bath in the dark. A control consisted of only Lake Erie bottom water. The oxygen concentration in water overlying these cores was monitored every minute by computer for twelve hours to determine the linear rate of oxygen depletion. Microelectrode profiling was measured using a micro-oxygen electrode. The electrode was mounted onto a precision screw slide and inserted into the sediment at a rate of 0.1 centimeters every 30 seconds and the oxygen concentration was recorded. Nitrate and pH also were recorded using microelectrodes. The oxygen demands for twelve samples were determined by the two methods and all fall within the range of ~0.1-0.2 g O₂/m²/d. These data are in agreement with each other and are comparable to

data reported in the literature for Lake Erie sediment oxygen demand. The results can be used to improve estimates of sediment oxygen demand and internal chemical loading into Lake Erie waters.

Poster Board No. 078

A HAND-PAINTED CATALYST LAYER VS. A HOT-PRESSED MEA. Esther I. Hwang, eihdance@yahoo.com, 2242 Spahr Rd, Xenia, OH 45385 (Dominion Academy of Dayton).

With fluctuating gas prices and the need to find alternative fuel and power sources, Polymer Electrolyte Membrane Fuel Cells (PEMFC) are a promising energy conversion device. When building these cells, there are two common procedures for making the Membrane Electrode Assembly (MEA): fabricating the catalyst layer directly on the membrane or using hot-pressing technique. By testing two different types of MEA construction, efficiency of the MEA can be improved and information on how to construct fuel cells for maximum power output is gained. To experiment with these two constructions, a single PEMFC with a hand-painted catalyst layer along with carbon electrodes and electrolytes was created and then connected to a Fuel Cell Test Station to evaluate the performance. Then a single PEMFC with a catalyst pre-loaded carbon electrode and electrolyte was hot-pressed to create a MEA and tested in the same manner. It was hypothesized that the MEA fabricated with hand-painted catalyst layer would be more efficient, thus having a better performance. Performance was impacted by a range of obstacles: kinetic limitations, ohmic losses, and transport constraints. After building two MEAs, one with a hand-painted catalyst layer and the other hot-pressed, four Polarization Plots were compared to see which PEMFC had a greater efficiency rate after four trials, two for each MEA at 100% and 80% relative humidity (RH). The peak power density of the hand-painted catalyst MEA was 1.25 times greater than the one made by the hot pressing tech; at 80% RH, it was 1.35 times greater. From the Polarization plot's curves, more current could be drawn for a given voltage from the hand-painted catalyst layer MEA, compared to the hot-pressed MEA. The results of this project indicated that a PEMFC hand-painted catalyst layer MEA gave a superior efficiency rate versus a PEMFC with a hot-pressed MEA.

Poster Board No. 079

GLOBAL DIMMING IS AS RESPONSIBLE AS GLOBAL WARMING FOR THE UNIVERSAL CLIMATE CHANGE. Akanksha Mishra, jaya.mishra805@yahoo.com, 12090 Crestfield Ct, Cincinnati, OH 45249 (Mount Notre Dame High School).

Global warming is generating lot of awareness from political and non-political communities; however, the problem of global dimming is not getting required attention. Global dimming is a result of increased of atmospheric aerosol cloud around our planet that reflect sun rays back into space and restrict the sunlight reaching on earth's surface that may affect the annual rainfall. To test the hypothesis that both global dimming and global warming are the causes of rapid climate change, an experimental system was designed to test whether increased aerosol cloud and atmospheric CO₂ affects the rate of water evaporation and atmospheric temperature. Experimentally the aerosol clouds was generated by placing dry ice in a beaker containing water and CO₂ by adding sodium bicarbonate in conical flask having acetic acid. The beakers generating artificial clouds kept on the wooden platform above the experimental apparatus designed to measure the temperature, the rate of ice melting and water evaporation. Experimentally generated CO₂ was transferred in to the other flask that contains ice. The temperature, rate of ice melting and evaporated water volume was measured in control and experimental conditions after 1 hr 30 min of experiment. Electric lamp bulb was used as the source of solar energy. The water evaporated in control 2.9 +/- 1.3 ml compared to 0.9 +/- 0.3 ml (mean+/-SD, n=3) in experimental condition, temperature increases 76.4 +/-2.1 °F in control to 79.6 +/-2.6 °F (mean+/-SD, n=3) in experimental, and ice converted into the water is 56.1+/-1.9 ml in control and 80.3+/- 6.5 ml (mean+/-SD, n=3) in experimental conditions. Surprisingly, the experiment performed under the aerosol clouds did not show any change in the temperature or rate of ice melting in comparison to the normal controlled condition. These results indicate that aerosol clouds cover (i.e global dimming) and increase CO₂ (i.e. global warming) both affect the global climate by reducing the rate of water evaporation and increasing the global temperature.

