To
Dr. Abe Silverstein
whose pioneering work in liquid hydrogen technology paved the way to today's success —

Grunder von Bellum
9 November 1967
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**Dr. Kerry L. Cheesman, Editor**

Biological Sciences Department

Battelle Hall, Capital University

1 College and Main

Columbus, OH 43209-2394 USA

Phone 614-236-6951 (office) or 614-236-6520 (secretary)

Fax 614-236-6518 Email OJSeditor@capital.edu

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- Horticulture Abstracts
- Nuclear Science Abstracts
- Review of Plant Pathology
- Selected Water Resources Abstracts
- World Agricultural Economics and Rural Sociology Abstracts

Date of issue — March 2007

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The Ohio Academy of Science
Hosted by
Cuyahoga Community College
Eastern Campus
Highland Hills, OH
April 20-21, 2007

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Cover photo: Courtesy of the National Aeronautics and Space Administration. Photo personally signed by the late Dr. Wernher von Braun (1912-1977) to commend then NASA Lewis Research Center Director, the late Dr. Abe Silverstein (1929-2001). The All-Academy Lecture this year, entitled Emerging Technologies that Support Space Exploration, is by Dr. Woodrow Whitlow Jr., the current Director of the National Aeronautics and Space Administration (NASA) John H. Glenn Research Center at Lewis Field in Cleveland, Ohio.
The Ohio Academy of Science
116th Annual Meeting
Hosted by
Cuyahoga Community College Eastern Campus
April 21-22, 2007

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!
Cuyahoga Community College Eastern Campus welcomes you to the 116th 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 9, 2007. 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/Tri-CRegistrationForm.pdf
Online payment option www.merchantamerica.com/ohiosci

Friday, April 20: Registration will not be open on Friday.

Saturday, April 21: Registration in the lobby of the Liberal Arts Center (ELA) from 7:30AM-11:30 AM. On-site registration is possible by check, VISA, or MasterCard. Cash is discouraged.

Saturdays Parking: Watch for signs. See map in program.

Smoking Policy: Smoking is not permitted in any building.

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

Meals: Friday, April 21: None planned. Saturday, April 22: Lunch available at nearby restaurants.

General Schedule

Friday, April 20, 2007
3:00 PM-5:00 PM The Ohio Academy of Science Board of Trustees Meeting
ELA Room 229

Saturday, April 21, 2007
7:30 AM-11:30 AM General Meeting Registration
ELA Lobby
9:00 AM-11:00 AM Pathways to Your Future Symposium
ELA Room 122
9:00 AM-11:30 AM Morning Podium Sessions in ELA

All Academy Lecture
ELA Theater
11:30 AM Official Notice of Annual Business Meeting
ELA Room 122
11:30 AM Lunch on your own
Available at nearby restaurants.

Emerging Technologies that Support Space Exploration
By Dr. Woodrow Whitlow, Jr.

Dr. Woodrow Whitlow, Jr., is Director of the National Aeronautics and Space Administration (NASA) John H. Glenn Research Center at Lewis Field in Cleveland, Ohio. Appointed to this position effective December 25, 2005, he is responsible for planning, organizing, and directing the activities required to accomplish the missions assigned to the Center.

While managing an annual budget of approximately $500 million, he oversees a workforce of close to 1700 civil service employees that is supported by approximately 1400 contractors. The Center has 24 major facilities and over 500 specialized research facilities located at the 350-acre Cleveland site and the 6400-acre Plum Brook Station site in Sandusky, Ohio.
From September 2003 through December 2005, Dr. Whitlow served as the Deputy Director of the NASA John F. Kennedy Space Center. There his duties included assisting the Director in determining and implementing Center policy and in managing and implementing the Center's missions and Agency program responsibilities in the areas of processing, launch, and recovery of launch vehicles; processing of spacecraft; and acquisition of launch services. Prior to this appointment as Deputy Director, he served as the Director of Research and Technology at the Glenn Research Center.

Dr. Whitlow began his professional career in 1979 as a research scientist at the NASA Langley Research Center, Hampton, Virginia. He assumed various positions of increasing responsibility before moving to the Glenn Research Center in 1998. In 1994, he served as Director of the Critical Technologies Division, Office of Aeronautics, at NASA Headquarters.

Dr. Whitlow earned his Bachelor of Science, Master of Science, and Doctor of Philosophy degrees in Aeronautics and Astronautics from the Massachusetts Institute of Technology. He has written nearly 40 technical papers, most in the areas of unsteady transonic flow and aeroelasticity.

Dr. Whitlow has received numerous awards, including U.S. Black Engineer of the Year in Government, NASA Exceptional Service Honor Medal, NASA Equal Opportunity Honor Medal, the (British) Institution of Mechanical Engineers William Sweet Smith Prize, and the Presidential Rank of Meritorious Executive. The American Institute of Aeronautics and Astronautics named him an associate fellow in 1993.

Dr. Whitlow and his wife have two daughters and two granddaughters.

Tri-C, Ohio's largest community college, offers associate degrees, certificate programs and the first two years of a baccalaureate degree. Students can choose from nearly 1,200 credit courses in over 130 career, certificate and university transfer programs. More than 125 off-campus credit courses are available at various locations near home, at work sites, on cable television, and via the Internet, and over 225 non-credit workforce and professional development courses are offered each semester through Corporate College and Workforce Development.

Tri-C offers a top quality education and flexible learning options at the lowest tuition in Northeast Ohio. The College also generates spending of about $500 million annually in Northeast Ohio and sustains more than 25,000 jobs.

In addition, more than 500,000 Northeast Ohio residents attend college-sponsored cultural, community and sports programs each year. The College is home to Tri-C JazzFest Cleveland, the nation's premier educational jazz festival, and also hosts popular cultural arts programs at Playhouse Square and at campus theaters.

**Meeting Site: Eastern Campus Overview**

The Eastern Campus in Highland Hills, southeast of Cleveland, opened in the fall of 1971 with permanent facilities being completed in 1981. The campus features high-tech classrooms, laboratories, a library, a 600 seat performing arts center, a business conferencing center, a gymnasium, an indoor jogging track, an art gallery, music studios, a Children's Center, a cafeteria and an outdoor athletic complex equipped with basketball, volleyball and tennis courts, an Olympic running track and a soccer field.

The Technology Learning Center, which opened at the Eastern Campus in 1996, contains state-of-the-art electronic classrooms capable of videoconferencing and distance learning, three advanced technology lecture classrooms, an 130-computer open lab and seven individual computer classrooms providing students with e-mail and Internet access.

The Eastern Campus is located southeast of Cleveland off I-271 at:

4250 Richmond Road
Highland Hills OH 44122
216.987.2000
## Hotels Near Cuyahoga Community College/Eastern Campus

<table>
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<tr>
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<th>Distance to Campus</th>
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<td>4250 Richmond Rd</td>
<td>0.5 miles</td>
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<tr>
<td>Highland Hills, OH 44122-6104</td>
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</tbody>
</table>

### Marriot Cleveland East (0.5 miles)
- 26300 Harvard Road, Warrensville Hts  216-378-9191
- 3795 Orange Place, Beachwood  216-831-7200
- 3840 Orange Place, Beachwood  216-831-3735
- 3820 Orange Place, Beachwood  216-595-9551
- Super 8 Motel (0.94 miles)
- 3795 Orange Place, Beachwood  216-831-7200
- 3750 Orange Place, Beachwood  216-831-3000
- Courtyard-Cleveland-Bchwood (1.03 miles)
- 3625 Orange Place, Beachwood  216-896-5555
- Innensbrach Chalet (2.19 miles)
- 24201 Hazelmere Rd, Beachwood  216-561-2522
- Embassy Suites Hotel (1.05 miles)
- 3775 Park East Dr, Beachwood  216-765-8066
- Hilton Cleveland East (1.21 miles)
- 3663 Park East Dr, Beachwood  216-464-5950
- Residence Inn-Cleveland Bchwd (1.25 miles)
- 3628 Park East Dr, Beachwood  216-831-3030
- Clarion Hotel (1.40 miles)
- 26300 Chagrin Blvd, Beachwood  216-831-5150
- Radisson Hotel (1.40 miles)
- 26300 Chagrin Blvd, Beachwood  216-360-7341
- Days Inn (2.11 miles)
- 30050 Chagrin Blvd # 360, Beachwood  440-248-3110
- Econo Lodge (1.52 miles)
- 4353 Northfield Rd, Cleveland  216-475-4070
- Days Inn (1.57 miles)
- 4511 Northfield Rd, Cleveland  216-662-9200
- Knights Inn N Randall (1.80 miles)
- 4751 Northfield Rd, Cleveland  216-475-3100
- Shaker House (2.08 miles)
- 3700 Northfield Rd, Beachwood  216-991-6000
- Red Roof Inn (2.44 miles)
- 24801 Rockside Rd, Bedford  440-439-2500

## Restaurants near Cuyahoga Community College/Eastern Campus

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<thead>
<tr>
<th>Restaurant Name</th>
<th>Address</th>
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<td>River City Grill</td>
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<tr>
<td>Cafe S Sushi</td>
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<td>Benihana</td>
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<td>Ruby Tuesdays</td>
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<td>Giovanni's Restaurant</td>
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<td>Charley's Crab</td>
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<td>P F Chang's China Bistro</td>
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<tr>
<td>Hyde Park Prime Steakhouse</td>
<td>3795 Orange Place</td>
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<tr>
<td>Corky &amp; Penny's</td>
<td>3625 Orange Place</td>
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<tr>
<td>Mitchell's Fish Market</td>
<td>3795 Orange Place</td>
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<td>Fleming's Prime Steak House</td>
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<td>Bravo Cucina Italia</td>
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<td>Red Lobster</td>
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<td>Bob Evans</td>
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<td>Olive Garden</td>
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<td>Houlihan's</td>
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<td>Bahama Breeze</td>
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<td>Red Robin</td>
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<td>Quiznos Sub</td>
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<td>Boston Market</td>
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<td>Pizza Hut</td>
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<td>Starbucks</td>
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<td>Wendy's</td>
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<td>Wild Oats Natural Market Place</td>
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<td>De Gaetano's Village Square Pizza</td>
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<td>Mc Donald's</td>
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<tr>
<td>Dairy Queen</td>
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<td>Stone Oven Bakery Cafe</td>
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<td>Original Pancake House</td>
<td>3625 Orange Place</td>
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<tr>
<td>The Cheesecake Factory</td>
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<td>Mc Donald's</td>
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<td>Augie's Pizza</td>
<td>3625 Orange Place</td>
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<tr>
<td>Sweet &amp; Healthy Pizza</td>
<td>3625 Orange Place</td>
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<td>Original Pizza</td>
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<tr>
<td>KFC</td>
<td>3625 Orange Place</td>
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<tr>
<td>Augie's Pizza</td>
<td>3625 Orange Place</td>
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<tr>
<td>Astona Restaurant</td>
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Pathways to Your Future:
Preparing Tomorrow’s Scientists
9:00 A.M. - 11:00 A.M.
ELA Room 122

Poster Session-Multidisciplines
09:00 AM – 10:00 AM
ELA Commons

Pre-College Poster Session
010:00 AM – 11:30 AM
ELA Commons

Aquatic Biology & Ecology
Podium Session
9:00 AM
Dr. Susan Carty - Presiding
ELA ROOM 109

Biology & Medical Science
Podium Session
9:00 AM
Dr. Mark Headings - Presiding
ELA ROOM 110

Earth, Environmental Science & Geology Podium Session
9:00 AM
T.B.A - Presiding
ELA ROOM 111
THE WEST CREEK URBAN WETLAND PROJECT: A COLLABORATIVE COMMUNITY EFFORT IN THE REHABILITATION OF AN URBAN WATERSHED IN CUYAHOGA COUNTY, OH. Terry E. Greathouse, terry.greathouse@tric.edu, Vase@tri-c.edu, Judy Barker, judith.barker@tri-c.edu, Susan Ormond Brathwaite, ormond.brathwaite@tri-c.edu, Lorain County Community College, 1005 N. Abbe Rd., Elyria OH 44035-1613.

West Creek is a tributary of the highly urbanized lower Cuyahoga River. The problems present in the watershed include storm water surges and transfer of nutrients, pollutants and sediment from the urban areas into the creek. There is a lack of viable plant and animal communities and large populations of invasive plant and animal species are present. It was hypothesized that the creation of a constructed wetland in a basin between two landfills and rehabilitation of the surrounding area would help address these problems. The West Creek Urban Wetland Project is a collaborative partnership between Cuyahoga Community College (Tri-C), the West Creek Preservation Committee, the City of Parma, Ohio and HB Engineering. Grants were obtained in January, 2002 and a 2-acre basin was excavated by the Parma Service Department. Vegetation was established using containerized roots, rhizomes and whole plants. Three plant communities were created; a moist, saturated soil zone, a shallow water zone (5 to 60 cm deep) and deep water zone (1 to 1.5 m deep). Tri-C students were involved in all phases of the project, including the eradication of invasive plants and the planting of over 10,000 native Ohio wetland plants. Results include creation of a 2-acre urban wetland complex, restoration of a 2-acre riparian zone and rehabilitation of 34 acres of landfill to field habitat. The West Creek Urban Wetland Project is an example of how a community college and the community can come together to create a strong urban watershed rehabilitation program.

BRIDGES TO SUCCESS IN THE SCIENCES PROGRAM. Christopher Brathwaite, cbrathwaite@tric.edu, Judy Barker, judith.barker@tri-c.edu, Cuyahoga Community College, 4250 Richmond Rd., Highland Hills OH 44122-6104.

“Bridges to Success in the Sciences Program” is a ten year old Program at Cuyahoga Community College (Tri-C), funded by the National Institutes of Health. Bridges is committed to increasing the number of underrepresented minority students who study in the various science disciplines at Tri-C, who continue their science education by transferring to four-year institutions, and ultimately attend to graduate school in a science discipline. Each Bridge student has both a Tri-C faculty mentor and a research faculty mentor at one of our partner institutions, (i.e.) Case Western Reserve University, Cleveland State University, Baldwin-Wallace College, the University of Akron and John Carroll University. Participants work in the Tri-C Bridges program and conduct research investigating (1) microbial diversity in newly created wetlands; (2) the cold season and make research programs (3) economic transition occurring in Lorain County; and (4) chemical characterization of potential biofuels. The information learned from these projects has been disseminated at scientific conferences throughout North America. Specifically, presentations have been made at annual meetings of the AAAS in Boston, San Francisco, and Seattle; of Sigma Xi in Montreal; and the Ohio Academy of Science. 30 of the 34 students have continued their education beyond the associate degree. The research program has been tied directly to the minor of Bridges transfer rate is 68%. This rate of transfer is greater than both for Tri-C (40%) and the national rate (30%). One aspect of the Program is that we are adamant about is that Bridges is a family. Once you are in the Bridges family, we consider you a part of the family forever. We stay in close contact with all students, and offer them ongoing mentoring and networking opportunities. Twenty Bridges students have graduated from four year schools. This fall (2006) there will be a total of 8 Bridges students attending graduate school.

Poster Session A
Multidisciplines
9:00 – 10:00 AM

BOARD 01 EUGLENOPHYTA FROM THE GREAT SMOKY MOUNTAINS NATIONAL PARK. Christopher T. Boehlert, cboehler@heidelberg.edu, Susan Och, scoarty@heidelberg.edu, Heidi Lee, heidelberg@tiffin.edu, Heidelberg College, Tiffin, OH 44883.

In 2004 Jeff Johansen and others showed only one Euglenophyte species had been identified from the Great Smoky Mountains National Park. As part of the All Taxon Biodiversity Inventory conducted in the park, the goal of an algal team was to document all algal species throughout the park. This report focuses on members of the Euglenophyta. It was hypothesized that there were
more species to be found. A small pond near the Methodist Church site in the Cades Cove area was sampled in May, June, and October 2004, July 2005, and March and May 2006. Samples were immediately examined and micrographs taken; some samples were examined using scanning electron microscopy. Waters from these sites were identified to include: Euglena helioideae, E. fusca, E. polymorpha, E. spirigera, E. splendens, Monomorpha pyrum, Phacus suecicus, P. tartus, Strombomonas cf urceolata, Tracholomonas hispida, T. superba, and T. volvocina.

**BOARD 03**

**THE EFFECTS OF LARVAL REARING DENSITY AND FOOD AVAILABILITY ON ADULT WING COLORATION AND MATING SUCCESS IN MONARCH BUTTERFLIES (DANAUS PLEXIPPUS).** Amy L. Smith, smitham@wooster.edu, (Michelle J. Solensky, msolensky@wooster.edu), The College of Wooster C-2745, 1189 Beall Ave., Wooster OH 44691.

Developmental stress can have important physiological effects on organisms. Developing rearing is energetically expensive and results in substantial fitness costs. Rearing protein in adult monarch butterflies (Danaus plexippus) is correlated with higher male mating success (one way to measure fitness), and a color manipulation study suggests that this correlation is due to female preference. This study could produce adult coloration that correlates with mating success. This study tested the prediction that low food stress and low density larval rearing (control treatment) should produce darker orange wing coloration and higher male mating success. Variation in larval rearing color and EPT abundance observed in streams suggests a need to manage ditches for the Upper Big Walnut Creek watershed for the conservation of macroinvertebrate communities.

**BOARD 05**

**EXPRESSION AND LOCALIZATION OF NOVEL PROTEINS IN PLASMODIUM, Tashara L. Banks, tbanks@wooster.edu, (Tukey, PhD), Cleveland State University, Dept of Biological, Geological, and Environmental Sciences, 2121 Euclid Ave., Cleveland OH 44115.**

Malaria is an infectious disease caused by the genus Plasmodium. The disease causes approximately 3 million deaths each year. The four species that cause malaria in humans are P. falciparum, P. vivax, P. ovale, and P. malariae. The objective of this study was to use the Plasmodium genome, vaccine development efforts have intensified. Proteins in blood stage merozoites have been identified as possible vaccine candidates. Rhoptry organellar proteins take part in the parasite invasion of the erythrocyte and parasitophorous vacule formation. These proteins are strong candidates for developing a vaccine against malaria. Multidimensional Protein Identification Technology (MudPIT) analysis of the rhoptry organellar, obtained by subcellular fractionation, revealed 36 novel proteins. Eighteen were hypothetical proteins and had no homology to known proteins. To confirm rhoptry origin of the proteins, plasmid recombinants of PY01146 and PY02301 were constructed. Full length cDNAs of PY01146 and PY02301, encoding two of the hypothetical proteins, were obtained by polymerase chain reaction (PCR) and subcloned into pET-28a vector. Recombinant plasmids were transformed into Escherichia coli strain BL21DE3 competent cells and IPTG-induced expression was performed. Antibodies were also synthesized against the peptides obtained from MudPIT. Western blotting of the antibodies revealed recombinant proteins using antibodies made against rhoptries and antibodies made against synthetic peptides encoded by genes PY01146 and PY02301. Histidine tags on the recombinant proteins were also stable to the protein extraction protocol and size of the proteins.