Poster Board No. 080

DOES WAVELENGTH AFFECT THE DIFFRACTION PATTERN OF LASER RADIATION? Michael V. Di Mascio, michael.dimascio@hotmail.com, 4311 Laura Marie Dr, Waynesville, OH 45068-8942 (Waynesville High School).

This experiment investigated the effects of wavelength on the diffraction pattern of laser radiation using three lasers – a 632.8nm He-Ne laser, a 617nm red diode laser, and a 532nm green diode laser – for improved capabilities. It was hypothesized that shorter wavelengths of laser radiation would result in less intensity with shorter diffraction bands. Each laser was aligned perpendicular and placed 2.1 meters from a vertical plane. The hair was aligned horizontally on a slide frame and placed 10 centimeters from the laser. A control was established; the red diode laser was directed at the hair and the 1m potentiometer with LED readout and photoresistor was adjusted to read the highest value 10 for the intensity of the first-order maximum above the primary maximum. Then, the resulting intensity was measured for each lasers' five maximum orders of diffraction using the light meter. The distance between corresponding minima was measured above and below the central maximum as a dependent measure. The mean after three trials of the five maximum orders' intensities and distances between corresponding minima were: green laser – 3.8 / 6.75cm, red laser – 4.4 / 8.06cm, He-Ne laser – 5.6 / 8.3cm. The green diode laser had the shortest wavelength with lowest intensity and least distance between minima of the diffraction pattern. The hypothesis was correct as originally assumed. These results can be applied to developing specific frequencies of laser radiation for spectroscopy and interferometry with non-destructive materials interaction and laser missile defense without obstructive atmospheric interference. Also, this procedure can be applied to developing high frequency lasers for precise vaporization in welding holes and for surgery.

Poster Board No. 081

THE ROLE OF MMP9 IN BLOOD BRAIN BARRIER DISRUPTION. Catherine E Koch, cookieclev@aol.com, 20776 Brantley Rd Shaker Hts, OH 44122 (Hathaway Brown School).

Infiltration of white blood cells (WBC) across the BBB into the central nervous system (CNS) is a critical event in the pathogenesis Multiple Sclerosis (MS). This is directed by several molecules such as matrix metalloproteinases (MMPs), enzymes that degrade the BBB basement membrane. Among the large number of MMPs expressed in MS, several studies show a correlation between MMP9 levels and disease severity. In order to determine whether MMP9 is a major component of BBB disruption, male and female C57Bl/6 MMP9 knockout (MMP9^{-/-}) mice and wild type (wt) mice were infected with JHMV (a mouse model of MS). After perfusion and sacrifice, WBC were isolated by percoll gradient from brain homogenate and quantified by flow cytometry. No difference in CNS inflammation between wt and MMP9^{-/-} mice was found (4.51x10⁵ and 4.78x10⁵ cells/brain respectively at day 7). Similarly, sodium fluorescein (NaF) assay showed no difference in BBB permeability between wt and MMP9^{-/-} mice (~12 µg of NaF/brain in both groups). However, quantification PCR showed a 13 fold increase of MMP3 and 20 fold increase of MMP12 mRNA expression in MMP9^{-/-} brains at day 3 compared to wt, suggesting compensatory effects. On the other hand, JHMV infection of mice deficient of TIMP-1 (tissue inhibitor matrix metalloproteinase-1), the inhibitor of MMP9, showed an increase of WBC (CD45 high positive) infiltration into the CNS of TIMP-1^{-/-} (57.04%) compared to wt (29.2%) soon after infection (day 3). Ultimately, this data demonstrates the complexity of the MMP system posing a challenge for identifying therapeutic targets for MS.

Poster Board No. 082

ATTITUDE TOWARD ROOM COLOR. Hannah M. Littler, kmash@roadrunner.com, 1410 Alum Cliff Road, Chillicothe, OH 45601 (Bishop Flaget Middle School).

While perceptions of color are subjective, there are color effects that have very universal meaning. Colors provide non-verbal communication. They create a physical and emotional reaction. Color can have an astounding effect on perceptions, feelings, and interactions. Different colors evoke different memories and different ideas. This experiment determined whether the color of a room affects human behavior. The hypothesis is that human behavior is influenced by the colors of a room. Ten male and ten female students were provided with 20 identical paint color samples and a survey form containing questions concerning their emotions (if any) toward the specific paint colors. The survey also queried their preferred choices of colors for specific rooms in their environments. After the students completed the questionnaires, the data were evaluated. The males and females preferred colors for rooms in their environments which they had indicated as evoking happy or calm emotions. Sky blue was the primary color of choice for the rooms in their environments 50% of the time. The females seemed to prefer lighter shades of the color samples and the males more frequently chose the darker shades. The results indicated that color does affect human behavior. If this experiment were done again, adults would be asked to complete the questionnaire to see

if age would make a difference in the responses. The students that were tested are influenced by the saturation of the colors and the colors chosen for this experiment may have a different effect on adults.

Poster Board No. 083

ALTERNATIVE ENERGY: ACID HYDROLYSIS OF BIOMASS. William J. Bailey, jwbailey97@aol.com, 23447 Emmons Rd, Columbia Station, OH 44028 (Columbia High School).

Cellulose is the main component in plant biomass. The production of ethanol from cellulose has not been developed as a commercial process due to the difficulty of converting cellulose to glucose for the fermentation step. Another approach is to convert cellulose to levulinic acid (4-Oxypentanoic acid). The esters of levulinic acid can be used as a diesel fuel extenders at concentrations up to 20% with no engine modifications. The conversion of cellulose to levulinic acid is achieved by concentrated acid hydrolysis at room temperature. It was hypothesized that this simple, one step process would be more efficient than a multi-step, biological fermentation needed to produce ethanol. Six 10g samples of 5 types of cellulose rich biomass; corn stover, wheat straw, softwood, hardwood, newspaper and a cellulose control, were treated in a 77% sulfuric acid solution to "decrystallize" the cellulose. Water was then added to reduce the acid concentration to 30%wt. The samples were heated at 100°C for three hours to break down the cellulose and produce levulinic acid. Samples were filtered and the filtrate was extracted using methyl isobutyl ketone (MIBK). The MIBK was evaporated to recover the levulinic acid. The product was weighed, and the theoretical yields calculated. The yield of levulinic acid from the cellulose control was 42%, the biomass sample yields ranged from 44% to 18%. The samples in order from highest to lowest yield are straw, (44%) softwood, (44%) cellulose control, (42%) hardwood, (42%) corn stover, (26%) and newspaper (18%).

Poster Board No. 084

CHITOTRIOSIDASE (CHIT-1) IMMUNOHISTOCHEMISTRY IN THE DIAGNOSIS OF CROHN'S DISEASE. Sara L. Kamionkowski, lykamio@yahoo.com, Mary P. Bronner MD, bronnem@ccf.org, 1010 Hillcreek Ln, Gates Mills, OH 44040 (Hathaway Brown School).