**BOARD 06**

**POPULATION DENSITIES OF SEA URCHINS (ECHINOMETRA LUCENTER) IN ROCKY INTERTIDAL ZONES OF SAN SALVADOR,** Banks, tloeloe@yahoo.com, (Tobili Y. Samuels, PhD, Biological, Geological, and Environmental Sciences, 2121 Euclid Ave., Cleveland OH 44115.**

Echinometra lucunter is a common sea urchin found in the rocky intertidal zone of pan-tropical areas including San Salvador. The Bahamas. E. lucenter density variation was measured based on wave action in the rocky intertidal zones. It was hypothesized that the density of E. lucenter would be greater in the seaward sections of the rocky intertidal zones compared to greater wave action, which erodes the limestone rocks of the rocky intertidal zone, creating crevices that provide ideal habitats for E. lucenter. Two rocky intertidal zones were chosen for this study. One-meter polyvinyl chloride (PVC) quadrats with a diameter of two-and-a-half centimeters were used.
Urchins were counted at each site (site 1 = 234 m², 3,212 urchins; site 2 = 100 m², 867 urchins); urchins were counted within the grid for each quadrant and both populations were completely censused. The data from each site were combined and the primary results of the pooled data (N = 5,070 urchins) indicated that the lumbriner densities increase as proximity to the seaward side of the rocky intertidal zone increases. The average of the total urchins found on the seaward side (462 urchins) was almost twice the landward side (246 urchins). The average number of urchins measured was 7.65 urchins/m². In other studies, this tendency was found to be influenced by stronger wave action on the seaward side of the rocky intertidal zone.

The wall lizard, Podarcis muralis, is one species of the Podarcis genus, a genus whose phylogenetic relationships are still mostly unknown. In the 1950s a small number of these lizards were released near Cincinnati, Ohio, and since this time have established a large territory in the area. Such isolated populations are prone to limited genetic variation due to their restricted gene pool. Sequencing and analysis of Podarcis DNA is a highly effective strategy for identifying genetic relationships among these species. Determination of genetic relationships can be based upon amplification of extracted DNA via the polymerase chain reaction (PCR) followed by DNA sequencing of the amplified fragment. Sequence analysis permits identification of the single nucleotide polymorphisms that are diagnostic of each species. Samples of DNA were collected from 17 lizards between 22 June 2000 and 28 January 2001. These have been amplified using two primer pairs (B4, C9) previously used in genetic studies of other populations of Podarcis. Amplification products were run on agarose gels for analysis of genetic variation. The current study reports an analysis of fragment sizes and sequences from these primer pairs in the Cincinnati population of wall lizards.

Despite being implicated as the cause of declines in numerous populations of amphibians, the presence or absence of chytridiomycosis (a pathogenic disease caused by the fungus Batrachochytrium dendrobatidis) in declining populations of Blanchard’s cricket frog (Acris crepitans blanchardi) is not yet investigated. The purpose of this research was to address: (1) whether or not chytridiomycosis is present in populations of Blanchard’s cricket frogs in the Midwestern United States; (2) the overall prevalence of infection, if any, at each site; and (3) the geographic distribution of the disease. Skin swabs or toe clips were collected from 205 cricket frogs at 21 sites throughout the Midwestern United States in the summer of 2005 and 2006. The sites were from six states with samples from 82 specimens from Ohio (6 sites in Auglaize, Preble, Greene, Clinton, and Montgomery Counties), 53 specimens from Michigan (6 sites in Barry, Lenawee, Washtenaw, St. Clair, and Kent Counties), 39 specimens from Illinois (3 sites in Jackson, Effingham, and Will Counties), 17 specimens from Iowa (4 sites in Madison, Guthrie, Lucas, and Ringgold Counties), 9 specimens from Missouri (1 site in Jefferson County), and 5 specimens from Kansas (1 site in Crawford County). The samples were subsequently tested for the presence of chytridiomycosis by running a polymerase chain reaction involving primers specific to B. dendrobatidis. Given that chytridiomycosis has been implicated as the cause of declines in numerous species, it was hypothesized that chytridiomycosis would be detected in these declining populations of cricket frogs and that a tentative relationship between the presence of B. dendrobatidis and population die-offs would be found. Data revealed that the chytrid fungus is present in populations of Blanchard’s cricket frogs, as B. dendrobatidis was detected in 31 of 205 (15.1%) skin swab and toe clip samples. Infected individuals were found in all states except Kansas and there appeared to be no obvious geographic pattern in infection. These data show that the B. dendrobatidis is present in many populations of Blanchard’s cricket frogs in the Midwestern United States. However, no mortality was observed in the infected, yet seemingly healthy populations of cricket frogs at the investigated sites. Also, the wide geographic occurrence of B. dendrobatidis in Blanchard’s cricket frogs suggests that the presence of chytridiomycosis is not necessarily causing the documented decline. It is likely that more than one factor is responsible for the ultimate cause of the rapid and extensive decline of Blanchard’s cricket frogs, with chytridiomycosis possibly working in synergy with these other factors.
 hopsythesized that these phenotypes are a result of a modified tetrahybrid inheritance, in which wild type C57BL/6J and 129 mice have reciprocal genotypes of at least four modifying genes. The four craniofacial phenotypes observed result from segregation of four cotyledon semi-dominant suppressor loci. From Chi-Square analyses, several significant genomic loci have been identified as regions of interest. Within these significant loci, top candidate genes have been chosen for further study. Sequence analysis of similar phenotypes between the candidate gene and sk1, and 2) previously demonstrated biochemical connections. To test whether candidate genes may actually modify the sk1 phenotypes, expression of the candidate genes was examined in areas of craniofacial defects to determine if there is a difference between C57BL/6J and 129 strains through immunostaining antibodies against each gene. A difference strongly suggests that the gene is a modifier of sk1 and that the strain is directly affecting the phenotypes.

BOARD 14  INHIBITION OF BATRACHOCHYTRIUM DENDROBATIDIS BY AN ANTIFUNGAL COMPOUND, 2,4-DIACETYLPHLOROGLUCINOL, PRODUCED BY BACTERIA FOUND ON THE SKIN LAYER OF AMPHIBIANS. Robert M. Brucker, bruckerm@muc.edu, (Brandon Sheafor, sheafobr@muc.edu), Mount Union College, 1972 Clarke Ave., Alliance OH 44601.

Amphibians face one of the largest extinction rates of any extant vertebrate class. One of the reasons for this is loss of habitat to which the chytrid fungus, Batrachochytrium dendrobatidis. The spread of chytridiomycosis from direct contact with an infected amphibian is the method of transmission. The risk of transmission is increased by environmental factors such as direct sunlight which may be vital in preventing the spread of B. dendrobatidis. The affect of droplet size on transmission will also be considered. The spread of B. dendrobatidis has been characterized by zoospores. This may naturally occur in environments with fast moving water, waterfalls, or tropical regions where the air is thick with moisture. Using an aquatic method of transmission in nature is possible. The hypothesis is that 2,4-DAPG produced by epidermal bacteria may be important in conferring resistance to pathogenic fungi like B. dendrobatidis. To test this, the inhibitory effects of 2,4-DAPG on B. dendrobatidis will be explored using a 96 well, MTI (3-(4,5-Dimethylthiazol-2-yl))-2,5-diphenylethelazolium bromide) assay. The assay will quantify the cellular activity of B. dendrobatidis against varying concentrations of 2,4-DAPG by measuring a difference in absorbancy as the fungal zoospores reduce MTT to formazan crystals over an incubation time of 6 hours.

BOARD 15  DISTRIBUTION OF ROCKY INTERTIDAL ZONE GASTROPODS NERITA VERSICOLOR AND N. PELORONTA IN SUN AND SHADE MICROHABITATS ON SAN SALVADOR, THE BAHAMAS. Tracy E. Dohn, s09.jtiggelaar@wittenberg.edu, John M. Tiggelaar II, s08.itiggelaar@wittenberg.edu, Wittenberg University, Box #1600, 734 Woodlawn Avenue, Springfield OH 45504.

 nerites living in the tropical rocky intertidal zone are subjected to severe environmental stressors such as direct sunlight which causes desiccation. The habitat selection of Nerita versicolor and N. peloronta was studied to determine microhabitat distribution relative to shade. It was hypothesized that N. versicolor and N. peloronta would more likely be found in shaded areas where the ambient temperature would be lower. Observations were taken at 17 different 1 m2 quadrats at four separate locations containing 1003 N. versicolor and 45 N. peloronta on the island of San Salvador, The Bahamas, from 5 June 2006 to 12 June 2006. Percentages of sun and shade for each quadrant were estimated and compared to the percentages of nerites occupying the shaded area. Some quadrants had only N. versicolor present. Most nerites (68.4%) were located in the shade (69.0% of N. versicolor and 55.6% of N. peloronta). The average amount of shade available per quadrat was 24%. As found here, most species of other species of rocky intertidal zone gastropods are more likely to be found in sheltered areas.
EVALUATION OF SELECTED TUMORS AND CANCERS OF HUMAN SKIN BY MEANS OF HIGH RESOLUTION LIGHT MICROSCOPY (HRLM), IMMUNOMICROSCOPY, AND TRANSMISSION ELECTRON MICROSCOPY (TEM). Lisa M. Martorano, s08.lmartorano@wittenberg.edu, and David L. Mason, dmaslon@wittenberg.edu, Wittenberg University, Box 2783, Springfield OH 45501.

Tissue samples (n = 7) of known skin tumors and cancers were obtained from Community Hospital in Springfield, OH and other hospitals in the Dayton Miami Valley (Ohio) or through high resolution light microscopy, immunomicroscopy, and electron microscopy. These techniques were implemented to distinguish histological features of the skin cancers. The following lists the findings of skin cancers that were detected with the ultrastructural features: HRLM showed nodular growth in the epidermis, indicative of basal cell carcinoma. HRLM showed the basal lamina separating malignant cells from the underlying dermis. With squamous cell carcinoma, HRLM revealed malignant squamous epithelial cells penetrating into the dermis. These cells contained a strong presence of keratin as detected by immunomicroscopy. In a case of malignant melanoma, dark melanin pigment was found in malignant cells under HRLM; however, malignant cells appeared devoid of melanin in a case of amelanotic melanoma—TEMA readily showed premelanosomes within the cytoplasm of the amelanotic cells. In a case of merkel cell cancer, small neurosecretory granules located beneath the cytoplasmic membrane of the malignant cells were revealed by TEM. Furthermore, immunomicroscopy detected neuron-specific enolase (NSE) in the malignant cells. NSE was also present in malignant cells of a carcinoid. HRLM showed malignant lymphocytes invading the dermis and HRLM revealed small neurosecretory granules between the squamous epithelial cells, TEM illustrated the deeply cleaved shape of the T-lymphocytes. Overall, the above forms of microscopy helped to better identify the unique cellular structures of malignant skin cancers.

HIGH RESOLUTION LIGHT MICROSCOPY EMPLOYING LABELED ANTIBODIES HELPFUL WITH THE IDENTIFICATION OF A SPECIFIC TYPE OF CANCER. David L. Mason, dmaslon@wittenberg.edu, Wittenberg University, Box 720, Springfield OH 45501.

From approximately 300 cases of human cancers presenting at Community Hospital in Springfield, OH, and other hospitals in the Dayton Miami Valley, tissues were fixed in neutral buffered formalin (NBF), dehydrated, embedded in paraffin, sectioned on an ultramicrotome, and placed onto glass slides for immunostaining. Primary antibodies were applied, followed by a secondary antibody (link antibody) that was conjugated to either peroxidase or a fluorescent stain. The results on the following cases revealed by immunomicroscopy a specific antigen by light microscopy that was helpful with the identification of each type of malignancy. When using over-the-counter herbicides, it is possible that the consumer may accidentally introduce these chemicals to the spores of native, wild ferns when spraying nearby weeds in garden beds or forests adjacent to fields in agriculture. It was the intent of this experiment to determine what effects these consumer available herbicides may have on the germination of the spores of ostrich fern (Matteuccia struthiipteriis (L.) Todaro). After being washed from the sporangia and placed at 24 hours, 48 hours, and 72 hours with herbicide-free controls for both time intervals, thus creating 4 treatments. ANOVA indicated the significance of Roundup® time, and also indicated an interaction between the two (p = .013). After being run as a group one-way ANOVA, both the Tukey and Bonferroni Post Hoc tests demonstrated significant differences between treatments (p < .001). This suggests that application of Roundup®, time of application, as well as an interaction between Roundup® and time together are significant factors. These data suggest that Roundup® mixed to annual specifications significantly lowers the germination of ostrich fern spores.

PREPARATION AND CHARACTERIZATION OF PD(II) COMPLEXES OF AND F-19 NMR-REPORTER PINCER LIGAND. Heidi M. Fondeur,1 heidifondeur@hotmail.com, Man Lung Kwan,2 nhoffman@jaguar1.usouthal.edu, Rachel K. B. Ann,3 Rachel K. Fondeur,3 Benjamin F. Wicker,4 Benjamin F. Wicker,4 Bridges to Success in Sciences, Departments of Biology & Life and Earth Sciences, Otterbein College, Westerville OH 43081.

The versatility of organopalladium pincer complexes in catalytic organic synthesis has attracted great attention with most studies being focused on their catalytic applications, the mechanism of many catalytic processes using such complexes having yet to be determined. We have synthesized a new set of PD(II) arylibis(phosphinite) complexes shown below for K = Tfa (Trifluoracetate), Cl, Br, I and characterized by NMR and X-ray crystallography. The axial-F NMR signal should provide useful metrics (e.g. chemical shifts and coupling constants) for the other cases in the same family and with selectivities as well as in mechanistic studies of these organic transformations. Halide-metathesis equilibria for such reactions have been monitored by both 19F and 31P NMR spectroscopy. Complexes [(F-pincer)PD-L] (L = AsPh3, Pyr, and NCCH3) having 19F and 31P NMR-reporter pincer-ligand complexes have been prepared and characterized by multinuclear NMR and F-19 NMR-reporter pincer-ligand complexes have been prepared and characterized by multinuclear NMR. The 19F NMR yield by treating the Pd-CI species with TIPFP (Hexafluorophosphino thalium (I)). Activation energies for dissociation of L = AsPh3, Pyr, and NCCH3 have been measured and the energy barriers are 90–90 kcal/mol.

REEF MACROBORBORATION AND BIOEROSSION IN HOLOCENE REEF FACIES ENRIQUILLO VALLEY, DOMINICAN REPUBLIC. B. Ann Hoedt, Ann.Hoedt@otterbein.edu, (Hali) J. Lescinsky, Hlescinsky@otterbein.edu, Dept of Life and Earth Sciences, Otterbein College, Westerville OH 43081.

Grazing and macroboring are two main components of bioerosion within coral reef systems. Grazing and macroboring abundance were investigated in five different Holocene (5-8000 ybp) reef facies in Enriquillo Valley, Dominican Republic. Corals were examined along 12 m transects: lagoon (2 transects), branching (6), mixed (4), massive (4), and platy (2); and evaluated for taphonomic grade (surface condition), colony orientation, and encrustation. In addition, 25 coral heads per transect were collected and examined for macroborers: Lithophaga (Bivalves) were the most abundant borers in these facies followed by sponge traces, primarily Entobia ovula and Entobia mammillata. In addition, Entobia ovula and Entobia mammillata were also frequently encountered in both the massive and mixed reef zones. It is hypothesized that bivalve borers will be limited by small substrates particularly in the branching coral zone. Branching and lagoon
In 1989 the "no net loss" policy emerged from the Clean Water Act. The goal of this policy is to conserve and protect wetlands whenever possible, but it predominantly focuses on creating or restoring wetlands to replace natural wetlands that have been lost to anthropogenic development. The 10 ha wetland in this study is one that was created in the spring of 2006 at Dawes Arboretum, Licking County, Ohio as mitigation for a regional road expansion. The purpose of this study is to spatially analyze abiotic soil characteristics in the created wetland complex. Soil samples were collected at 10m x 10m intervals from four of the five multiple basins present in the complex and physiochemical characteristics were analyzed for basin-to-basin variation. A total of 83 samples were used. Eight were obtained from basin one, 46 from basin two, 105 from basin three, and 111 from basin five. The physicochemical characteristics measured in this study are pH, bulk density, and percent organic matter. The hypothesis is that all of the basins are uniform in structure. To determine the initial phases of ecosystem assembly and sites of abiotic variation will impact initial plant establishment and growth. Organic matter and bulk density show some degree of correlation with each other (r = -0.58, significant at 0.01 level), but pH and organic matter also display this. Total correlation was found in all basins (F = 0.05). Soil samples show abiotic variability in pH, organic matter and bulk density in the basins, but no strong differences in depth. Attention to these abiotic factors may improve plant establishment and survivorship in newly created wetlands.

**BOARD 21**

**SOIL VARIATION IN A NEWLY CREATED WETLAND IN LICKING COUNTY, OHIO**

M. J. Kennedy, Kennedy_m@mskungum.edu, Slater Box 1894, Denison University, Granville, OH 43023.

**PARKS AND RESIDENTIAL PONDS IN CENTRAL OHIO**

J.J. Marks, KURT Marks@otterbein.edu, (Sarah Bouchard, sbouchard@otterbein.edu), 104 West Columbus St., Canal Winchester OH 43110.

Recent studies have shown that introduced non-native turtle species, such as red-eared sliders (Trachemys scripta elegans), can disrupt native turtle ecology by competing for food and basking sites. A total of twenty-one turtles were trapped in six of the nine ponds present in the complex and were checked once a day for five days at each site. Turtles were set in August 2006 in the early morning or the previous night to survey residential and Metro Park pond ecosystems in Central Ohio for non-native turtle species. Nine ponds were included in this study: five were residential ponds located in housing suburbs, and four were located in Metro Parks. At each of the nine study sites, turtles were trapped using baiting and baited hoop traps set in areas where turtles may feed or bask. Traps were set in August 2006 in the early morning or the previous night and were checked once a day for five days at each site. Turtles were identified to species, measured, and marked to prevent recounting. A total of twenty-one turtles were trapped in six of the nine ponds (three residential ponds and three Metro Park ponds). Four native and two non-native species were identified. The non-native species, T. s. elegans and T. s. scripta comprised 15% of turtles caught in the Metro Parks ponds, whereas 75% of turtles caught in the residential ponds were non-native. These are common pond turtletes and are likely introduced intentionally. Future studies should determine if these non-native turtles comprise a viable population and if they are negatively affecting pond ecosystems.

**BOARD 22**

**A SURVEY OF TURTLES IN METRO PARKS AND RESIDENTIAL PONDS IN CENTRAL OHIO**

Recent studies have shown that introduced non-native turtle species, such as red-eared sliders (Trachemys scripta elegans), can disrupt native turtle ecology by competing for food and basking sites. A total of twenty-one turtles were trapped in six of the nine ponds present in the complex and were checked once a day for five days at each site. Turtles were set in August 2006 in the early morning or the previous night to survey residential and Metro Park pond ecosystems in Central Ohio for non-native turtle species. Nine ponds were included in this study: five were residential ponds located in housing suburbs, and four were located in Metro Parks. At each of the nine study sites, turtles were trapped using baiting and baited hoop traps set in areas where turtles may feed or bask. Traps were set in August 2006 in the early morning or the previous night and were checked once a day for five days at each site. Turtles were identified to species, measured, and marked to prevent recounting. A total of twenty-one turtles were trapped in six of the nine ponds (three residential ponds and three Metro Park ponds). Four native and two non-native species were identified. The non-native species, T. s. elegans and T. s. scripta comprised 15% of turtles caught in the Metro Parks ponds, whereas 75% of turtles caught in the residential ponds were non-native. These are common pond turtletes and are likely introduced intentionally. Future studies should determine if these non-native turtles comprise a viable population and if they are negatively affecting pond ecosystems.

**BOARD 23**

**THE IMPACT OF VEGETATION STRUCTURE AND COMPOSITION ON GRASSLAND BIRD SPECIES DIVERSITY OF RECLAIMED STRIP-MINE IN SOUTHEASTERN OHIO**

A. E. Crone, acrone@muskingum.edu, Danny J. Ingold, ingold@muskingum.edu, Biology Dept, Muskingum College, New Concord OH 43762.

Reclaimed strip-mines have been shown to provide suitable nesting habitat for a variety of grassland bird species. The extent to which grasslands dominated by exotic grass species benefit grassland birds versus native grasslands as well as exotic grasslands encroached upon by exotic woody species (e.g., autumn olive, Eleagnus multiflora) is still in question. From mid-May through July 2006, the number of males of several bird species along 250 m transects in ten 250 x 100 m plots (5 on exotic grasslands, 3 on encroached grasslands, and 2 on native grasslands) in the Wilds was quantified (by song and visual observations with a range finder). The Wilds is a reclaimed strip-mine located at the intersection of Guernsey and Noble counties in southeastern Ohio. One-way ANOVAs were used to analyze these data, which detected no significant difference (P > 0.05) in the density of Henslow’s sparrows (Ammodramus henslowii), savannah sparrows (Passerculus sandwichensis), red-winged blackbirds (Agelaius phoenicus) among these three habitat types. A significant difference was detected in grasshopper sparrow (A. savannarum) density in the grassland plots (both exotic and native) lacking woody encroachment (F = 8.89, DF = 2, P < 0.05). A significantly greater density of common yellowthroats (Geothlypis trichas) was detected in plots with woody vegetation versus those (both exotic and native) lacking woody encroachment (F = 78.55, DF = 2, P = 0.001). These data suggest that grassland plots lacking woody encroachment (whether dominated by exotic or native grass species) were beneficial to nesting grassland birds, while plots with woody encroachment were less attractive.

**BOARD 24**

**HYDROGEN PRODUCTION THROUGH THE ELECTROLYSIS OF WATER**

Josh T. Lilly, Tlemley@heidelberg.edu, Heidelberg College, 310 E. Market St., Tiffin OH 44883.

The dependence on oil as a source of energy is growing and alternative energy sources that can reduce the use and environmentally damaging effects must be discovered. The only byproduct of the oxidation of hydrogen is water, making it a clean energy source. While measuring the gas production it was noted that 30mL were produced in ten minutes. The cell produced 1.2x10^-6 moles of hydrogen which would release 343J (286kJ/mol) when recombined with oxygen to form water, while it was determined that 1025J were put into the system. The efficiency of our electrolysis cell was approximately 34% under the given conditions (.975atm corrected for saturated vapor pressure, 21°C).

**BOARD 25**

**NATURAL RUBBER TEST FOR ELASTOMERS IN PURE SUE**

Amy L Blake, albl9@uakron.edu, (Michelle Hoo Fatt, hoofatt@uakron.edu), Dept of Mechanical Engineering, The Univ. of Akron, 1536 Gulf St., Uniontown OH 44685.

The long term goal of this research project is to develop constitutive equations and failure criteria for elastomers under high rates of loading. The following experiments were designed for pure shear in natural rubber. The typical industry because of its ability to strain crystallization; which imparts large strain and tensile properties at high shear rates. The objective of this study is to develop an apparatus and test procedure to characterize natural rubber in pure shear under high strain rates. Natural rubber is one of the most important materials used in industry because of its ability to strain crystallization; which imparts it with the high strength that natural rubber is known. The typical sample used in these experiments will be a 10:1 length to height ratio, which, when pulled in tension, ought to exhibit pure shear characteristics. A modified Charpy machine with linear sliding grips equipped with load cells and a high speed camera which will be used to measure the strain and load rates. A 24hour measure of the current passing through the electrolyte, a 24hour measure of the current, and an experiment measuring the hydrogen gas production. Multiple observations of the current show a sharp decrease in current immediately after electrolyte input, presumably to a build up of ions around each electrode. A 24hour record of the current revealed a 5.6mA/hour linear increase beginning at thirty minutes and continuing for the duration of the experiment. It was assumed that the difference in measures of bulk density, percent organic matter, and pH within and among different basins (F = 0.05). Soil samples show abiotic variability in pH, organic matter and bulk density in the basins, but no strong differences in depth. Attention to these abiotic factors may improve plant establishment and survivorship in newly created wetlands.

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BOARD 26 THE RELATIONSHIP BETWEEN TEMPERATURE ADAPTATION AND MATING SUCCESS IN MALE DANAUS PLEXIPPUS. Evan R Slanczka, ESLANCZKA09@wooster.edu, C-2726, 1189 Beall Ave., Wooster OH 44691.

In ectothermic organisms body temperature regulation is essential for survival. Experiments through the Gradients of Adaptation Hypothesis have shown that monarch butterfly (Danaus plexippus) reproductive success is linked to wing melanization. However, due to opposite, significant trends pertaining to percent wing melanization and mating success, the hypothesis is invalid. Reproductive success is linked only to wing color. The objective of this experiment was to elucidate these trends. To help understand these trends, it was hypothesized that reproductive success is linked with body temperature. Upon rearing monarchs at temperature extremes, the hypothesis was tested by rearing monarchs in different temperatures with a warm treatment group (77.6°-84.8°) and a cold treatment group (62.8°-72.8°). Using digital scanners to record their mating success as adults, the males' wings were analyzed for color percentages using Adobe PhotoshopTM and FoveaProTM. Upon reaching sexual maturity males from the two treatments (n=115) were released into cages with females and their mating success recorded for ten days. It was predicted that individuals raised in the cooler temperature group that had more melanin would mate more than those that had less melanin. Likewise, individuals raised in the warm treatment that had more melanin would mate more than those that had more melanin of this type. Linear regression to statistically analyze the results, it was found that separate, the model suggested a different trend (p=0.481) nor the warm treatment group (p=0.154) supported the hypotheses even though both trends appeared as hypothesized.

BOARD 27 AN ASSESSMENT OF THE MUSSEL COMMUNITY OF THE LITTLE MIAMI RIVER SYSTEM. Marshall H. Goodwin, marshall.goodman@otterbein.edu, Michael A. Hoggarth, mhoggarth@otterbein.edu, Dept of Life and Earth Sciences, Otterbein College, Westervile OH 43081.

The mussel community of the Little Miami River system was sampled at 27 locations from 16 June to 23 September 2006. Numbers of extant and extirpated species were compared to mussel data collected at 27 locations from 16 June to 23 September 2006. Numbers of extant and extirpated species were compared to mussel data collected 15 years prior (Hoggarth 1992). Our data demonstrate a general decline in the distribution and abundance of mussels in this system. The upper East Fork (above William Harsha Lake) and the mainstem, below the mouth of the East Fork, have retained their mussel diversity. The mussel community within Todd's Fork has been lost and the mussel community in the mainstem, above the mouth of Caesar Creek, largely has been extirpated. The system demonstrates a negative relationship between the number of fish anomalies and mussel diversity of mussels (Ohio EPA 1995, 2000), and densities of mussels and Corbicula fluminea (Asiatic clam) were found. Also, numbers of extant vs. extirpated species and individuals were compared to mussel data collected 15 years prior (Hoggarth 1992). Our data demonstrate a general decline in the distribution and abundance of mussels in this system.
recognition of the status of deer as keystone herbivores. Being able to accurately estimate white-tailed deer population size has been difficult, because deer are large, mobile, mobile. Distance sampling offers a relatively effective and efficient alternative to traditional capture-recapture approaches in population estimation. Sampling procedures and estimation routines developed by Program Distance were used to sample white-tailed deer abundance across the property of the Wilds in September 2006. The study was a 10,000 acre conservation research and education institution located in southeastern Ohio. Backcountry roads traversing the Wilds property were used as sampling transects. Along each transect, off-road vehicles were used to develop accurate estimates of relative abundance. These data may then allow for planning of future investigations designed to assess the impact of deer foraging on habitat development and change.

BOARD 33  BURYING BEETLE SURVEYS FOR THE POTENTIAL REINTRODUCTION OF THE AMERICAN BURYING BEETLE (Nicrophorus americanus) AT THE WILDS, OHIO. Ryan L. Bechtel, rbechtel@muskingum.edu, Adam Davis adavis@thewilds.org, (James L. Dooley, Jr., jdooley@muskingum.edu) Science Program, Muskingum College, 163 Stormont St, New Concord OH 43762.

Insects constitute approximately three percent (3%) of currently listed endangered species in the United States. The American burying beetle, *Nicrophorus americanus*, was listed as an endangered species in July of 1989. American burying beetles are known to be key contributors to ecosystem function and are considered to be habitat generalists. The dramatic decrease in their population is puzzling to entomologists, and reintroduction efforts have been undertaken. The objectives of this research were to survey a number of habitats within the Wilds ecosystem to document species richness and the relative abundance of related burying beetle species. The Wilds is a 10,000 acre conservation research and education institution located in southeastern Ohio. Locations deemed to contain sufficient resources to support robust numbers of congener burying beetle species. The Wilds is a non-profit conservation research and education institution located in southeastern Ohio and education institution located in southeastern Ohio on land that is a reclaimed surface mine. Wood frog population declines at the Wilds suggest habitat alteration and/or environmental pollution. The objective of this study is to survey 10 potential wood frog habitats at the Wilds. Wood frog terrestrial and aquatic habitats were assessed based on factors described in the literature as significant in influencing survivorship and reproductive success. The significant terrestrial factors include canopy cover, soil saturation, debris for overwintering and buffer distance to breeding habitat. The aquatic factors include pool depth and area, absence of fish, branches for oviposition, neutral pH and absence of toxic metals. GPS coordinates of the aquatic and terrestrial habitats were gathered and put onto an aerial photograph of the Wilds using GIS. These data will be analyzed with the aim of ranking suitable sites for either additional restoration or potential release of wood frogs.

BOARD 36  THE EFFECTS OF ANTIBIOTICS ON THE GASTROINTESTINAL MICROFLORA IN SLIDER TURTLES, TRACHEMYS SCRIPTA. Amy Jessen-Marshall, ajessen-marshall@otterbein.edu, 8641 Renaa Ave., Galloway OH 43119. Vertebrate herbivores do not have endogenous enzymes capable of breaking down the α-1,4- linkages of cellulose, the major component of plant cell walls, when feeding on grass. Therefore, they must rely upon microbial gut symbionts that ferment cellulose and produce short-chain fatty acids that the herbivore can use as an energy source. The main objective of this study is to determine which antibiotics will successfully destroy the microbial symbionts of juvenile freshwater turtles, *Trachemys scripta*. Destruction of these microbial gut symbionts will enable the exploration of their importance and potential sources of inoculation. Three possible antibiotic treatments (Streptomycin with Bacitracin, Chloramphenicol with Bacitracin, and Enrofloxacin) were considered for this study. An antibiotic screening was conducted on wild turtle fecal samples to determine which antibiotics were potentially the most effective. The most effective antibiotics were (1) administered orally in a gelatin based food, (2) introduced directly into tank water, but not in food (3) administered both in food and directly in tank water, and (4) not administered in either food or water. Successful completion of this study will lay the methodological foundation for future studies of chelonian microbial symbionts.
domesticus, for one month. Fecal samples were collected from each turtle, and bacterial populations were isolated. Studies are currently taking place to identify bacteria and determine substrates for fermentation. This research is especially relevant to juvenile turtle nutrition, as many turtle species undergo a diet shift from carnivory to herbivory. The results of this study will provide a better understanding of how the diet shift influences gastrointestinal and microbial populations. This study will also highlight the importance of these populations to different turtle life stages.

BOARD 38 IDENTIFICATION AND COMPARISON OF WILD FRESHWATER TURTLE MICROBIAL GUT SYMBOINTS. Denise L. Bunger, denise.bunger@otterbein.edu, (Sarah Bouchard, sbouchard@otterbein.edu, Amy Jessen-Marshall, ajmarshall@otterbein.edu, and Sharice Potter, spotters@otterbein.edu), One Otterbein College, Westerville OH 43081.

Herbivorous vertebrae require microbial gut symbionts to ferment plant cell walls. Although these symbionts are fairly well studied in mammals, few studies have been done in reptiles. The purpose of this research is to describe microbial gut populations in wild, freshwater turtle species, and to identify a possible relationship between microbial populations and diet. Turtles were trapped using floating basking traps and hoop traps at Otterbein Pond in Westerville, OH. A total of thirty turtles were sampled: ten painted turtles, Chrysemys picta, twelve map turtles, Graptemys geographica, seven red eared sliders, Trachemys scripta elegans, and three ringed sliders, Trachemys scripta scripta. A sterile plastic pipet tip was inserted into the cloaca of each turtle to obtain a bacterial sample from the large intestine. Bacteria were then inoculated on Tryptic Soy Agar (TSA) plates and grown in candle jars at room temperature, ensuring an anaerobic environment. Colonies grown on TSA plates were then isolated and identified as gram-positive or negative using Phenylethyl Alcohol (PEA) and Eosine and Methylene Blue (EMB) plates respectively. Colonies were then isolated from these plates and inoculated in enterotubes, designed to perform multiple biochemical assays at once. These test results were then used to help determine the identification of bacteria. Initial analyses indicate that approximately five unknown species were found. Further biochemical assays, as well as DNA sequencing, will be performed to identify bacteria to genus and species. Additionally, we will determine if any relationship can be established between turtle diet or species and bacterial species.

BOARD 39 COMPLETE 1:100,000-SCALE COVERAGE OF THE SURFICIAL GEOLOGY OF OHIO’S LAKE ERIE COAST. Douglas L. Shrade, doug.shrade@dnr.state.oh.us, E. Mac Swinford, Gregory A. Schumacher, Glenn E. Larsen, Erik R. Venteris, Richard R. Pavey, ODRN, Division of Geology, 2045 Morse Road C-1, Columbus OH 43229-6693.

The Ohio Department of Natural Resources, Division of Geological Survey has completed the five 1:100,000-scale surficial geology maps covering Lake Erie’s coastline. The maps, from west to east, are the Toledo, Lorain/Put-in-Bay, Cleveland South, Cleveland North, and Ashtabula 30 x 60 minute quadrangles. Surficial geology maps are subdivided into geographic distribution of surficial deposits from the surface down to the uppermost bedrock unit. Data from county soil maps, water wells, ODOT and EPA geotechnical borings, bedrock geology and topography maps, and field observations were collected, and recorded on 1:24,000-scale topographic quadrangles. The map interpretations were originally drawn on Mylar overlays that were scanned and digitally compiled at the 1:100,000-scale. The vertical sequence of lithologic materials from the surface bedrock is depicted within a polygon of probability by a descriptive stack. The resulting maps show the lateral and vertical variations of unconsolidated material and the underlying bedrock lithology for a polygon and between adjacent polygons. A goal of this report is to provide surficial geology maps with Ohio’s new 1:500,000-scale bedrock geology map, it is possible to determine the composition of the unconsolidated material and the bedrock at any location along Ohio’s Lake Erie coast. These maps will enhance the understanding of the geologic framework for use in land use planning and coastal-erosion management both along Lake Erie’s coastline and within Ohio’s northern tier of counties.

BOARD 40 A COMPARISON OF CONE-IN-CONE AND CONCRETIONS AS VERTEBRATE FOSSIL BEARING CARBONATE SEDIMENTARY STRUCTURES IN THE LATE DEVONIAN (FAMENNIAN) CLEVELAND SHALE OF NORTHERN OHIO. Douglas W. Dunn, ddunn@cmnh.org, Evan E. Scott, Cleveland Museum of Natural History, Dept of Invertebrate Paleontology, 1 Wade Oval Dr, Cleveland OH 44106-1676.

Examination of 437 Cleveland Museum of Natural History Vertebrate Paleontology Department specimens from cone-in-cone and concretions and their catalog records shows that compared to the dolomitic concretions in the Late Devonian (Famennian, III) Cleveland Shale of northern Ohio, the formation’s cone-in-cone in Cuyahoga and Lorain Counties yields fewer occurrences of vertebrate fossils, fewer taxa, and a lack of some of the smaller taxa found in the Cuyahoga County concretions. Jurassic and Cretaceous layers and limestones include specimens of the pachyostemorphs Burgangiatis perissus (1—number is number of specimens in cone-in-cone; a second number represents a second occurrence in concretion), the cladodonts Cladoselache sp. (5, 44) and Ctenacanthus compressus (1, 19), and the paleoniscoid Tegeolepis (1). Along with these additional taxa, these concretions include the pachyostemorphs Haldensteini holdeni (2), Paramylostoma arcuulis (2), the cladodont Stethacanthus (1) and the coronodontid Diademodus hydei (1). Cone-in-cone occurs mostly in Lorain County, west and southwest of the three concretion zones in Cuyahoga County. Geographic location of these two different sedimentary structures exists on a near (Cuyahoga County) further off shore (Lorain County) gradient, possibly related to differences in various environmental factors (water depth, oxygen content, ph, salinity, etc.) present at deposition time. Continued collection/analysis of Cleveland Shale cone-in-cone, concretions and their preserved fauna may help determine why this gradient exists.

BOARD 41 2006 SUMMER REPTILE SURVEY OF THE SUNNYBROOK PRESERVE, GEauga COUNTY, OHIO. R. Chris Stanton, cstanton@bw.edu, April M. A. Asadati, awasadati@obu.edu, Greg Slawrance, slawrance@otterbein.edu, Dept of Life Science, Otterbein College, Westerville OH 43081.

When it comes to the conservation of biological diversity, reptiles are often overlooked because of the negative stereotypes that are associated with them. However, reptiles play important roles in ecosystems and surveys of their populations are necessary to assess these species' status. This reptile survey was conducted in the summer of 2006 for the Geauga Park District at the Sunnybrook Preserve located in Chesterland, Ohio. The objectives of the survey were to determine which reptile species are present at the Sunnybrook Preserve, along with their population density, ratio, and movement within the preserve. The preserve was visited 22 times between May and September in order to search for reptiles. Artificial cover objects were used to increase capture efforts and the Lincoln-Peterson formula was used to calculate the population estimates of the found species. A total of 188 reptiles were captured, belonging to four species of snakes. The population estimates calculated for each species were as follows: 288 eastern garter snakes (Thamnophis sirtalis), 240 northern brown snakes (Storeria dekayi), and 24 eastern milk snakes (Lampropeltis triangulum). One northern water snake (Nerodia sipedon) was also found on the preserve, but a population estimate could not be calculated based on one individual. The 2006 Ohio Reptile Atlas lists these four species, along with the black rat snake (Elaphe obsoleta obsoleta), the eastern ribbon snake (Thamnophis sauritus), and the midland painted turtle (Chrysemys picta marginata) as common in Geauga County, and the field crongoung, and midland painted turtle were found on the preserve during the sampling period.

BOARD 42 DOPAMINE RECEPTOR DRD2 SINGLE NUCLEOTIDE POLYMORPHISMS AND ALCOHOL DEPENDENCE. Hayley J. Lawrence, hayley0241@hotmail.com, (Simon K. Lawrence, slawrance@otterbein.edu), Dept of Life Science, Otterbein College, Westerville OH 43081.