Diagnostic distinction between ulcerative colitis and Crohn's disease is critical for correct medical care, but remains very difficult because these chronic intestinal conditions are of unknown cause and have similar symptoms and pathology. An important distinction in a subset of Crohn's patients is granulomas or tissue collections of specific white blood cells called macrophages. A diagnostic test based on macrophages may therefore be useful. Toward this goal, CHIT-1 immunohistochemistry (IHC) was investigated as a diagnostic tool to distinguish Crohn's disease and ulcerative colitis. CHIT-1 is a protein specific to human macrophages. IHC is a tissue staining technique that marks specific proteins with a color that is visible on cells viewed microscopically. Diseased intestinal tissue samples from 62 total patients were selected, including those with Crohn's disease (N= 22), ulcerative colitis (N= 20), and non-inflammatory intestinal control disorders (N= 20). Automated IHC using a diaminobenzidine basic detection kit (Ventana, Tucson, AZ) and CHIT-1 rabbit polyclonal antibody (1:25 dilution; Sigma, St. Louis, MO) was performed. Crohn's tissue with granulomas served as an external positive staining control and substitution of normal rabbit serum on each tissue for CHIT-1 antibody served as negative staining controls. IHC was scored using the product of semi-quantitative assessment of macrophage staining intensity (0-3) and the quartile percentage of positive stromal cells (0-4), for a score range of 0-12. The average score for Crohn's was 6.X, ulcerative colitis was 3.X, and non-inflammatory colonic controls was 2.X. CHIT-1 IHC therefore shows promise as a diagnostic marker of Crohn's disease.

Poster Board No. 085

A COMPARISON OF E85 AND GASOLINE IN TERMS OF ENVIRONMENTAL AND FINANCIAL IMPACTS. Tyler C. Moore, ictmoore@roadrunner.com, 124 Mountainview Dr, Chillicothe, OH 45601 (Zane Trace Junior High).

E85 is a biofuel that contains 85% ethanol and 15% gasoline, and is said to reduce the amount of carbon dioxide (CO₂) and cancer-causing benzene emissions from automobiles. The goal of this project was to determine whether claimed benefits for E85 were fact or fiction and determine whether E85 is a viable substitute for gasoline in terms of emissions and financial benefits. The hypothesis for this project was that E85 can save energy and reduce pollution but that it might cost more money than gasoline. To test this hypothesis, a 2001 flex fuel Dodge minivan was filled with E85 and

driven until it ran out of fuel. This process was repeated three times for a total distance of 506 miles. Then the same minivan was filled up with regular, unleaded gasoline and likewise driven until likewise empty. This process was also repeated three times for a total distance of 804 miles. The data were prorated to represent 12,000 miles of driving. As expected, the E85 averaged less miles per gallon (13.64 mpg for E85 versus 18.65 mpg for gasoline) and would cost \$525 more per year to drive an average annual mileage of 12,000 miles per year. Nevertheless, based on the total energy for E85 versus gasoline (i.e., the energy needed to generate, refine and transport the fuel minus the energy generated by the fuel produced), E85 can save a significant amount of total energy as compared to gasoline (+17,281,908 BTUs for E85 versus -37,613,251 BTUs for gasoline).

Poster Board No. 086

IS WIND A CONTRIBUTING FACTOR TO LAKE ERIE'S WATER CLARITY? Robin S. Klaus, sbk7@wcoil.com, 700 Beechwood Place, Elida, OH 45807 (Elida High School).

Water clarity affects the food chain and the aesthetic appeal and suitability of a lake for recreation. Decreased water clarity has harmful effects. It reduces the light available for photosynthesis, in turn, reducing the population of phytoplankton. It smothers benthic organisms and habitats and promotes the growth of pathogens and waterborne diseases. Therefore, it can increase the ingestion risk to water drinkers developing gastrointestinal diseases. This study investigated wind as a contributing factor to water clarity levels in Lake Erie's Western Basin. The hypothesis was: if wind speed increases, water clarity decreases. Data were measured and recorded 200 meters from shore, off the end of a pier at water depths of 2.3 to 3 meters. For thirty days in July of 2007, an anemometer was used to measure wind speeds and a Secchi disk was used to measure the penetration of light into water. The highest recorded wind speed was eleven knots. On the day that this occurred, clarity was .8 meters, as opposed to the three meters of clarity measured on a windless day. When a high wind speed was recorded, a low level of water clarity was measured, and the opposite was also true, showing that wind speed has an inverse relationship with water clarity. This proved the hypothesis to be correct. It is therefore to be expected that on windy days not only will the clarity of the water decrease, but also the aesthetic appeal and the lake's suitability for recreational activities such as fishing and swimming.