Alcoholism is a disease that is characterized by physical and emotional dependence on alcohol. It has both genetic and environmental components. One goal of this research was to determine if there is a link between the dopamine d2 receptor (DRD2) gene and alcoholism. The hypothesis that polymorphisms in DRD2 are associated with alcoholism is controversial, with some studies supporting a link and others not. The recent publication of the NCBI “HapMap,” which provides a complete catalogue of single nucleotide polymorphisms in the human genome, provides an opportunity to test the hypothesis more rigorously. Therefore, the hypothesis of this study is that polymorphisms in the DRD2 gene are associated with the disease of alcoholism. A sample of approximately 100 Otterbein College students will be surveyed using screening instruments that are designed to identify problem drinkers and alcoholism, e.g. the AUDIT: Alcohol Use Disorders Identification Test (Enoch and Goldman, 2002). Epithelial cheek cells will be collected and extracted using the Epitope Bucical Swab DNA Extraction Kit. The polymerase chain reaction (PCR) will be used to amplify the DRD2 gene. PCR products will be
genotyped for DRD2 single nucleotide polymorphisms (SNPs) using the Applied Biosystems SNAPSHOT kit and analyzed on an Applied Biosystems Genetic Analyzer. The survey and genotyping data will be analyzed statistically using the T-Test. Correlation of alcoholism and DRD2 SNPs may support the hypothesis that this gene plays a significant role in the disease process. This will provide insight to genetic testing for the risk of alcoholism, possible prevention methods, and treatment.

BOARD 43  FOREST FLOOR INVERTEBRATE COMMUNITIES IN PINE VERSUS MIXED HARDWOOD STANDS IN OHIO, OH. Sarah E. Osicka, sosicka@bw.edu, R. Chris Stanton, cstanton@bw.edu, Brian J. Tornabene, bttornabe@bw.edu, Baldwin-Wallace College, Dept of Biology, 275 Eastland Road, Berea OH 44017.

The forest floor invertebrate communities of northeastern Ohio have been changing in response to numerous environmental factors, such as urban development, pollution, and invasion of exotic species. However, these communities have been poorly studied and the effects of these disturbances are largely unknown. In order to understand the current composition of local communities, 10,789 forest floor invertebrates were collected using pitfall traps during the summers of 2005 and 2006 in hardwood and pine-dominated stands in the Cleveland Metroparks. These stands consisted of native hardwood species and planted pines estimated at 50 years old. The objectives of this study was to determine species diversity in both stands, determine differences in the communities of each stand, and identify any unusual aspects of these communities. It was hypothesized that invertebrate diversity would be greater in the deciduous stands compared to the coniferous stand due to higher soil moisture levels, higher soil pH, and greater leaf litter depth. The invertebrates that were collected have been identified to "groups" (such as spiders, springtails, and beetles) using the Sphagnum Index. In 2006, 46 groups of invertebrates were collected in the hardwood stand and 39 in the pine stand, resulting in an average Shannon score of 1.89. A total of 17 groups were collected in the pine stand, resulting in an average Shannon score of 1.69. In 2005, 16 groups of invertebrates were captured in the hardwood stand and 14 in the pine stand, resulting in an average Shannon score of 1.85 for hardwood but 2.15 for pine. The difference in Shannon scores between years in the pine stand was due to a decline in the number of invertebrates found in the two pine stands. The first year 1513 individuals in 2005 to 185 individuals in 2006. The cause for this decline may have been due to moisture levels, which were higher in 2006. The dominant groups in both communities, for both years, were sowbugs (3,317), springtails (2,277), and spiders (1,130). The dominant invertebrate species in these stands, representing 21.4% of all invertebrates collected, was the exotic European sowbug (Oniscus asellus).

BOARD 44  A COMPARATIVE LIMNOLOGICAL INVESTIGATION OF TWO RESERVOIRS IN CLARK AND HOCKING COUNTIES, OHIO. Justin L. Tank, s08.dwallingford@wittenberg.edu, Christopher J. Gabe, s08.dwallingford@wittenberg.edu, Karell G. Pelle, s07.kpelle@wittenberg.edu, Stephanie L. Von Moll, s07.svmoll@wittenberg.edu, Jana M. Venema, s08.venema@wittenberg.edu, Laura A. Marty, s09.lmartorano@wittenberg.edu, Horton H. Hobbs III, hthobbs@wittenberg.edu, Dept of Biology, Wittenberg University, PO Box 720, Springfield OH 45501-0720.

During early autumn, an examination of the biological and physicochemical characteristics of two lentic ecosystems in southcentral Ohio was conducted. These small reservoirs contained different fish species and exhibited a difference in dissolved oxygen concentrations. Differences in the limnological makeup of these two systems were observed focusing on plankton counts and several physicochemical properties including temperature, specific conductance, alkalinity, water hardness, pH, nitrate-nitrogen, orthophosphate, and dissolved oxygen. Notably, during analysis of data, the soil makeup and bedrock in these overlying areas was investigated to determine any differences. Morphometric chemical data such as depth, the biomass of phytoplankton and zooplankton found in C.J. Brown Reservoir was nearly 5 times greater than that of Rose Lake depended on depth. The biomass of Rose Lake was dominated by the plankters Eudorina spp. and Pseudocyclops; while phytoplankton chemical data such as depth, the biomass of phytoplankton and zooplankton found in C.J. Brown Reservoir was nearly 5 times greater than that of Rose Lake. Rose Lake exhibited distinct stratification patterns for physicochemical properties which follows temporal biomass changes, whereas these patterns were not present in C.J. Brown Reservoir. Rose Lake possessed characteristics of an oligotrophic lake with a large photic zone and low plankton count. However, C.J. Brown Reservoir displayed characteristics of a more eutrophic lake with a small photic zone and high plankton count.

BOARD 45  SITE FIDELITY IN CHITONS ON SAN SALVADOR, THE BAHAMAS. Colleen E. Kannen, s06.kannen@wittenberg.edu, Maria G. G. Reinsel, s08.astalzer@wittenberg.edu, Joseph M. Fillico, s07.jfilicko@wittenberg.edu, 501 N. Wittenberg Ave, Springfield OH 45501.

Limpets (Littorina spp.) exhibit site fidelity as a predatory avoidance strategy and to forage more efficiently. Other tropical marine gastropods likely do this as well. This study on San Salvador, a sub-tropical island in The Bahamas, investigated whether the fuzzy chiton, Acantopleura granulata, exhibited similar site fidelity. Chitons are one of the oldest representatives of the mollusk family, bear 8 flexible plates on the anterior side of their body, and occupy limestone rocky intertidal zones. 64 chitons were located over a 13 day period, from 30 May 2006 to 12 June 2006, at three different locations by uniquely marking each with paint. All chitons were originally marked in a prior depression and during the research period 19 chitons never left their primary depression in the rock during the entire study period, 34 chitons left and returned, 4 left their original position and remained in the study site but not in their original position, and 9 chitons left their original position and were never displayed again. During one 6 day experiment the fuzzy chiton had a 72.4% return rate after leaving their spot and returning. This high return rate means that chitons also are utilizing site fidelity as a survival strategy.

BOARD 46  CLUSTERING BEHAVIOR OF THE HERMIT CRAB, CLIBINARIUS TRICOLOR, ON SAN SALVADOR, THE BAHAMAS. Zachary D. Bozic, s08.sbozic@wittenberg.edu, Richard A. Schultz, s07.jschultz@wittenberg.edu, Katherine R. Seitz, s07.kseitz@wittenberg.edu, Kathleen A. Reinsel, kreinsel@wittenberg.edu, 501 N. Wittenberg Ave, Springfield OH 45504.

Clustering, a common animal behavior, is defined here as groups of 50-5000 individuals in contact with each other within an area of one square meter. Tricolor hermit crabs, Clibanarius tricolor, were observed forming aggregations in low tidal areas on San Salvador, The Bahamas, in June 2006. We hypothesized that no hermit crabs would remain the same cluster after a 24-hour period. Over two weeks, piles of hermit crabs were selected haphazardly from Singer’s Point and Bonefish Bay. Each crab in the pile was removed from the site, marked with a permanent marker, counted, and its location noted. After 24 hours the sites were revisited and the remaining marked crabs were counted. Data were recorded indicating whether the crabs were within a 40 cm radius or within a 1 square meter quadrant centered on the cluster. Of the 1694 marked hermit crabs, 1413 individuals were collected within the 40 cm radius and 845 remained in the one square meter area following the 24-hour period. Therefore, we rejected our hypothesis. This suggests that tricolor hermit crabs do not always stay in a particular cluster, but can freely move distances greater than 1 meter in 24 hours.

BOARD 47  AN ANALYSIS OF CHLOROPHYLL CONCENTRATION IN RELATIONSHIP TO WATER DEPTH, AND TURBITY, IN THALASSIA TESTUDINUM IN BELIZE REEF ENVIRONMENTS. Dominik M. DePompe, Dominic.DePompe@otterbein.edu, (Halard Lecinsky Chair Professor of Biology), Otterbein College, Westerville OH 43081.

Sea grass chlorophyll absorbance offers an excellent, non destructive model for monitoring near shore and reef water quality. Turtle grass (Thalassia testudinum) and coral-symbiont photosynthesis in tropical reef environments is super saturated with light in the shallowest sites. This study will identify the lower limit of photosynthetic saturation in turtle grass for turbid and non turbid water in terms of both depth and ambient light illumination. Three reef environments of the central Belize Barrier Reef system will be compared: windward, leeward and lagoon patch reefs. At each depth, 10 leaves will be harvested from T. testudinum and chlorophyll concentration and ambient illumination measured at each depth. The chlorophyll absorbency of each leaf will be measured from the leaf petiole using a Minolta Chlorophyll Meter SPAD-502. Preliminary results in September have shown a strong correlation between depth and leaf length, showing chlorophyll absorbance decreasing from root to shoot. The comparison of the light saturation depth in turbid and clear waters should reflect the ambient light concentration in those waters. Below saturation depth the turtle grass
PHYSIOLOGICAL RESPONSES? Leslie E. Prince, lprince@wooster.edu, (Sharon E. Lynn, slynn@wooster.edu), 1189 Beall Ave, Box 2499, Wooster OH 44691.

Defining personality or coping styles, which relate to a variety of behavioral or physiological responses, is useful when studying and comparing bird and other animal behaviors. Shyness or boldness towards novel objects whereas stress responsiveness is a physiological indicator of personality. The goal of this study was to determine whether personality was related to physiological stress responses in bluebirds, Sialia sialis. A novel object test was used to measure the shyness or boldness of bluebirds nesting in nest-boxes in the NC Appalachian Mountains. When a novel object was placed at the entrance of the nest-box, birds that entered the nest for the first time were more likely to enter the object than birds that entered less frequently. In addition, birds at the site entered the object with less fear than birds that entered the object. When a standardized Capture-Handle Protocol was used to assess birds’ physiological stress responses, birds entered the object with less fear than birds that entered the object. A series of blood samples (3, 15, 30, and 60 minutes after capture) were taken to measure stress responsiveness to both shy (n=8) and bold (n=7) birds. Enzyme-linked immunosorbent assays were used to determine the amount of CORT present in the samples. The hypothesis was that birds shyer of the novel object would have higher corticosterone responsiveness compared to bold birds. Bold and shy birds did not have significantly different stress responsiveness. Overall, this study indicates that breeding bluebird’s personality (as measured by response to a novel object) did not correlate with stress responsiveness (repeated measures ANOVA: P = 0.973, P = 0.614).

BOARD 50: CAN PERSONALITY TRAITS PREDICT PHYSIOLOGICAL RESPONSES?
Several studies have shown that perinatal exposure to xenobiotic mixtures such as polychlorinated biphenyls (PCBs) cause physiological and behavioral disruption. This study demonstrates that the PCB-exposed rat is a relevant model for understanding mechanisms of social deficits in children with developmental disorders like autism and Asperger’s syndrome. PCB 47/77 at 0 ppm (control), 12.5 ppm, or 25 ppm (w/w) of the diet was fed to pregnant Sprague-Dawley rats (n=4/treatment group) throughout gestation and until rat pups were weaned. Impacting offspring both directly in rat chow and indirectly through placental and lactational transfer. The motor ability of offspring (n=20/treatment group) was tested at 14, 30, and 60 days of age with measures of strength, coordination, arousal, stereotyped fix action patterns, and locomotor activity. Circulating levels of the hormone vasopressin, involved in the regulation of social behavior, were measured at 29 days of age. PCB-exposed rats displayed altered rates of movement in tasks requiring the ability to complete grooming chains and to complete the hang test and negative geotaxis response in comparison to controls. Most notably, PCB 25 ppm animals show a developmental delay in the ability to complete synaptic chain grooming with a significant 0% completion rate elicited by controls. These consequences likely stem from neuroendocrine disruption as suggested by preliminary results in alteration of circulating vasopressin. The data show that PCB 12.5 ppm and 25 ppm may allow the use of this system to serve as a model to observe a range of behavioral severity much like that seen in the broad autistic phenotype.

Invasive weeds are costly to agricultural production. Establishing a relationship between biomass allocation based on nutrient availability will provide greater precision in predicting species that will have the highest environmental impacts. The objective of this study is to examine how variation in the availability of essential and non-essential elements, nitrogen, phosphorus, and sulfur, affect biomass allocation of three pairs of congener plant species: Ambrosia trifida, Ambrosia artemisiifolia, Avena fatua, and Solanum lycopersicum. The hypothesis is that the three pairs of congener plant species (USVs) during positive and negative social encounters to communicate with conspecifics and other organisms. Rodents use ultrasonic vocalizations (USVs) during positive social encounters. Different USV signals are measured in rat pups perinatally exposed to either polychlorinated biphenyls (PCBs) or environmentally induced stress. Comparisons are made with USV signals from control animals not exposed to PCBs or early stressors. PCB was ingested by the dam during gestation and prior to pup weaning (N = 12). Prenatal stressors were used on the dam during the third week of gestation and included unpredictable handling, injection with isotonic saline (i.m.), and novel environment exposure (N = 7). USV signals were recorded during (1) isolation distress, (2) conditioned odor preference, and (3) social recognition tests. For (1), the number of USV signals was measured during a one minute rat pup isolation experience at postnatal day 10. For (2), the USV levels were examined during a place preference test on postnatal day 12 in which rats remain in the environment and (3) includes measuring the amount of time the rat pups spend investigating a novel or familiar conspecifics on postnatal day 22. Results are analyzed using inferential statistics including analysis of variance and post-hoc T-tests. The results have implications for the understanding of how environmental stressors can alter social communication.

PTEN is a protein that regulates growth factor signaling in cells by deactivating AKT, a protein that induces pathways leading to cell proliferation, survival and growth. Because of its role in regulating cell proliferation, PTEN is an important tumor suppressor gene, which is mutated in many cases of prostate carcinomas as well as cancers in other tissues such as breast, lung, endometrium, and bladder. Previous research has shown that PTEN-deficient mice that develop bladder carcinoma appear to have a mechanism that inhibits the development of their cancer, and there is evidence that the p21 is involved in this mechanism. In order to study p21 in cells that do not express PTEN, RNA interference was used to knockdown PTEN in 293 cells. By inserting short hairpin RNA into the pSRP vector, a plasmid that appears to express RNA and to be capable of decreasing PTEN expression in cells was created. This technique allowed western blotting to be performed to examine gene expression in PTEN-expressing and PTEN-deficient cells in order to investigate which proteins may work to stop cancerous growth.
BOARD 58  THE ROLE OF EPITOPE SPECIFIC CD8+ T CELLS IN T1 BLACK HOLE FORMATION AND MOTOR DYSFUNCTION IN AN ANIMAL MODEL OF MULTIPLE SCLEROSIS. Amanda K. Applegarth1,2, amanda.applegarth@gmail.com, J. Andrew J. Johnson3, johnna4@uc.edu, Istvan Pirko4, istvan.pirko@uc.edu, 1Dept of Life and Earth Sciences, Otterbein College, Westerville OH 43081, 2Dept of Physics, Otterbein College, Westerville OH 43081, 3Dept of Neurology, University of Cincinnati College of Medicine, Cincinnati, Ohio.

The presence of MRI T1 black holes, a type of brain lesion, in MS patients correlates with disability through an unknown mechanism. A murine model of T1 black hole formation using the Thieeler's murine encephalitis virus (TMEV) was developed. In the TMEV model of MS, mice have developed T1 black holes, mediating T1 black hole formation. Injection of the VP2peptide prior to infection with TMEV causes a depletion of VP2peptide specific CD8+ T cells and preservation of motor function. The purpose of this pilot study was to determine if these Dp: VP2peptide specific CD8+ T cells contributed to T1 black hole formation in our IFN-α/-/mouse model system. It was hypothesized that antigen specific CD8+ T cells would contribute to T1 black hole formation in the TMEV infected IFN-α/-/- mice and these T1 black holes would correlate with disability. By treating mice with VP2peptide prior to and during TMEV infection expansion of Dp: VP2peptide epitope specific CD8+ T cells was inhibited. The total volume of T1 black holes per group was measured using microcomputed tomography scans and Analyze 7.0 at days 14 and 49. Rotordor was used to assess motor dysfunction twice a week. At days 14 and 49 no correlation could be seen between T1 black hole lesion volume and motor dysfunction. Injection on the head and age effect of the mice were considered to skew the results.

BOARD 59  FUNCTIONAL NEURO-ANATOMICAL PHYSIOLOGICAL INVESTIGATION OF REWARD PROCESSING IN RATTUS NORVEGICUS. Ethan J. Miller1, ejmille@bgnet.bgsu.edu, Scott C. Molitor2, smolitor@eng.utoldeo.edu, (Howard C Cromwell3, hcccrom@utoledo.edu), 1Neuroscience, Mind & Behavior at BGSU, Bowling Green OH 43403, 2University of Toledo, Dept of Bioengineering.

The purpose of this study is to further examine neural pathways involved in reward processing and hunger. The nucleus accumbens, particularly the shell, has afferent connections into the lateral hypothalamus. Direct stimulation of the lateral hypothalamus results in feeding behavior, as well as other appetitive behaviors. Increased food intake has been observed when those afferent pathways are pharmacologically stimulated. Examination of this neural pathway was performed by local injections of tract tracers into both nucleus accumbens and lateral hypothalamus according to standard stereotaxic methods. A survival time of 7-10 days was used to allow the uptake of the tract tracers. An anterograde tracer [Fluoro-Ortho-Diaminoxyfluoro-Orange-Gold (FOOOG)] was used to microscopically visualize the pathways in 40μm coronal slices (N=4). In addition, electrophysiological procedures carried out by intracellular current-clamp recordings. A stimulating electrode was introduced into the nucleus accumbens, lateral hypothalamus and a recording electrode in the complementary structure. Consequent post-synaptic activation in the form of graded/action potentials are observed as indications of direct or indirect neural connectivity (N=5). Initial observations reveal successful uptake of the different tracers into the dendrites (FR/axon terminals (FG)), and that the electrophysiological procedures are viable methods for monitoring neural activity. This study is a descriptive and exploratory investigation. In place of inferential statistical procedures, analyses include a full complement of descriptive statistical procedures, including but not limited to, analysis of amplitude and latency of post-synaptic activation. Implications include greater understanding of the functional neuroanatomy of brain and reward systems of rattus norvegicus.

BOARD 60  INVESTIGATING THE RELATIONSHIP BETWEEN DANAUS PLEXIPPUS AND LESPELIA ARCHIPPIVORA. Natalie M. Cope1, nc cope@wooster.edu, (Michelle J. Solensky2, msolensky@wooster.edu), Box C-1354, 1189 Beal Ave., Wooster OH 44691.

The purpose of this study is to examine the tri-trophic interaction between monarch larvae (Danaus plexippus), a tachinid fly parasitoid (Lespeletia archippivora) and the monard mustard (Alliaria petiolata). This tri-trophic approach is useful because both host plant chemistry and monarch larval biology and behavior can affect parasitoid host location, oviposition preferences, and habitat selection. Approximately 96 monarch larvae and eggs were collected from A. syriaca plants in Columbiana, Mahoning, Wayne, Holmes, and Stark counties. A brief description of the habitat, GPS coordinates and elevation were recorded, as well as the date of collection, location of the patch, larval developmental stage (instar), and larval position on the plant and location on the leaf. Plant height, plant height relative to surrounding vegetation, plant damage, A. syriaca density in the surrounding area, and monarch larval density at the site were recorded. T1 black hole formation from the field, monarch larvae were reared in the laboratory where the fate of each larva (healthy adult, parasitized by tachinid fly, died of unknown cause) was recorded. If parasitoids emerged from a host, length of larval and pupal casing, as well as number of parasitoid larvae that emerged from each host were recorded. The effect of host and habitat characteristics on whether each host larva was parasitized (yes/no) will be measured using chi-square analysis. For categorical independent variables, the presence or absence of parasitoid larvae that emerged from each host were recorded. The effect of host and habitat characteristics on whether each host larva was parasitized (yes/no) will be measured using chi-square analysis. For categorical independent variables, the presence or absence of parasitoid larvae that emerged from each host were recorded.

This research investigates patterns in the distribution and abundance of garlic mustard (Allaria petiolata [Bieb.] Cavera & Grande), an invasive biennial, with respect to historical land use, and examines environmental conditions to look for underlying causes. Sixty 121-130m2 plots were selected along existing trails or roads at the Cuyahoga Valley National Park using GIS. Plot stratification was based on 1959 land use, with thirty plots in agricultural use at that time and thirty under forest cover. Plots were analyzed for garlic mustard understorey population distribution, maximum area covered, abundance, and maximum incursion distance. Environmental characteristics such as distance from streams and canals, elevation, canopy cover, polygon area, area:perimeter ratio, slope, and aspect were also examined using GIS. Historical land use is not significantly correlated to garlic mustard presence (r2 =.301, p=.016, n=60) and maximum incursion distance (r2 =.325, p=.04 and r2 =.257, p=.016, n=60 respectively) and are related to each other (r2 =.50, p=.001, n=60). These results differ from studies of garlic mustard in New England where historical land use appears to be a larger factor in distribution. These results suggest the importance of landscape corridors in biological invasions and can be used to
supplement the efforts of land managers in controlling the spread of invasive species in this region.

BOARD 63  **SALAMANDER SPECIES DIVERSITY ON DISTURBED AND UNDISTURBED PORTIONS OF A RECLAIMED STRIP-MINE IN SOUTHEASTERN OHIO.**  John M. Treasure, johnmt@muskingum.edu, Danny J. Ingold, ingold@muskingum.edu, Biology Dept, Muskingum College, New Concord OH 43762.

Data on salamander species diversity and habitat preference on reclaimed strip-mines is generally lacking. In particular, little has been reported on the diversity and abundance of salamander species on undisturbed remnant forest patches surrounded by larger reclaimed forests and grasslands. From late July through October 2006, 18 circular plots (each ~ 75 square m in size) were searched for salamanders on the Wilds, a reclaimed strip-mine in Muskingum County, Ohio. Eight plots were located in forested areas that had been previously strip-mined, while the other 10 were in undisturbed patches of forest surround by reclaimed lands. Seven species of salamanders were found on disturbed plots while only two species were detected on previously-mined forest plots. More salamanders of all species combined were found on undisturbed versus disturbed plots (N = 60 vs. 7 respectively). Red-backed and mountain dusky salamanders (Plethodon cinereus and Desmognathus ochrocephus respectively) were the most abundant species (both in terms of numbers and density) on the undisturbed plots. Red-backed salamanders and red-spotted newts (Notophthalmus viridescens) were the only species found on the disturbed plots. The abundance of both red-backed and mountain dusky salamanders were greater on undisturbed vs. disturbed plots (N = 24 vs. 4 and N = 20 vs. 0 respectively). These findings suggest that areas on that were previously strip-mined provide less desirable habitat for salamanders when compared to remnant forest patches surrounding by reclaimed lands.

BOARD 64  **THE VALUE OF MANURE AS A NUTRIENT SOURCE FOR CORN PRODUCTION.**  Alan P. Sundermeier, sundermeier.5@osu.edu, Ohio State University Extension, Wooster Extension Road, Suite 1, Bowling Green OH 43402.

Manure can be utilized as a nutrient source for corn production. Quick test data indicates that the value of manure can range from $35.00 to $60.00 per ton of manure. Once this value has been determined, the use of manure in corn production systems can replace the use of inorganic nitrogen fertilizer. Also, livestock producers will be able to determine a value to manure when selling to other corn producers. Field plots were established in 2006 in Wood County, Ohio. Plot size was 40 feet by 500 feet each entry. All entries were replicated three times in a randomized design. Following the 2005 soybean harvest, liquid dairy manure was injected into selected entries at a rate of 7,000 gallons per acre. Approximate nutrient content of manure applied was 172 pounds of nitrogen per acre of total nitrogen. No additional nitrogen was applied to any of the entries. Corn yield data was collected from the field plots. The average of 13 entries with manure applied was 110.9 bushels per acre of corn compared to the average of 3 entries with manure was 136.9 bushels per acre. These results indicated a significant statistical difference (F value .05) of 26% between the entry means. These benefits are only realized for manure application. Using a market price of corn at $3.50 per bushel results in a value of $91.00 per acre for manure application on corn.

BOARD 65  **WOODY PLANT SPECIES COMPOSITION ACROSS A NORTH-SOUTH GRADIENT ON A RECLAIMED STRIP-MINE IN SOUTHEASTERN OHIO.**  G. Bradford McBride, gmcbride@kent.edu, and Danny J. Ingold, ingold@muskingum.edu, Biology Dept, Muskingum College, New Concord OH 43762.

Strip-mining in the eastern United States has lead to the transformation of large tracts of forests and agricultural land to artificial grasslands dominated by exotic grasses and usually only a few woody plant species. However, in the wake of strip-mining, small patches of undisturbed forests, not readily accessible to mining efforts, were occasionally left behind. In this study woody tree species density, frequency, coverage and importance values were quantified on 40 circular plots (50 m²) across a north-south gradient on a reclaimed strip-mine in Muskingum County, Ohio. The overall objective of this study was to determine whether differences occur in woody plant species composition in disturbed (presence of mine spoils) versus remnant forest patches in north, central and southern plots. Rapidly colonized strips around the Wilds occurred in the 1940s and 50s and most recently on the southern sites (1970s and early 80s), with scattered woodlots left behind. Although both disturbed and remnant forest patches were found on all three areas, randomly chosen plots on the north and central locations had a greater frequency of disturbance (north = 60%, central = 60%, south = 20%). Importance values (relative density + relative frequency + relative coverge) from each region indicated that sugar maples (Acer saccharum) and silver maples (A. saccharinum) were the dominant species in northern plots, while tree-of-heaven (Ailanthus altissima) was the dominant species on central plots. On southern plots where disturbance was less frequent, sugar maples, American basswood (Fagus grandifolia), tulip poplars (Liriodendron tulipifera) were the dominant species. These data suggest that the woody plant species composition and importance on a reclaimed strip-mine differ not only between forest patches that were previously strip-mined versus “islands” of land that were left un-mined, but also across a north-south temporal gradient of disturbance.

BOARD 66  **SPATIAL ANALYSIS OF OHIO WETLAND MITIGATION BANKS.**  Jordan W. Mora, mora_j@denison.edu, (Douglas J. Spieles, spieles@denison.edu), Slayter Union Box 2236, Denison University, Granville OH 43023.

Mitigation wetlands are intended to replace wetland area lost to development, but the success of mitigation wetlands in reaching the mandated performance remains in question. One method of improving the diversity and size of the ecosystem is to consolidate replacement obligations in large, off-site wetlands called mitigation banks. Previous evaluations of mitigation banks focus on temporal analyses of community change and disregard spatial scale. This study combines three spatial scales in an effort to evaluate the characteristics of the surrounding landscape, the spatial arrangement within wetland mitigation bank ecosystems, and the degree to which these replacement wetlands provide suitable habitat for waterbirds. The objectives are as follows: 1) determine whether the wetland was created in a suitable area with substantial buffer zone of at least 50m, a low relative rate of urbanization, connectivity to natural areas, and low road density; 2) determine the overall trends of wetland mitigation bank ecosystems using the individual criteria of the Ohio Rapid Assessment Method for Wetlands; 3) within the wetland, determine the patterns of habitat quality and diversity based on the composition and similarity of waterbird species. Fifteen active mitigation banks distributed throughout central and northern Ohio are included in this study. USGS Digital Ortho-Quadrangles from1994 to 2001 and recent aerial photos from 2006 were compared to map wetlands variables. Field observations and an analysis of the ecosystem-level spatial variation using the aerial photos are needed to complete the Habitat Suitability Models and Ohio Rapid Assessment Method for Wetlands.

Pre-College Posters - Session B 10:00 – 11:30 AM

BOARD 67  **THE DEVELOPMENT OF A METHOD FOR THE DETECTION OF CREATINE KINASE.**  Caitlin M. Mann, rincenacrunne@ameritech.net, Chung Chui Liu, clik9@po.cwru.edu, 95 Buckingham Rd., Rocky River OH 44116. (Hathaway Brown School)

Creatine kinase (CK, EC 2.7.3.2) is an enzyme that aids in catalyzing the reaction that produces adenosine diphosphate, ADP, from adenosine triphosphate, ATP, in the human body. Elevated levels of CK can indicate diseases of the skeletal muscle, and lowered levels can indicate liver diseases. The goal of this research project was to develop a simple, cost-effective method for accurately detecting CK levels. Throughout following three reactions, the levels of CK can be detected indirectly. First, CK catalyzed the reaction of creatine and ATP producing creatine phosphate. This pyruvate was oxidized with pyruvate oxidase and a phosphate solution, producing acetyl phosphate, pyruvate and ATP. The formed ADP reacted with pyruvate kinase. The overall reaction then catalyzed the reaction of creatine and ATP producing creatine phosphate and ATP. The levels of CK can indicate diseases of the skeletal muscle, and lowered levels can indicate liver diseases. This study combines three spatial scales in an effort to evaluate the characteristics of the surrounding landscape, the spatial arrangement within wetland mitigation bank ecosystems, and the degree to which these replacement wetlands provide suitable habitat for waterbirds. The objectives are as follows: 1) determine whether the wetland was created in a suitable area with substantial buffer zone of at least 50m, a low relative rate of urbanization, connectivity to natural areas, and low road density; 2) determine the overall trends of wetland mitigation bank ecosystems using the individual criteria of the Ohio Rapid Assessment Method for Wetlands; 3) within the wetland, determine the patterns of habitat quality and diversity based on the composition and similarity of waterbird species. Fifteen active mitigation banks distributed throughout central and northern Ohio are included in this study. USGS Digital Ortho-Quadrangles from1994 to 2001 and recent aerial photos from 2006 were compared to map wetlands variables. Field observations and an analysis of the ecosystem-level spatial variation using the aerial photos are needed to complete the Habitat Suitability Models and Ohio Rapid Assessment Method for Wetlands.
How can a proficient reader easily read the following sentence: Deos see, by following the correct position, a short misspelled word is easier to read than a long misspelled word; (2) a misspelled word in the context of a sentence is easier to read than one that stands alone; and (3) a misspelled word with the first and last letters in the correct positions is easier to read. To test these hypotheses, a survey sheet was constructed that included correctly spelled and misspelled words of varying length presented by themselves and within sentences. Thirty five students were asked to read the words, with one third testing only 7th and 8th graders to assure similar reading proficiency and the elimination of subjects deemed not proficient readers because they could not quickly read a test sentence. Testing results showed that the length of the misspelled word and the misspelled word being in context did not affect the proficient reader’s ability to read the word. Words of 4, 6, 8, and 10 letters were most easily read with 76%-78% accuracy and words in context were read with 76%-77% accuracy. Keeping the first and last letter in the correct place did affect the proficient reader’s ability to read the misspelled word. Words with the first and last letters in the proper location were correctly read 86% of the time while words with the first and last letters misplaced where correctly read only 68% of the time.

BOARD 69 THE EFFECT OF SALINITY ON THE HEAT TRANSFER RATE OF WATER IN RELATION TO THE FORMATION OF EL NIÑO. Lali J. Reddy, lollipopp603@aol.com, 504 Greenbrier Ct., Steubenville OH 43952. (Catholic Central High School)

El Niño is an interference of the ocean-atmosphere system in the Tropical Pacific that has significant consequences for weather around the globe, specifically in the northern hemisphere. The total quantity of dissolved solids that are found in water is heat. The energy transferred between objects because of a difference in their temperatures. The specific heat capacity of a substance is the quantity of heat it takes to raise the temperature of one gram of the material 1°K or 1°C in a specified way given constant pressure and volume. The effect of high and low salinity on heat energy absorption was determined. It was hypothesized that the salinity of the water and the heat transfer rate would be inversely proportional to each other. Nine 600-mL beakers were filled with 500 mL of water and after heating. Before heating, the average temperature for all nine beakers was approximately 22.76°C. After heating, the average temperature for all nine beakers was approximately 55.15°C. The heat transfer rate in joules per minute for the nine beakers, in ascending order, is as follows: 27.3 mA for the current, and 1.99 volts for the LED voltage. The averages for the red LED went up to 10 lux for the light intensity, while the voltage was set in increments of one from 0 to 12 volts volt for the blue LED and 0 to 10 volts for the red in one volt increments. Each color LED was tested five times at each of the voltages. Four multimeters was used to measure the voltage of the power supply more accurately. The LED voltage, current, and light intensity. The variable power supply was set to multiple voltages. The voltage and light intensity of the LED, as well as the current, were then measured. The averages for the red LED went up to 10 lux for the light intensity, and 27.2 mA for the current. The blue LED, the averages went up to 11.4 lux for the light intensity, and 3.38 volts for the LED voltage. When an increase in voltage or current was applied to a red or blue LED, an increase in light intensity was observed. No light was detected from the red LED until the voltage applied to it was two volts. Similarly, no light was detected from the blue LED until the voltage applied was four volts. This explains the reasons for the voltage range difference of two volts caused the readings for the blue LED that was tested to be approximately two volts greater than those of the red LED.

BOARD 70 VISUAL ACUITY AND PINHOLE VISION. Travis M. Eli, travel7288@hotmail.com, 2346 Aubrey Court, Circleville OH 43113. (Teays Valley High School)

Throughout history, man has tried discovering ways to increase one’s vision. Some people believe use of pinhole glasses will enhance and/or increase their vision. The goal of this experiment is to determine whether any particular eye disorder would benefit from the use of these glasses while comparing age ranges of 11-15 years old to 35-50 year olds. From a distance of 6.096-meter (20 feet), 200 subjects were asked to read an eye chart without their corrective lenses. Next, they put the pinhole vision glasses on and read the same eye chart. Finally, subjects replaced the pinhole vision glasses with their own corrective lenses. The eye chart was rotated 90° so that the subjects could not read the chart at a range of 6.096-meters. The 100 suffering from Myopia were able to read the chart again at a range of 6.096-meters without corrective lenses. Their original visual acuity doubled wearing pinhole glasses. Wearing their corrective lenses, they could not read the chart from a range of 60.96-meters. Hyperopia subjects without corrective lenses were able to read the eye chart from a range of 30.48-meters. Pinhole glasses decreased their ability to see accurately. Of the subjects tested, 98 percent were found to have had perfect corrected vision. These findings indicate those with Myopia were better suited for pinhole vision glasses verses Hyperopia. Decreased natural vision was experienced in 27 percent of those with Hyperopia, while natural vision increased in 97 percent of Myopia subjects.

BOARD 71 COUNTER CLEANERS: ANTI-BACTERIAL WIPES. Toral S. Vaidya, pvaidya744@aol.com, 744 Countright Blvd, Mansfield OH 44907.

The project was to answer the question of which antibacterial wipe works the best to kill bacteria on surfaces. Six antiseptic wipe brands were tested to determine which one was the most effective. The hypothesis stated that Lysol â would work the best to kill bacteria. The second most effective wipe contained quaternary ammonium (quaternary ammonium chlorides). The brands tested were Windex with Vinegar, Scrubbing Bubbles, Pro Sprayâ, Cloroxâ, Lysolâ, Thievesâ, and a dry paper towel wipe. Samples were tested on separate 6 x 8 cm square for each brand by wiping the designated square for 10 seconds. Counter surfaces were swabbed and plated, then wiped with the specific brand, to dry, and swabbed and plated again. Three trials were performed, each following the same procedure. The swabbed agar plates were placed in an incubator at 36°C for 48 hours and then observed by counting the staphylococcus bacterial colonies grown on the plates. Results showed that Thievesâ eliminated 100% of the bacteria, Lysol 98%, Windexâ x 94%, Windexâ with Vinegar 83%, Pro Sprayâ 37%, Scrubbing Bubblesâ 29%, control 7%, and dry wipe eliminated 0%. Thievesâ wipes worked the best of all wipes and contained pure grain alcohol, deionized water, coconut oil, soy lecithin, and essential oils with cinnamon bark, eucalyptus, and rosemary. Thievesâ was effective in killing bacteria because it contained pure grain alcohol (95% alcohol) and the essentials oils, both of which have excellent antibacterial activity. Alcohol in the concentration of 70-92% rapidly kills bacteria. Lysolâ, the second most effective wipe contained quaternary ammonium, another proven antibacterial agent.

BOARD 72 THE BRILLIANCE OF LEDS: IS MORE CURRENT BETTER? Cherylyn M. Geers, cherylyn@one.net, 3721 Dust Commander Dr., Hamilton OH 45011-5525. (Homeschool)

This project was designed to investigate LEDs (light-emitting diodes), including the relationship of LED light intensity to LED voltage and current. Blue and red LEDs were tested to see if this relationship was different. In order to conduct this experiment, a multi-meter attachment to measure light intensity, Extech model 401020, was used. A variable power supply, resistor, and LED were assembled into a series circuit. The variable power supply was set in increments of one from 0 to 12 volts for the blue LED and 0 to 10 volts for the red in one volt increments. Each color LED was tested five times at each of the voltages. Four multimeters were used to measure the voltage of the power supply more accurately. The LED voltage, current, and light intensity. The variable power supply was set to multiple voltages. The voltage and light intensity of the LED, as well as the current, were then measured. The averages for the red LED went up to 10 lux for the light intensity, and 27.2 mA for the current. The blue LED, the averages went up to 11.4 lux for the light intensity, and 3.38 volts for the LED voltage. When an increase in voltage or current was applied to a red or blue LED, an increase in light intensity was observed. No light was detected from the red LED until the voltage applied to it was two volts. Similarly, no light was detected from the blue LED until the voltage applied was four volts. This explains the reasons for the voltage range difference of two volts caused the readings for the blue LED that was tested to be approximately two volts greater than those of the red LED.