Poster Board No. 087

THE EFFECTS OF SODIUM CHLORIDE ON ELODEA CELL SIZE. Barbara M. Goodwin, onlyc.a.p@hotmail.com, 732 Pearson Rd, Fairborn, OH 45433 (Fairborn High School).

This project studied the effect of salt on *Elodea canadensis* and *Elodea densa*. They were used to model living plants living near roadways after exposure to salt in the winter. The hypothesis was that if two plants (regardless of the liquid they were placed in) belong to the same species, then their cell size will be similar. Plants were kept for three weeks in fresh water, or salt water (20g/L NaCl). Microscope photographs were taken of the leaves at zero time, one week, and three weeks. The results showed leaves of *Elodea* kept in fresh water had chloroplasts in motion within the cells. *Elodea* placed in salt water had chloroplasts in the center of the cells as the cells had plasmolyzed. This was especially evident in *Elodea densa* leaves which were kept in salt water. The sodium and chloride ions of salt interfered with osmosis in the plant cells. *Elodea* kept in salt water leaf color as their chloroplasts were damaged. At the end of three weeks 10 leaves in each group were measured. *Elodea canadensis* leaves did not change in length (both groups the leaf length was 7 ± 2 mm long mean ±SD). *Elodea densa* leaves in salt water were 12 ± 4 mm long twice the length of the leaves kept in fresh water which were 6 ± 3 mm long. It could be hypothesized that this increased growth was adaptive in response to the salt concentration. More studies would be needed to corroborate this finding.

Poster Board No. 088

WHAT KIND OF SALT MELTS ICE THE FASTEST? Andrew J. Boellner, andrewboel@aol.com, 5110 Smith Rd, Ottawa Lake, MI 49267 (St. Joseph School, Sylvania Ohio 43560).

Any salt will melt ice and thus it is widely used to make roads and sidewalks safer. This experiment determined which kind of salt will melt ice the fastest: magnesium chloride (MgCl₂), sodium chloride (NaCl), potassium chloride (KCl), and calcium chloride (CaCl₂). The control was ice melting with no salt. The hypothesis was that calcium chloride will perform more effectively because it is reported to be more effective than other salts at lower temperatures. For each trial, 300 g of crushed ice were put into a sealed container

with 67 g of each of the four kinds of salt and shaken 20 times by hand. Each different salt and ice mixture was poured into an aluminum loaf pan at a constant temperature (21.9 ° C). The weight and volume of water melted were measured after 30 minutes. The melted water volume averages were: calcium chloride, 248.2 ml; magnesium chloride, 174.4 ml; potassium chloride, 62.86 ml; and sodium chloride, 123.2 ml; the control averaged 12.2 ml. The weight results followed the same pattern as the volume. The test results support the hypothesis that the use of calcium chloride results in more ice melted in a given amount of time.