BOARD 73 THE EFFECT OF PHEROMONE CONCENTRATION ON ODOR TRACKING ABILITY IN THE AMERICAN COCKROACH, PERiplaneta americana. Caitlin R. Duffy1, cduffy08@bvs.net, Jennifer L. Avondet1, 1 19600 North Park Blvd, Shaker Heights OH 44122, (Hathaway Brown School), 2 Case Western Reserve University, Dept of Biology, 2080 Adelbert Rd., Cleveland OH.

The effect of concentration on an insect’s ability to track a pheromone source has been shown in the moths, Grapholitha molesta and Periplaneta americana, that as the concentration of the pheromone increases, the insects show negative chemotaxis (orientation toward a chemical stimulus). The present experiment was conducted on the American cockroach, Periplaneta americana, because they are known to track wind-borne plumes of female sex attractant pheromone to
locate mates. Preliminary work with non virgin male cockroaches (n=39) found no response to pheromone, periplanone B, below a concentration of 0.001 ng and the cockroaches’ response at 10 ng (the stock concentration) was similar to that seen at 10 ng. In the second experiment, five concentrations of our “standard” concentration of 0.1 ng, two concentrations below the normal concentration (0.003 ng and 0.01 ng), and two concentrations above the normal concentration (1 ng and 10 ng), were placed in each bucket after being watered with 350 milliliters of a 10% acid rain solution. The day after watering, the pH of each soil was measured. When needed, water each bucket with 350 milliliters of a 2% solution of lime. It is believed that pelletized lime, because it is an alkaline, will neutralize acidic soil. The buckets were labeled Control 1-3, Cow Manure 85%, Manure 65%, Manure 45%, and Manure 25%. After the tests, a series of membranes was fabricated from sulfonated poly(ether ether ketone) (SPEEK). Films were solution cast with an ion-exchange capacity of 1.0-1.4 mmol/g and a thickness of 40-200 μm. The membrane proton conductivity was 0.22-0.09 S/cm and the methanol permeability was 2×10^-3-3×10^-4 cm/s. Fuel cell tests were performed with 5 cm^2 DMFC test fixtures at 60 and 80°C. In general, fuel cell performance of the SPEEK membranes correlated with the proton conductivity in the membranes. It was found that membranes with lower conductivity outperformed those with higher conductivity (at a similar area resistance) and were characterized by better stability due to lower methanol crossover.

BOARD 74 THE ENZYMATIC BROWNING OF APPLES. Mitchell A. Poole, debbie@poolefamily.us, 13400 Georganow Rd, Lower Miami Township OH 45456. (Andrew School St Elizabeth Ann Seton School)

This experiment tested how to prevent apples from browning while tasting acceptable. The hypothesis was that a 25% solution of lemon juice and water would most effectively inhibit browning versus 100% apple juice, 100% orange juice, 2 Tablespoons and 2 teaspoons of Fruit Fresh diluted in 1/4 cup water, 1/4 cup sugar diluted with 1/2 cup water, 100% water, dipping in plastic wrap, and a non-treated control. N=20 apples were sliced and each slice was dipped in treatment or wrapped. Start time and time to brown were recorded using a browning scale photograph. A blind taste test was conducted with N=30 of boys and girls ages 10-16. Participants tasted treated apple slices and recorded if it tasted acceptable. The average time to brown was Fruit Fresh 0:40:51, orange juice 0:12:32, 25% lemon juice 0:11:32, apple juice 0:10:50, water 0:10:50, sugar water 0:09:53, wrap 0:05:40 and non-treated control 0:04:00. A second trial on N=10 apples tested 25%, 50%, 100% lemon juice concentrations, Fruit Fresh®, and non-treated control. Average time to brown for N=10 apples was 100% lemon juice 1:33:11, Fruit Fresh® 1:09:38, 50% lemon juice 0:48:27, 25% lemon juice 0:32:52 and control 0:11:56. Acceptability of taste was apple juice 100%, sugar water 96.7%, orange juice 96.7%, control 93.3%, water 93.3%, Fruit Fresh® 80%, apple juice 76.7%, sugar water 76.7%, 100% lemon juice 50%. The hypothesis was not supported. The 25% lemon juice did not prevent browning better than Fruit Fresh®. Higher lemon juice concentrations did not taste acceptable.

BOARD 75 DOES ORGANIC MATTER IN TOPSOIL REDUCE THE EFFECTS OF ACID RAIN? Rebecca K. McGrail, jmcgrail@jcc.edu, 366 Westwood Drive, Steubenville OH 43953. (Steubenville Catholic Central High School)

The research goal of this study was to determine if organic matter in topsoil can reduce the effects of acid rain. It was hypothesized that pelleted lime would reduce the effects of acid rain greatest. It is believed that pelleted lime, because it is an alkaline, will neutralize acidic soil. The buckets were labeled Control 1-3, Cow Manure 85%, Manure 65%, Manure 45%, and Manure 25%. Each bucket contained 446 grams of washed pea gravel, 2,000 grams of topsoil were placed on top of the gravel. 500 grams of respective organic matter was then mixed thoroughly throughout the soil. When needed, water each bucket with 350 milliliters of a 10% acid rain solution. The day after watering, the pH of each soil was checked. After eight weeks it was discovered that soil will only turn acidic with plant growth. As a result, five grams of grass seed were placed in each bucket after being watered with 350 milliliters of rainwater. Every bucket was placed in a plastic bag, placed in a room at 20° C, and covered with a towel until the grass sprouted. The results showed that the topsoil with peat moss retained a pH of 7.0 the longest. However, the manure groups had healthier grass, which was determined by color and height. In conclusion organic matter in topsoil reduces the effects of acid rain. The peat moss neutralized the effects of acid rain the longest, leading to the rejection of the hypothesis.

BOARD 76 EFFECT OF MEMBRANE TRANSPORT CHARACTERISTICS ON DIRECT METHANOL FUEL CELL PERFORMANCE. Claire Pavlak®, cpavlak8@aol.com, Ryszard J. Vycilsk®, rjvy@case.edu, Jennifer Schmidlin, jmschmidlin@case.edu, Peter N. Pintauro®, pnp3@po.cwru.edu. 12801 Kingsbury Dr, Rocky River OH 44116. (Board of Chemical Engineering, Case Western Reserve University. (Hathaway Brown School)

The direct methanol fuel cell (DMFC) is an alternative energy source for portable electronics that is second experimental stage of its commercialization stage. Many research groups claim to have developed membrane materials with attractive DMFC properties (i.e. a low methanol crossover and high proton conductivity). It is difficult, however, to understand which type of material will power an application in a given DMFC system. For the same class of sulfonated copolymers, it is not obvious whether the derivative with a lower or higher sulfonation degree would work best (a membrane with fewer sulfonic acid ion-exchange sites will have a lower methanol permeability but also a lower proton conductivity). There is also the issue of membrane thickness; a thin membrane may generate a higher maximum power (due to lower electrical resistance), but might be operationally unstable, while a thicker membrane could allow for more stable operation with a moderately high power output at high voltage. This research is directed toward understanding which membrane property controls DMFC performance; ionic (protonic) resistance, methanol crossover, DMFC output, or a combination of these. A series of membranes was fabricated from sulfonated poly(ether ether ketone) (SPEEK). Films were solution cast with an ion-exchange capacity of 1.2-1.7 mmol/g and a thickness of 40-200 μm. The membrane proton conductivity was 0.02-0.09 S/cm and the methanol permeability was 2×10^-3-3×10^-4 cm/s. Fuel cell tests were performed with 5 cm^2 DMFC test fixtures at 60 and 80°C. In general, fuel cell performance of the SPEEK membranes correlated with the proton conductivity in the membranes. It was found that membranes with lower conductivity outperformed those with higher conductivity (at a similar area resistance) and were characterized by better stability due to lower methanol crossover.

BOARD 77 EFFECTS OF CHANGES IN CONTEXT ON THE SPATIAL MEMORY OF RATS. Kate L. Schmidlin, kls4@case.edu, Kimberly Schmidlin, Kimberly Drive, Kent OH 44240. (Theodore Roosevelt High School)

Rats have been used to study how mammals learn and respond to their environment. The purpose of this study was to determine whether changes in context of the rats’ environment will affect the time it takes them to find the platform in a Morris maze. A Morris maze is a circular water tank, 122 cm in diameter with a 41 cm depth of water and a 15 x 15 cm platform just below the surface where a swimming rat can escape from the water. The Morris maze was in a room with bright posters and other visual cues. Sixteen male hooded rats were given experience in finding the platform from 3 release points around the tank. The rats were released from the 3 points again and the time each took to find the platform was recorded. Eight randomly chosen rats were given a change in context in two experiments. In the first, a loud noise was added while the rats swam to the platform. In the second, the posters and other visual cues in the room were removed. It was hypothesized that the changes in context would reduce the rats’ spatial memories and extend the time required to find the platform. A T-test showed there was no significant difference (p > 0.10) in the time to find the platform between the control group and the experimental group exposed to noise from two of the three release points. There was no significant difference (p > 0.10) in the time to find the platform between the control group and the experimental group with removal of visual cues. However, the rats that were in both experimental groups found the platform more slowly than those exposed only to removal of visual cues (0.10< p< 0.01) with the second experiment taking 6.5 sec.; t = 4.10, p < 0.01), indicating a possible cumulative effect.

BOARD 78 REPLACING PETROLEUM FUEL WITH ALCOHOL BLENDED WITH ORANGE OIL AND PINE OIL. Raymond Tan, ztan@cinci.rr.com, 8308 Cherrydale Ct., Mason OH 45040. (Mason High School)

The purpose of this study was to determine the combustion behavior of fuel alcohol following the addition of orange oil (limonene) and pine oil (cyclohexene) is produced from citrus fruits such as orange peel. It was hypothesized that the addition of either limonene or terpineone would make the fuel burn brighter, with higher flames, and higher flame temperatures, without negatively impacting the fuel flow or...
injection properties such as the kinematic viscosity. The combustion experiment was performed with oil lamps containing alcohol mixed with 0%, 5%, 10%, 20%, 30% limonene and turpentine respectively. The combustion patterns were observed and recorded with a digital camera. The flame temperatures were measured with a thermocouple. The effect on the fuel mixture density and kinematic viscosity was also tested. It was found that the additional distillate impurities be added to the mixture at a higher temperature, with higher and more vigorous flames. The open flame temperatures however did not vary beyond standard deviations from the alcohol readings. Combustion of 30% limonene generated smoke with a distinctive odor not present in the other flames. If one group had a higher facial prominence than the other. The results of this study found that males received significantly higher facial prominence in both 1985 ($n=164$, $t = 3.386$, $p < 0.001$) and 2005 ($n=98$, $t = 3.04$, $p = 0.002$). This supported the first hypothesis that modern mass media are still stereotyping between the genders. However, the difference between male and female scores between 1985 ($Male = 56.02$, $Female = 42.49$, $diff = -13.54$) and 2005 ($Male = 55.35$, $Female = 41.39$, $diff = 14$) was found to be the same. This did not support the second hypothesis; however, it also showed that despite no increase in face-ism, there was also no decrease.

**BOARD 79 - GENDER DIFFERENCES IN THE DIAMETER OF CORONARY ARTERIES.** Isabel Pereira de Almeida, i.almeida@askanywhere.com, 1209 Lynn Rd., Bowling Green OH 43402. (Bowling Green High School)

In recent studies it was found that women do not recover as well as men after a heart attack and undergoing bypass surgery. A reason to explain this is that women have smaller coronary arteries than men, and therefore do not get blood pumped through the body as efficiently as men. A study of 50 cadaver hearts collected in the 1980s (supplied by Dr. Baptista M.D., Ph.D. from MUO of Toledo) were measured with a digital caliper to find the diameter of each of the arteries. The arteries measured were the right coronary artery, left coronary artery, anterior descending artery, circumflex coronary artery, posterior descending artery and distance bifurcation. The hearts were both from males and females. At the end of the study the measurements of each artery were compared to that of the other gender. The data was entered in the program and the program will have to be understood. The results of the study agree with the hypotheses that women will have smaller diameters than men. In some artery the difference was significant according to the one-tailed t-test applied to the average measurements. For the right coronary artery and the posterior descending artery their t values were significant. The t-value for the RCA is 1.746 and the t-value for the PD is 2.104. This information can lead to new research by providing some key evidence in gender differences of the heart. This information can also aid surgeons before conducting a bypass operation.

**BOARD 80 - CRYSTAL FALLOUT, GROWTH, AND SIZE AFFECTED BY IMPURITIES AND CHEMICALS.** Zechariah A. Ciccione, zaeciccione@aol.com, 5208 W. Viola, Austintown OH 44515. (Ohio Distance Electronic Learning Academy)

Crystals form when molecules of a solution sink (fallout) and collect on the bottom of a container or when chemicals evaporate from a solution. The molecules interact like molecules until the combined molecules form a large enough mass until the combined molecules become large enough, forming a crystal. The crystal's purpose was to demonstrate how impurities and chemicals affect crystal fallout, growth, and size. It is hypothesized that larger crystals form in potassium alum than in ammonium alum and that crystals formed in the ammonium alum solution with impurities or with chemicals differ from those with one with impurities. Three containers had potassium alum solution and chromium nitrate (for a purplish color); three containers had ammonium alum solution and green food coloring. The impurities used were lake green, chromium nitrate, or copper sulfate. For the inorganic trial, each corn plant received a 0.05 ml injection properties such as the kinematic viscosity. The final vertical measurements were taken in centimeters on 25 April 2006. The means for each group were as follows: organic- 60.4 cm, control- 54.9 cm, inorganic- 49.3 cm. A test was used to analyze the difference between mean plant heights for the three trials. The P-value for inorganic versus organic was highly significant (P < 0.0008). The data supports the hypothesis that organic fertilizers have the necessary components to produce greater vertical growth. To conclude, organic fertilizer promoted the best overall plant growth.

**BOARD 81 - FACE-ISM: A CASE STUDY OF STEREOTYPING IN NEWSWEEK MAGAZINE.** Kapil R. Melkote, kmelkote@gmail.com, 1505 Devonshire St., Bowling Green OH, 43402. (Bowling Green High School)

Face-ism, the amount of facial prominence in a photograph, may convey certain messages about the depicted person. Researchers have found that higher facial prominence conveys perceptions of higher intelligence, ambition and dominance. The purpose of this study was to investigate the face-ism phenomenon in the depiction of the genders in Newsweek magazine. The study investigated the following hypotheses: (a) Depictions of people in U.S. mass media images will give greater prominence to the face in male than in female depictions in the years 1985 and 2005, and (b) The differences in the depiction of the genders in the years 1985 and 2005 will give greater prominence to the face in male than in female depictions in the years 1985 and 2005, and (b) The faces in female depictions in the years 1980s (Male = 56.02, Female = 42.49, diff = -13.54) and 2005 (Male = 55.35, Female = 41.39, diff = 14) was found to be the same. This did not support the second hypothesis; however, it also showed that despite no increase in face-ism, there was also no decrease.

**BOARD 82 - THE EFFECTS OF ORGANIC AND INORGANIC FERTILIZERS ON CORN (Zea mays).** Christina Morrell, 4604 Victory Rd., Lot 2, 44515. (Ohio State University)

The experiment was conducted to test the effects of organic and inorganic fertilizers on plant growth. Organic fertilizers improve soil texture and increase moisture retention. Inorganic fertilizers are easier to apply and generally less expensive than organic fertilizers. Plants treated with organic fertilizers will have four-inch pots used in each trial. In each pot a seed of corn was hand sown. The organic fertilizer was produced by Plant Tone™, and was applied at a concentration of 2.5g fertilizer/200ml water in each four inch pot. For the inorganic trial, each corn plant received a mixture of ammonium nitrate (10/10/10) and potassium chloride. The treatments were applied for each of the trials. The corn plants treated with organic fertilizer appeared to demonstrate the best growth. The final vertical measurements were taken in centimeters on 25 April 2006. The means for each group were as follows: organic- 60.4 cm, control- 54.9 cm, inorganic- 49.3 cm. A test was used to analyze the difference between mean plant heights for the three trials. The P-value for inorganic versus organic was highly significant (P < 0.0008). The data supports the hypothesis that organic fertilizers have the necessary components to produce greater vertical growth. To conclude, organic fertilizer promoted the best overall plant growth.

**BOARD 83 - A SENSORY EVALUATION OF BEEF: A STUDY COMPARING THE PREFERENCE AND DIFFERENCE BETWEEN HIGHLAND BEEF AND A NATIONAL RETAILER BEEF.** imagall B. Snyder, snyder@horizonview.net, 241 Whisler Rd, Kingston OH 45644. (Zane Trace High School)

Highland cattle are a potentially important source of specialty beef. A study was conducted with the cooperation of American Highland Cattle Association's beef producers. Fifty panelists were asked to a) identify the difference between sirloin samples of Highland cattle and a national retailer in a triangle difference test and b) identify their preference between them in a paired preference test. The hypotheses were that a) there was no significant difference in the ability of panelists to identify difference and b) there is no no significant difference in the ability of panelists to identify preferences. Sample steaks were frozen to -20 degrees Celsius. Steaks were cooked on a belt oven at 350 degrees Fahrenheit, to an internal temperature of 145 degrees Fahrenheit (medium rare). Samples were cut into 5 pieces approximately 1x1 inch in size. Each panelist was given a set of two samples (one Highland, one national retailer) and asked to identify which they preferred. A set of three samples (a random combination of two from one group and one from another), and asked to identify which was different. 27 of the panelists indicated they preferred meat from the national meat retailer. 23 panelists indicated they preferred meat from the national meat retailer. 23 panelists indicated they preferred meat from the national meat retailer. Results were analyzed using binomial statistical analysis with a previously established 0.05 alpha level. A significant difference was found in the ability of panelists to identify difference, and the first hypothesis was rejected; no significant difference was found.
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in preference, and the second hypothesis was accepted. The researcher concluded a substantial number of panelists preferred Highland beef, opening a viable market for Highland producers.

BOARD 84  EFFECT OF PRODUCE CLEANERS ON SURFACE HERBICIDE. Andrew J. Frankart, sfrankart@junio.com, 5044 Brookhill Ln., Lima OH 45807. (Lima Central Catholic High School)

The purpose of the experiment was to determine if commercial produce cleaners are effective in removing surface herbicides on soybeans. Produce cleaners were tested for residual traces of glyphosate, the herbicide agent in a popular herbicide called Roundup®. Research was prompted by curiosity of the effectiveness of produce cleaners and by prior knowledge of harmful effects of certain herbicides. The hypothesis was that seventy percent of surface herbicide would be removed by the application of commercial produce cleaners. Project experimentation involved spraying four sets of untreated soybeans with a commercial herbicide, Roundup®, in order to simulate the spraying of the produce as it would occur in commercial agriculture. The herbicide was allowed to dry on all four sets of soybeans. The control set received no further treatment. The other three sets were treated with either commercial produce cleaners or water. The beans that had been sprayed with herbicide and then treated with varying cleaners were tested by the process called Cation-Exchange Chromatography with Postcolumn Derivatization with the technique called a Dionex 500 High Performance Liquid Chromatography system containing several reagents including potassium phosphate, o-Phthalaldehyde (OPA), sodium hypochlorite (bleach), and 2-mercaptoethanol that were used to detect the presence of glyphosate. The results revealed that the group rinsed with water alone removed more of the glyphosate than any of the other three groups. The results indicated that the produce cleaners rinsed an average of 69% of glyphosate off the produce. This agrees with the consecutively rinsed sets, and their resistance and mass were measured daily. On average, the oranges lost 25 % of their mass during the initial 24 hours of dehydration and their resistance decreased from 60 to 12 kilohms. Then a second experiment was conducted to verify the results from the dehydrated oranges. The juice content, or amount of water in an orange, and the electrical resistance of five oranges were determined to establish a pattern. The hypothesis was proven incorrect, so we experimented to find out why this happens. The more juice an orange has, the more resistance it presents to electricity. However, the experiment could not be used to rank the oranges from juiciest to least juicy. More research would have to be performed to find a way to commercialize this method.

BOARD 85  ARE NON-SMOKING SECTIONS OF RESTAURANTS REALLY SMOKEFREE? Lawrence I. Boothe, lbooth@1st.net, 798 Township Rd. 15, Rayland OH 43943. (St. John Central High School)

Suspended particulates in the air were measured in ten public facilities throughout Ohio in cities such as Akron, Canton, Cleveland, St. Clairsville, Dillonvale, Yorkville, and several others. This was done by using the Sidepak AMS10 Monitor, which measures total suspended particulate (TSP) in the air in micrometers per cubic meter (μg/m³). The purpose of this study was to prove that non-smoking sections in public facilities were not really smoke free. The Sidepak draws in air through a sensor that measures these particles based on the scattering of light. The data showed that the air quality was poorer in the non-smoking sections than it was in the smoking sections. The resistance it would present to an electric current, which could then be able to determine the strengths of the structural members that comprise it in order to evaluate a structure's load-carrying ability.

BOARD 86  CHEMOLUMINESCENCE: THE TIMELESS PROCESS. Lizzie D. Martin, lizziedae91@yahoo.com, 15899 St. Rt. 739, Richwood OH 43344. (North Union High School)

The research conducted involved detecting blood on multiple surfaces after sanitizing, sealing, and, after an extended period of time. The hypothesis was made that bovine blood could be detected through a process called chemoluminescence, in which a chemical reaction produces light. The hypothesis was proven incorrect, so we experimented to find out why this happens. The more juice an orange has, the more resistance it presents to electricity. However, the experiment could not be used to rank the oranges from juiciest to least juicy. More research would have to be performed to find a way to commercialize this method.
This study was to determine how pollution effects microorganisms in pond water. The results would indicate if pollutants would effect the microorganisms with some pollutants having a greater effect. Pond water was collected, hay infusion made, 600 ml of hay infusion and 200 ml of pond water put into seven glass jars. Five days later, each jar tested for living organisms. 15 ml of five pollutants added to five jars and 1/3 of a rusty soup can added to the sixth jar. Each jar, including control jars, tested daily for amounts of microorganisms and findings were charted. Control jars showed less than 1% of microorganisms. Rock salt was 50-75% decrease, but the organism Anabaena multiplied. Roundup™ eliminated algae and decreased more than 50% of the microorganisms. Lack of food and oxygen may have caused a decrease in microorganisms. Tire mulch and rust decreased 25-50% of the microorganisms. 20-20-30 fertilizer caused increase due to the nutrients. The experiment supported the hypothesis with all pollutants tested having some effect, ranging from 25% to greater than 75%. Motor oil had greatest effect. Rust and tire mulch had the least. The data shows how bad some pollutants can be to microscopic life, which may have long term effects to human health. It is important that humans are very careful with things that can pollute water. Understanding the effects of water pollution helps protect life.

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A large amount of research is underway regarding the use and effectiveness of micro-propulsion devices, typically for micro-
light bulb efficacies. Meredith M. Evans (evansfm@clover.net) 54670 TR 152 West Lafayette OH 48345

The purpose of this experiment was to determine which type of light is the most efficient in a footcandles to amp ratio. The types of lights tested were mercury vapor, high pressure sodium, halogen, fluorescent, and incandescent lights. The lights were placed around the hot wire leading to the electrical receptacle to which each light was separately connected. The light meter was placed 152.5 cm away from the testing area and 91.5 cm above the ground. Each sample was tested for the lamps passed through the meter. The footcandles produced were read each time from the lumen meter and recorded. The hypothesis of this experiment was that the 100 watt incandescent bulb would rate the most efficient because research showed that incandescent light bulbs use the least energy to burn. The lights ranked, most to least efficient were: 65 watt incandescent floodlight, two fluorescent bulbs, one fluorescent bulb, tungsten – halogen, 25 watt incandescent, high pressure sodium, 75 watt incandescent, 100 watt incandescent, and mercury vapor. The result of 65 watt incandescent floodlight being the most efficient is because it had a wide back inside the bulb which was coated in a reflective substance. Homeowners could draw from this experiment that, to reduce energy expenses but still have a brighter illuminated space they could use a 65 watt incandescent floodlight. Thus, if more homeowners purchased 65 watt incandescent floodlight this could cause rise in demand for these lights resulting in a change in the lighting industry.

AQUATIC BIOLOGY & ECOLOGY PODIUM SESSION
9:00 AM, SATURDAY APRIL 21, 2007

Dr. Susan Carty - Presiding
ELA ROOM 109

9:00 NEW RECORDS FOR FRESHWATER DINOFLAGELLATES IN ALASKA. Susan Carty scarty@heidelberg.edu Dept of Biology, Heidelberg College, Tiffin, OH 44883.

Nine freshwater dinoflagellates have been previously reported from Alaska based on four reports from the literature. It was the goal of this research to visit the vicinity of Juneau, Alaska in July 2006 and sample standing water locations for freshwater dinoflagellates. Thirty eight locations, including lakes, ditches, small ponds and muskeg bogs were sampled using a 10 um plankton net, squeezying of littoral macrophytes, and sample standing water locations for freshwater dinoflagellates. Five new species were recorded for Alaska including Peridinium polonicum, Peridinium umbonatum, Gloeodinium montanum, Gymnodinium fuscum, and Hemidinium nauticum. It was determined that other, interior habitats will yield additional species.

9:15 THE AVAILABILITY OF LABILE DISSOLVED ORGANIC CARBON TO LOW ERIC BACTERIOPLANKTON. Tracey T. Meilander, ttzebuc@kent.edu and Robert T. Heath, rtheath@kent.edu. Dept of Biological Sciences, 256 Cunningham Hall, Kent State University, Kent OH 44242.

The labile dissolved organic carbon (LDOC) pool consists of low molecular weight carbon compounds, such as sugars and amino acids which are utilized by aquatic heterotrophic bacteria for metabolism, growth, and reproduction. Currently, the exact chemical composition and availability of the LDOC pool remains unknown. The purpose of this investigation was to determine if LDOC utilization was constant or variable in different bacterioplankton assemblages. LDOC was estimated using a bacterial bioassay method at eighteen stations in Lake Erie during summer of 2004. To determine if bacterial assemblages of different bacterioplankton assemblages. LDOC was estimated using a bacterial bioassay method at eighteen stations in Lake Erie during summer of 2004. To determine if bacterial assemblage influenced the amount of labile carbon utilized, bacteria from one station or depth were inoculated into the water from another station or depth and incubated at ambient temperature. The amount of carbon respired by the bacterioplankton was converted into moles of carbon utilized, or LDOC. In one-third of these swap experiments (n=18), changing the bacterial assemblage resulted in either a significant increase or decrease (ANOVA post hoc Tukey, p < 0.05) in LDOC utilization. Our results show that utilization of LDOC appears to be a function of the bacterial assemblage, water chemistry, and degree of exchange. Our findings suggest that the bacterial assemblage at each station may influence the LDOC availability. Ohio Sea Grant (R/ER-60) funded this research.
9:30 THE VOLUMETRIC INDEX OF THE PLANKTON (VIP): A RAPID METHOD TO MONITOR PLANKTON, Douglas D. Kane, dkane@ashland.edu, Jessica A. Sizemore, sizemore.50@osu.edu, Hong T. Nguyen, nguyen.741@osu.edu, Richard J. Reider, reider.12@osu.edu, David A. Culver, culver.3@osu.edu F.T. Stone Laboratory, Put-In-Bay, OH 43456.

Plankton is responsive to environmental changes and easy to collect; however, it is both time consuming and expensive to enumerate. Traditional microscopic techniques to enumerate and compare phytoplankton and zooplankton samples are beneficial to researchers and resource managers. We developed the Volumetric Index of the Plankton (VIP) using zooplankton samples (n = 192 and n = 57) collected during 1998 and 2006 and plankton samples (n = 50) collected (1998 only) from Lake Erie’s three basins. Samples were enumerated using traditional microscopic techniques (e.g., Utermöhl technique) from which abundances and zooplankton (dry-weight) and phytoplankton (wet-weight) (specifically, cyanophyte and crustacean) biomasses were calculated. Samples were then collected in graduated cylinders and the volumes of zooplankton and phytoplankton were measured and standardized by the volume of water sampled. Linear regression analyses were used to determine if settled volumes could estimate the microscopically-determined abundances and biomasses. Log_{10} standardized zooplankton volume was significantly correlated with both log_{10} total zooplankton (crustaceans, rotifers, and dreissenid venus) abundance (p = 0.002) and log_{10} crustacean zooplankton abundance (p < 0.001), with the latter relationship explaining more of the variability in the data (r^2 = 0.223 vs. r^2 = 0.162). Log_{10} standardized zooplankton volume was significantly (p = 0.001, r^2 = 0.312) correlated with log_{10} crustacean biomass. Further, log_{10} standardized cyanophyte volume was significantly correlated with cyanophyte biomass (p = 0.001, r^2 = 0.206). The VIP may be an appropriate technique for rapidly and qualitatively assessing plankton and zooplankton in experimental microcosms (n = 6) containing lake sediments, filtered lake water, and nymphs (1416 m^3) collected from western Lake Erie, Ohio, 43456.

9:45 BURROWING MAYFLY (HEXAGENIA SPP.) BIOTURBATION AND BIOIRRIGATION: A NEGLIGENT SOURCE OF INTERNAL PHOSPHORUS LOADING IN LAKE ERIE, Justin D. Chaffin, jdchaff@bgsu.edu, Douglas D. Kane, dkane@ashland.edu, F.T. Stone Laboratory, Put-In-Bay, OH 43456.

Traditional lake eutrophication models predict lower phosphorus concentrations with decreased external loads. However, in lakes where decreased external phosphorus loads are accompanied by increasing phosphorus concentrations, a seeming "trophic paradox" exists. Internal phosphorus loads may better explain this paradox. Burrowing mayfly nymphs, Hexagenia spp., as bioturbators and bioirrigators are able to re-suspend sediment particles and solutes into the water column. It was hypothesized through these activities, Hexagenia spp. would increase the water-column concentration of phosphate-phosphorus. Phosphorus concentrations of experimental microcosms (n = 6) containing lake sediments, filtered lake water, and nymphs (417 m^3) collected from western Lake Erie, control microcosms containing lake water with sediments (n = 6) and control microcosms containing only lake water (n = 6) measured and compared from July 30, 2006, through August 5, 2006. Concentrations of total reactive phosphorus of the experimental microcosms were significantly (ANOVA, p < 0.001) greater than controls for ten of eleven sampling periods after time zero. Soluble reactive phosphorus concentrations of experimental microcosms was significantly (ANOVA, p < 0.001) greater than controls for all but one sampling period after time zero. Thus, Hexagenia spp. are a source of internal phosphorus loading. High densities of Hexagenia nymphs in western Lake Erie may help explain the "trophic paradox." Further, Hexagenia may be a neglected source of internal phosphorus loading in lakes in which they are abundant. The shape and width (1.1 cm) of the filamentous shape and width of the boundary layer coating the sensors, and thus their ability to extract chemical information. Since crayfish rely on chemical signals to gain information about predators, prey, and mates, crayfish aesthetasc might be physically tuned to how odors are present in the environment. Animals from different flow environments are hypothesized to have chemical sensors that are shaped to capture odors efficiently in that particular habitat, given hydrodynamic theory. Antennule and aesthetasc length, diameter, and spacing were compared among 43 distinct populations of the crayfish Orconectes virilis listed as being collected in river (n=10) or lake (n=12) habitats. Structural parameters were measured from SEM images and analyzed using ANOVAs (JMP, SAS Institute). Although variation was high, the mean aesthetasc length was longer in Lake O. virilis (113±10 um) than in creek (104±8 um) or river (105±10 um) crayfish. Lake animals had aesthetasc that were attached to the antennule at a larger angle relative to the supporting antennule (43±4°) than animals from creeks (34±4°) or rivers (33±3°; p=0.038). The greater aesthetasc length and insertion angle extend the receptor-laden portion of the sensor beyond the boundary layer of slow-moving fluid created by the antennule, allowing water containing odorant molecules to be accessed by the sensors.

10:15 USING MUSEUM SPECIMENS TO DETERMINE IF THE ANTENNULE MORPHOLOGY OF THE CRAYFISH ORCONECTES VIRILIS CORRELATES WITH THE FLOW ENVIRONMENT. Kristina S. Mead, meadk@denison.edu, Biology Dept, Denison University, Granville OH 43023.

The local flow environment (mainstream current, turbulence, and substrate roughness) affects both the shape of the odor plume downstream of an odor source and specific features (concentration, width) of the odor filaments within the odor plume. The shape and arrangement of the sensors affect the thickness of the boundary layer coating the sensors, and thus their ability to extract chemical information. Animals from different flow environments are hypothesized to have chemical sensors that are shaped to capture odors efficiently in that particular habitat, given hydrodynamic theory. Antennule and aesthetasc length, diameter, and spacing were compared among 43 distinct populations of the crayfish Orconectes virilis listed as being collected in river (n=10) or lake (n=12) habitats. Structural parameters were measured from SEM images and analyzed using ANOVAs (JMP, SAS Institute). Although variation was high, the mean aesthetasc length was longer in Lake O. virilis (113±10 um) than in creek (104±8 um) or river (105±10 um) crayfish. Lake animals had aesthetasc that were attached to the antennule at a larger angle relative to the supporting antennule (43±4°) than animals from creeks (34±4°) or rivers (33±3°; p=0.038). The greater aesthetasc length and insertion angle extend the receptor-laden portion of the sensor beyond the boundary layer of slow-moving fluid created by the antennule, allowing water containing odorant molecules to be accessed by the sensors.

10:30 DOES TRIBUTARY-DERIVED PHYTOPLANKTON BIOMASS INFLUENCE HYPOLIMNETIC HYPOXIA IN THE SANDUSKY SUBBASIN OF LAKE ERIE?, Mary C. Marasco1, marasco.6@osu.edu, Joseph D. Conroy1, hitchcock.204@osu.edu, David A. Culver2, culver.3@osu.edu, F.T. Stone Laboratory and Dept of Evolution, Ecology, and Organismal Biology, Columbus OH, 43210 and 2 Dept of Biology/Toxicology, Ashland University, Ashland OH 44805.

In spite of nutrient control programs, the reoccurring problem of seasonal hypolimnetic hypoxia in the central basin of Lake Erie suggests that other ecological processes may be affecting hypolimnetic oxygen depletion rates (HOD). One possible ecological process that has received little attention is the role of phytoplankton density on hypolimnetic oxygen depletion rates (HOD). Biogeochemical models (weekly, June 1-August 1) monitored dissolved oxygen concentrations and phytoplankton biomass (as chlorophyll a concentration) in Sandusky Bay (at four sites) and subbasin (at seven sites) to determine HOD and to construct regression models between phytoplankton biomass and HOD. Phytoplankton biomass was significantly higher near Sandusky Bay and in the western basin of Lake Erie had higher HOD (means of 4.8 and 3.8 mg O_2/L month^-1) for the western and eastern subbasin sites, respectively) but HOD did not simply correlate with phytoplankton biomass and often included a
PHOSPHORUS LIMITATION OF PHOTOPHYTTONKTON GROWTH ALONG A TRANSIENT FROM THE SANDUSKY RIVER TO LAKE ERIE. Joseph D. McCall, mccallj@denison.edu, Andrew C. Drizin, drizin_j@denison.edu, Stephanie D. Fettig, fettig_s@denison.edu, Kathryn A. Sparks, sparks_k@denison.edu, Denison University, Granville OH 43023.

Plants may flower and set seed over a wide period of time, with some individuals flowering earlier and finishing sooner than plants in the same species. The study hypothesized that plants in the same species flowering earlier than others may have a significantly higher proportion of inflorescences galled by an undescribed cecidomyiid than plants that ended flowering earlier in the season. To test this hypothesis, plants were measured at the Denison University Biological Reserve, Licking County, OH in October of 2006. Using a repeated-measures MANOVA on these 39 plants, it was found that plants that ended flowering earlier in the season had a significantly higher proportion of inflorescences than samples taken from the same plants later in the season. Additionally, samples taken from the 39 individual plants earlier in the season had a significantly higher proportion of galled inflorescences than late flowering plants among the 39 samples. These results suggest that later-flowering plants may experience less seed predation but do not suffer a decrease in effective pollination.
The avian physiological stress response is characterized by increased blood concentration of the steroid hormone corticosterone (CORT), while corticosterone binding globulin (CBG), which regulates free CORT levels, has also been shown to decrease in some species, including the zebra finch (Taeniopygia guttata). Binding proteins such as CBG control hormone action such that bound hormone is inactive, and only free hormone participates in physiological pathways. As birds lack specific binding proteins, CBG also regulates testosterone, resulting in reproductive implications for stress. With food deprivation as the stressor, total CORT, CBG, free CORT and testosterone were analyzed in adult male zebra finches (N=10) to determine the affect of this eco-physiologically relevant stressor. Blood samples were collected after four- and ten-hour fasts and control periods. CORT and testosterone were measured via enzyimmunoassays, and radioligand binding was used for CBG. Food deprivation was hypothesized to elevate total CORT, displacing bound testosterone from CBG and causing testosterone clearance. It was also hypothesized to decrease CBG, impairing CORT and testosterone storage capacity. One-tailed paired t-test analysis of CBG, and Wilcoxon Signed Ranks Test for total CORT, free CORT, and testosterone were performed. The predicted changes were detected at four and ten hours for total CORT (p=0.005, p=0.003), free CORT (p=0.005, p=0.003), testosterone (p=0.043, p=0.003), and CBG at ten hours (p=0.000), but not for CBG at four hours. These results support the hypothesized stress response mechanism and provide evidence of an important relationship between stress and reproduction in the zebra finch.

9:45 AN INVESTIGATION OF BACKGROUND COLOR-MATCHING IN THE OAK TOAD, BUFO QUERCICUS. Andrew J. Rosendale, mcshaffd@marietta.edu, Dave G. McShaffrey, mcshaffd@marietta.edu, Dept of Biological and Environmental Sciences, Marietta College, 215 5th St, Marietta OH 45750.