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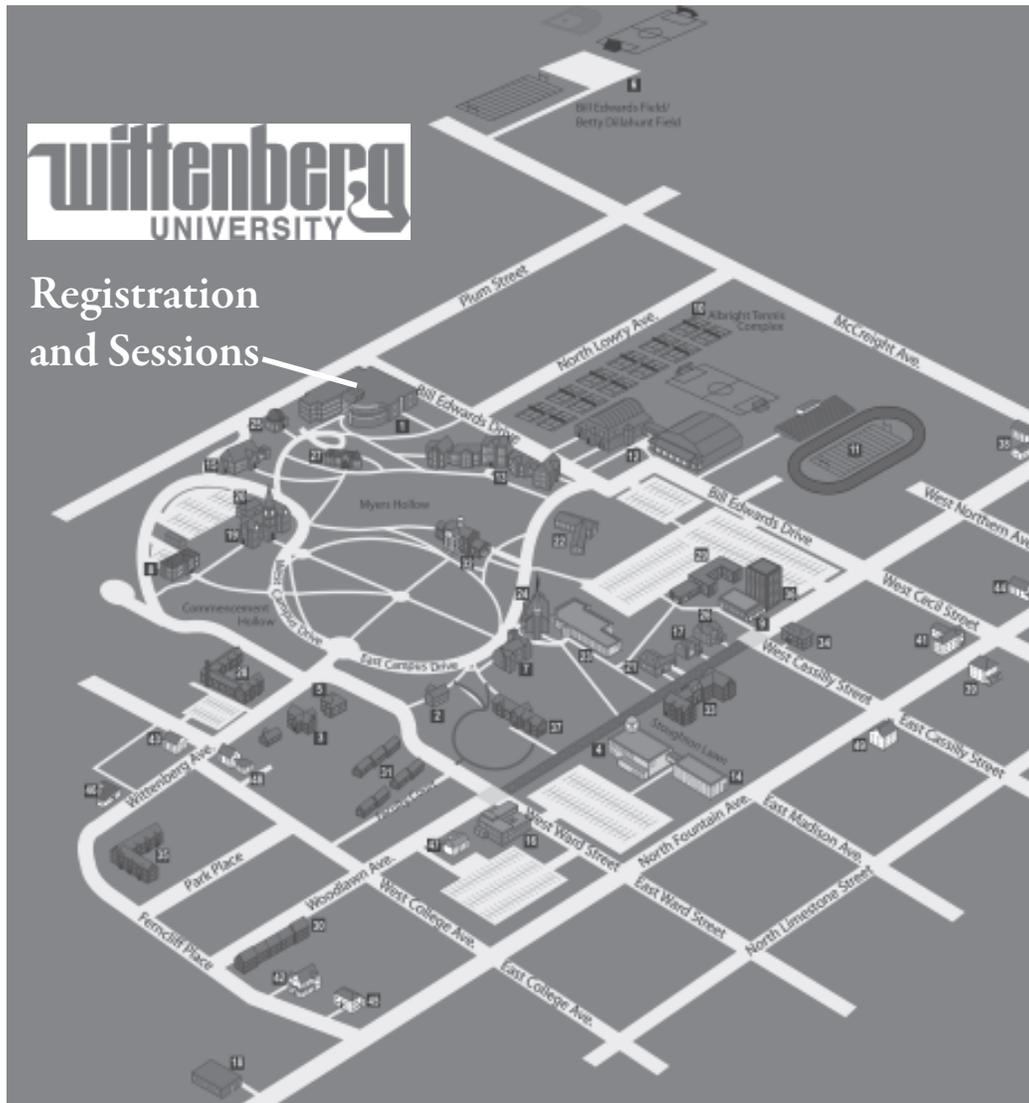
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4. Benham-Pence Student Center
5. Benjamin Prince House (President's House)
6. Bill Edwards Field/Betty Dillahunt Field
7. Blair Hall
8. Carnegie Hall
9. Chakeres Memorial Theatre
10. David B. and Georgiana S. Albright Tennis Complex
11. Edwards-Maurer Field
12. Health, Physical Education and Recreation Center
13. Hollenbeck Hall
14. Joseph C. Shouvin Center
15. Koch Hall
16. Krieg Hall
17. Matthies Honors House
18. Physical Plant Building
19. Recitation Hall
20. Recitation Hall Annex
21. Student Development/Dietrich House
22. Synod Hall
23. Thomas Library
24. Weaver Chapel
25. Weaver Observatory
26. William A. McClain Black Culture House
27. Zimmerman Hall

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Springfield is located 25 miles northeast of Dayton and 40 miles west of Columbus on Interstate Highway 70.

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Turn RIGHT onto Bird Road. 1.6 miles

Turn LEFT onto Robert Eastman Road. 1.0 miles

Turn RIGHT onto Croft Road (becomes Home Rd.). 3.2 miles

Turn LEFT onto N. Fountain Avenue. 0.4 miles

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Turn RIGHT onto Wittenberg Avenue. <0.1 miles

Turn Left immediately onto West Campus Drive. 0.1 miles

End at Recitation Hall.

Visitors traveling from the west of Springfield

From I-70 East merge onto US-68 N toward URBANA. 2.9 miles

Take the OH-41 exit toward SPRINGFIELD / TROY. 0.2 miles

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Turn RIGHT onto St. Paris Road / McCreight Avenue / OH-41 Continue to follow McCreight 0.6 miles

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