It has been well documented that various Anuran amphibians possess the ability to alter the overall color of their skin in response to various environmental variables. Such color change has been studied in many different toads such as Bufo americanus, with background color influencing this color change. In this study, the effect of background color on physiological color change in the toad Bufo quercicus was examined with the expectation that toads would lighten their color to more closely match the background color. Color matched toads (N=29) were placed on either a white or black background for over a three hour period, and photographs of the specimens were taken at the 0, 0.25, 0.5, 1, 2, and 3 hour time intervals. These digital images were used to quantify toad skin color through the use of the histogram function of the Adobe® Photoshop® CS program. A tonal percentage out of 255 total tonal values was assigned to each image using the histogram’s mean tonal value function. The baseline values were collected with the toads on a black background and N=15 for dark colored toads on a black background and N=15 for dark colored toads on a white background. All results were analyzed using a Mixed-Factor ANOVA. Both light and dark matched toads underwent a 15% change (p= 0.0001). The toads that were matched for three periods with light matched toads changing an average of 8.50% while the dark matched toads changed an average of 6.59%. The analysis of color change values suggests that the species Bufo quercicus color change closely matched to their color of their background, possibly as a form of crypsis; also, the color change in Bufo species is more widespread than the current literature indicates.

10:00 HOW DO ANTENNULE MOVEMENT PATTERNS CHANGE DURING REGENERATION IN THE CRAYFISH ORCONECTES SANBORNII? Meg Richardson, rrichard_m@onu.edu, Mead, M. (meadk@denison.edu), Denison University, Slayter Box 1341, Granville OH 43023.

Crayfish rely on chemosensory appendages (antennules) to track odors to find food, mates, and habitats. They “flick” their antennules in order to sample chemicals in the water using chemosensors (aesthetascs) located on the underside of the antennule. The arrangement of the aesthetascs on the antennule, as well as the speed of the flick affect odor-sampling effectiveness. Crayfish antennules that have been lost in a fight or removed experimentally can regenerate within 3 molts; they re-grow following the juvenile growth phase. This study will focus on the regeneration of one species, Orconectes sanbornii. It was hypothesized that 1) the speed of the animal’s flick will decrease after the antennules are experimentally removed (a sign that the antennules have regrown or otherwise the juvenile mode) and 2) the speed of the flick will increase following antennule removal because the animal must compensate for having such short antennules. The crayfish (n = 35) were filmed flicking, and then had their antennules removed surgically. Following antennule removal, crayfish were filmed after each subsequent molt. The crayfish’s natural odor sampling movements will be compared with those made during the regeneration process. Videos will be analyzed using the digitizing software Image J (NIH), which will make it possible to track the movement of antennules during successive frames of an olfactory flick.

10:15 EXTRAFLORAL NECTARIES ON FAVA BEANS (BROAD WINDSOR), VICIA FABA L., AND THEIR ATTRACTION TO Nectar SEEKING INSECTS. Mark E. Headings*, headings1@osu.edu, and Leslie Morris*, morris500@osu.edu, The Ohio State University Agricultural Technical Institute, 1328 Dover Road, Wooster OH 44691 and 1 USDA-ARS at The OSU Ohio Agricultural Research and Development Center.

Some plants produce extrafloral nectar in addition to floral nectar and both are attractive food sources for certain nectar - seeking insects. The objective of field investigations conducted was to determine the presence or absence of extrafloral nectaries on over 30 different types of beans. The authors previously reported finding extrafloral nectaries on mung beans, adzuki beans and cowpeas (California Blackeye No. 5). The focus of this report is on extrafloral nectaries which have also been found on fava beans (Broad Windsor), Vicia faba L.; however, they differ in structure and location compared to that of the other three. They are not located on plant stems as the others three species. Extrafloral nectaries were classified as being attached to the stems and appear as black spots. At least four extrafloral nectaries were observed in a given nectary. Seven close-up photographs of the extrafloral nectary structures were produced using a Nikon Coolpix 990 digital camera and computer digitizer. The structures in these photographs were magnified x35 to x400. It was observed that the multicolored Asian lady beetle, Harmonia axyridis and the small honey ant, Prenolepis impennis, were the primary feeders at the extrafloral nectaries. Insects benefit from this food source; however, the benefit to the plant has not been determined.

10:30 FREQUENCY OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS IN THE OHIO NORTHERN UNIVERSITY WRESTLING UNIT. Stacey Price, s-price@onu.edu, (Linda Young, l-young@onu.edu) 402 W College Ave, Ada OH 45810.

The purpose of this project is to monitor the athletes/staff of the Ohio Northern University wrestling unit for colonization and/or infection with Methicillin-resistant Staphylococcus aureus (MRSA) during the 2006-07 season. It is hypothesized that MRSA colonization/infection will increase within the unit due to physical contact with other athletes during competition. Prior to the first practice, all athletes/staff was collected with the exception of athletes/staff who completed a general health questionnaire and a nasal swab was obtained from each using a culturette. Microbes were extracted by vortexing the swab in 5 ml of sterile phosphate buffered saline (PBS) and spread directly on the surface of blood agar and Catalase agar and incubated at 37°C for 24 hours. Mannitol-fermenting colonies were then cultured for coagulase activity using a latex agglutination assay. Colonies from the 2 coagulase-positive specimens on PBS agar at a 1:10 dilution were applied to a TSA with blood plate (growth control) and to a 4.5% NaCl with Oxacillin plate and both incubated as before. One specimen grew on the Oxacillin plate suggesting a positive MRSA screen for nasal colonization. The affected participant was referred to an infectious disease specialist who diagnosed MODSA (Modified Staphylococcus aureus) colonization. This MRSA screening process will be repeated after 3 competitions, before and after invitationals, and at the conclusion of the wrestling season. Data will be analyzed to determine whether a statistically significant increase in MRSA colonization/infection occurs in the ONU wrestling unit with increasing exposure to other athletes.

10:45 THE EFFECTS OF ALCOHOL ON CHONDROGENESIS IN AGAROSE CULTURE. Veronica R. Avery, v-avery@onu.edu, Ohio Northern University, Department of Health Sciences, Ada OH, 45810. (Amy L. Aulthouse).

In the United States, approximately 1 in 25 pregnant women have reported binge drinking during their pregnancy. A few binge in early pregnancy could be dangerous even if the woman consumes alcohol after that. Any alcohol consumption during pregnancy can result in fetal alcohol syndrome (FAS) which is characterized by impaired growth, craniofacial malformations, stunted growth and mental deficiencies. Skeletal development is also compromised, and limb defects frequently involve short distal phalanges and other digital separation defects. To investigate the effect that alcohol
has on the cartilage during endochondral bone formation, experiments were conducted using human chondrocytes grown in vitro. The cells were grown first in monolayer and then suspended as single cells in an agarose gel and grown for four weeks. Five treatment groups were established (n=24 for each group): a control, 0.5%, 1.0%, 1.5% and 2.0% ethanol treatment groups. Nine cultures from each treatment group were stained with trypsin blue to determine cell viability, and 11 were stained with alcin blue to detect cartilage specific proteoglycans. The hypothesis was to determine mitotic activity was determined by counting the number of cell clusters (2 or more cells). An ANOVA was used to test for significance. If significance was determined a Student’s t-test was used to test for significance between the treatment groups. When normal control cultures were compared with the alcohol treatment groups there was a significant increase in number of dead cells, (p=2.33x10^-4), significant decrease in matrix production, (p=1.41x10^-4), and mitotic activity, (p=0.02), with increasing concentrations of alcohol.

11:00 TRANSDIFFERENTIATION OF CHONDROCYTES IN AGAROSE CULTURE Mackenzie A. Crawford, m-crawford@onu.edu, 310 Ballard Ave, Ada OH 45810 (Amy L Aulthouse, aaulhouse@onu.edu, Ohio Northern University, Dept of Biological and Allied Health Sciences, ’525 S. Main St., Ada, OH, 45810)

Chondrocytes play an essential role in the development of endochondral bones, especially within the ephiphysis growth plate, where growth in length occurs. It is generally accepted that chondrocytes divide, calcify their matrix and die. Bone matrix is then deposited on the calcified cartilage. However, there is now substantial evidence that some chondrocytes transdifferentiate into osteoblast-like cells. Human chondrocytes grown in agarose culture for up to 4 weeks maintain the chondrogenic phenotype. However, the fate of these chondrocytes in long-term agar culture is unknown. For this project, human chondrocytes were grown for 8 weeks in agarose culture. Two experiments were conducted, N=80 for both. Chondrocytes were suspended in agarose culture, 5x10^4 cells per milliliter and fed twice weekly with media. Cultures were analyzed using an Olympus inverted microscope at 4, 6 and 8 weeks. Cultures were stained with alcin blue, a stain for cartilage matrix or were stained with alizarin red S, a bone stain. The number of alcin blue positive single cells, and positive cell clusters where most numerous and decreased from then on. The number of single cells and cell clusters positive for alizarin red S increased as the experiment continued and were most numerous between weeks 6 and 8. Some cultures were prepared for immunohistochemistry, but results are inconclusive due to technical difficulties. Further tests will be conducted to determine the presence of other bone markers.

11:15 MOVEMENT OF MADTOMS (NOTURUS FLAVUS) IN HONEY CREEK William A. Monroe wmonroe@heidelberg.edu, (Kenneth Baker kbaker@heidelberg.edu) Dept of Biology, Heidelberg College, Tiffin, OH 44883.

Little is known about the movements of stonelocates (Noturus flavus) within the stream habitats in northwestern Ohio, most research is focused on the migratory stage. While some fish have been confined to specific habitats and are isolated from other populations, other fish are more mobile and traverse several habitats. It is hypothesized that stonelocates utilize longer stream reaches but spend more time in riffles. Four stonecat madtoms will be collected by netting and trapping and outfitted with radiotelemetry tags in the laboratory experiment data indicated that tills having greater than 5% clay or less than 75% sand were more likely to support predictivist models that were based on field data reported in 2006 and (b) extend the Ohio field data to a wider coverage of the range of possible soil textures. Controlled fracturing experiments, performed in triplicate, of various soil mixtures extended the known range of fracture-prone materials. Grain sizes of the materials were determined according to USDA size classification (sand, silt and clay). Clay mineralogy was also analyzed by X-ray diffraction analysis to investigate the impact of the clay minerals on the mechanical composition on fracturing mechanisms of the global tills. Methods included grinding soil core samples taken from three locations in Ohio, adding water and varying amounts of silica sand, pouring the mixtures into 8.5-inch diameter pans, allowing them to dry for over a week, and photo-documenting the presence or absence of fractures. The data for fractured lab samples were added to the field data (143 points) previously analyzed to update the predictive models. When plotted on the USDA soil texture ternary diagram, the field data indicated that tills with less than 60% sand, 25-70% silt and 3-52% clay would be more likely to form fractures. The texture classes of tills predicted to sustain fracturing were mainly clay, loam, clay loam, silty clay loam and silty clay.

9:30 THE EFFECTS OF QUARRYING ON WELLS IN SOUTHERN FRANKLIN COUNTY, OHIO. Naomi M. Hake (nbland@capital.edu), 813 Cypress Ln, Eaton, OH 45320; Terry D. Lahn (tlahm@capital.edu), Capital University.

The South Well Field located in Franklin County provides water for 30 percent of the population. The city of Columbus, Ohio, for example, pump an average of 22.7 million gallons of groundwater per day. These wells derive groundwater from glacial deposits, stream infiltration and underflow from limestone bedrock. North of the well field is a large coarse aggregate quarry. The possibility of this quarry to start limestone quarry operations that may change the quality and quantity of groundwater available at the well field. A MODFLOW model of the groundwater flow in this region was modified from an existing U.S. Geological Survey model. The model computed hydraulic head values based on known aquifer conditions. The impact of quarrying operations on groundwater flow was simulated using this model for five different simulations. Simulation 1a showed the natural flow of groundwater. Simulations 1b through 5 showed small changes in the quarry. In simulation 4, a limestone quarry was simulated. In simulations 1a through 3, the aggregate quarry did not significantly affect the flow of groundwater. In simulation 4, the quarry draws water away from the wells and caused decreases in the quantity of water. The results indicated a limited impact on the South Well Field with the current course aggregate mining operations. However, proposed limestone quarrying may significantly impact the regional groundwater flow system as shown by simulation 4 of the model.
Based on model results, these impacts may result in changes in quality and quantity of water available to the surrounding population should limestone quarrying proceed.

9:45 THE NEW BEDROCK GEOLOGIC MAP OF OHIO COMPLETED. E. Mac Swinford mac.swinford@dnr.state.oh.us, Ernie R. Slucher, Douglas L. Shrake, Gregory A. Schumacher, Glenn E. Larson, and Donovan M. Powers, ODNR, Division of Geological Survey, 2045 Morse Rd. C-1, Columbus OH 43229-6693.

The Ohio Department of Natural Resources, Division of Geological Survey has created a updated bedrock geologic map of Ohio for use in mineral exploration, environmental conservation, and land-use long planning. The old bedrock map of Ohio, produced in 1921, was a bedrock-geologic map still in print in the United States and was inadequate for modern geologic investigations. A total of 788 7.5-minute scale quadrangle bedrock-geology maps were hand drawn, brought into a GIS environment, and digitally compiled to create a seamless bedrock map of the state, which was then generalized for publication a 1:500,000-scale map. The resultant published map shows the distribution, characteristics, and correlation of 45 individual map units at the surface or buried beneath Pleistocene-age glacial deposits and represents a dramatic update to the 1921 map particularly in western Ohio. Economic commodities and geologic hazards related to specific stratigraphic intervals are discussed in the report. Funding sources for this project include a severance tax on Ohio mineral industries, the U.S. Geological Survey STATEMAP component of the National Cooperative Geologic Mapping Program, the U.S. Environmental Protection Agency Nonpoint Source Pollution Program, and the Ohio Department of Transportation.

10:00 COMPARING SOIL EROSION ON AGRICULTURAL PLOTS USING RADIONUCLIDE INVENTORIES. Lauren F. Vitko, lfv2@case.edu, Andrew P. Stubblefield, aps14@humboldt.edu, (Gerald Matisoff, gjx4@case.edu), Peter J. Whiting, npm5@case.edu, Case Western Reserve University, 1641 East 115th Street (House 5) 120B, Cleveland OH 44106.

Sustainable agriculture requires evaluation of the impact of crop residue, contour plowing, and gradient plowing on the loss of soil by erosion. Fallout radionuclides, Be-7, Pb-210, and Cs-137, have proven to be a useful tools in examining soil movement. The purpose of this study is to use radionuclides and radionuclide inventories to evaluate soil erosion and its dependency on crop residue cover, till direction, and position (ridges verses furrows). Eight soil cores were collected from four, 62.71 m² agricultural plots at Arlington, Warren County, after approximately 1.70cm of rainfall on July 20, 2006. Soil samples have been analyzed by gamma spectroscopy for Be-7, Pb-210, and Cs-137. Comparison of radionuclide inventories will be performed by calculating the mean difference and confidence intervals using the Students t test. Results will provide a relative measure of the impact of the three variables on soil erosion.

10:15 THE EFFECTS OF AXIAL OBLIQUITY VARIATION ON HESPERIAN MARTIAN TECTONICS. David M. Blair, david.blair@case.edu, (Steven A. Hauck, II, hauck@case.edu), Case Western Reserve University, Dept of Geological Sciences, 10900 Euclid Ave, Cleveland OH 44106-7216; 2282 Grandview Ave, Cleveland Heights OH 44106.

Previous analysis of imagery of wrinkle ridges on the surface of Mars has suggested evidence for a period of widespread and potentially synchronous contractional tectonism, though the driving mechanism for the formation of these features remains a mystery. Surface temperature variations over time due to changes in the planet's obliquity can lead to thermal stresses in the lithosphere that, depending on magnitude, may be capable of initiating contractional tectonic activity. Such a novel explanation has not yet been explored. Mars' obliquity cycles from 15º to 35º over the course of roughly 120,000 years, and previous studies indicate that there is a high probability (about 89%) that the obliquity has surpassed 60º at some point in the past 3 billion years; this extreme a change in obliquity may lead to significant change in temperature to generate significant thermal stresses. To assess this possibility, a simplified numerical model is being developed that couples a well-known model for the latitudinal variation of obliquity on Mars to a model for calculating the thermoeelastic contribution to global stresses. If successful, this project would not only provide a possible explanation for this period of global contractional tectonism on Mars, but would also demonstrate another potential driving force for the tectonics of planetary bodies in the inner Solar System.

10:30 PERFORMANCE OF COMPLEX NETWORKS USING INFORMATION-THEORETIC MEANS. D. W. Repperger1, daniel.repperger@wpafb.af.mil, C. A. Phillips2, R. L. Ewing3, J. B. Lyons3, 1Air Force Research Laboratory, AFRL, WPAFB OH 45433, 2 Wright State University, Dayton, OH

Network science provides an exciting new area in understanding complex systems. Intricacy in distributed network systems is now a pervasive way of life through the development of the Internet, and other paradigms. By combining resources in a network-centric framework, this may add value because multiple resources may be integrated in a productive manner. However, there is very little known about optimizing flow performance, vulnerability and capability of such systems. Recently at the Air Force Research Laboratory in Dayton, Ohio, measures of network complexity impedance (resistance to flow), and other performance measures have been developed using an information-theoretic basis. The purpose of this effort is to better understand how to improve overall flow in complex distributed networks. Using computer simulations involving Evolutionary Algorithms of a US Air Force network-centric system, the goal was to determine how the overall flow through the network could be influenced by changes in the interior flow parameters. A 5 node system was simulated with 15 unknown flows. Due to the architecture of the network, there were 4 constraint equations, yielding 11 possible optimal flows. The optimal flows were determined using an Evolutionary Algorithm approach. The results of two extensive computer simulations (minimum flow and maximum flow) of 168 hours each on a PC showed that the flow through a system could change 400% by simply adjusting interior flow values of the nodes. In conclusion, the performance of complex networks can be easily influenced by manipulating interior flow values. These studies will lead to a better means of improving throughput performance in complex distributed networks through an information-theoretic methodology.
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April 20-21, 2007
Cuyahoga Community College Eastern Campus
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Page 1 - Title, Author(s), Running Head, Abstract

Page 2 and remainder -

Introduction, Materials and Methods, Results, Discussion, Acknowledgments, Literature Cited, Tables, Figure Legends, Figures.

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

ABSTRACT. The abstract should summarize the main conclusions and any new methods or procedures critical to the results of the study. It should be 250 words or fewer.

INTRODUCTION. The introduction should describe the knowledge that gave rise to the question examined by, or the hypothesis posed for the research.

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

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

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

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

LITERATURE CITED. References to scientific literature should be arranged alphabetically by first author's last name using the Name/Year (N-Y) method as described in the CBE Manual.

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TABLES. Tables must be typed double-spaced, one table to a page, numbered consecutively, and placed in the manuscript after Literature Cited. Since tables must be individually typeset, consolidation of data into the smallest number of tables is encouraged. A horizontal double underline should be made beneath the title of the table, and single underlines should be made the width of the table below the column headings and at the bottom of the table. Do not use vertical lines, and do not place horizontal lines in the interior of the table. Footnotes should be used to clarify possible questions within the table, and should be noted by asterisks, daggers, or other symbols to avoid confusion with numerical data.

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