113th Annual Meeting
*The Ohio Academy of Science*
Meeting jointly with the
Ohio Branch of
The American Society for Microbiology

Hosted by
The Youngstown State University
Youngstown, Ohio
April 16-17, 2004


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The American Society for Microbiology (*OBASM)

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Youngstown, Ohio
April 16-17, 2004

Theme: Intellectual Property: Essential Capital for the New Economy

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Cover photograph: Jones Hall
Youngstown State University

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POSTMASTER:
Send address changes to:
The Ohio Journal of Science
1500 W Third Ave Ste 228
Columbus OH 43212-2817 USA
The Ohio Academy of Science
Meeting jointly with the Ohio Branch of The American Society for Microbiology (OBASM)

Hosted by
Youngstown State University
April 16-17, 2004

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!
Youngstown State University welcomes you to the 113th 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 7, 2004. 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/YSURegistrationForm.pdf
Online payment option www.merchantamerica.com/ohiosci

Friday, April 16: Your registration materials will be available at the door if you will be attending the Friday early evening reception in Moser Hall.

Saturday, April 17: Registration in DeBartolo Hall from 8:00AM-3:00PM. On-site registration is possible by check, VISA, or MasterCard. Cash is discouraged.

FREE PARKING: In lot off Fifth Ave. across from DeBartolo Hall. See map on page 43.

SMOKING POLICY: Smoking is not permitted in any building.

MEALS: Friday, April 16. Hosted Open Reception followed by Annual Address by the President of The Ohio Academy of Science. There is no Friday evening banquet. Saturday, April 17. Lunch available on campus and nearby, Saturday evening dinner for members and guests of OBASM. Contact Dr. Chet Cooper at Youngstown State University; Phone 330-941-1361; fax 330-941-1483 or by email cre cooper.01@ysu.edu

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

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GENERAL SCHEDULE

Friday, April 16, 2004
2:00 PM-4:00 PM The Ohio Academy of Science Board of Trustees Meeting
Presidential Suite, Kilcawley Hall

5:00 PM-6:00 PM Welcoming Reception
Lobby of Moser Hall

6:00 PM Annual Address by the President of The Ohio Academy of Science
Schwebel Auditorium in Moser Hall

by ROBERT T. HEATH, PH.D.
PRESIDENT
THE OHIO ACADEMY OF SCIENCE
2003-2004

Robert Heath is Professor of Biological Sciences and Director of the Water Resources Research Institute at Kent State University. He received his B.S. in pre-medical studies from The University of Michigan in 1963 and his Ph.D. in biophysics from the University of Southern California in 1968. He conducted postdoctoral research in molecular biology at the California Institute of Technology until joining the faculty at Kent State in 1970. Wanting to apply biochemical and molecular biological approaches to problems in freshwater ecology, he did his first sabbatical with Prof. Eugene P. Odum at the University of Georgia. He is a microbial ecologist currently investigating the role of natural bacterial assemblages in plankton communities of the North American Great Lakes, primarily Lake Erie. He studies energy flow and Carbon and Phosphorus dynamics in nearshore and offshore pelagic habitats. Bob is a Lifetime Member and a Fellow of The Ohio Academy of Science.

Saturday, April 5, 2003
8:00AM-3:00PM General Meeting Registration
Lobby of DeBartolo Hall

9:00 AM -11:00 AM Morning poster and podium sessions in DeBartolo Hall

11:15AM All Academy Lecture
Auditorium, DeBartolo Hall

Intellectual Property: Essential Capital for the New Economy
PANEL
Dr. Robert Bolla, Dean
College of Arts and Sciences
Dr. Gretchen Ann Bender
University of Dayton Law School

Others to be announced

12:15 PM Lunch
Various restaurants nearby and in Kilcawley Center and Winslow’s cafe near Butler Museum of Art

1:15 PM OFFICIAL NOTICE of Annual Business Meeting
for Academy Members Only
Room 260, DeBartolo Hall
About Youngstown State University

F
or almost a century, Youngstown State University (YSU) has prepared its graduates to become leaders in the region, the state, and the nation. Located on a beautiful 140-acre campus near downtown Youngstown, Ohio, YSU offers its students a comprehensive selection of major programs backed by a strong tradition of teaching and scholarship. YSU’s diverse student body of 12,698 and a student-faculty ratio of 19:1 provide the personal contact associated with a smaller institution, and its connection to the Ohio state system of higher education enables it to draw on the vast resources of that system. The average undergraduate class size is 27 for lectures and 9 for labs. Youngstown State seeks to offer its students a vital living and learning environment with a relatively small, cohesive campus and a wealth of curricular and cocurricular activities. Attractive residence halls house close to 1,000 students and include a special residential honors facility. A privately operated apartment complex, University Courtyard Apartments, offers a variety of living arrangements to 400 YSU students within easy walking distance of the center of campus. Student activities abound, with more than 130 student organizations, including social sororities and fraternities, and opportunities for participation in theater, performing groups, student publications, intramural and intercollegiate athletics, and activity planning. Youngstown State University competes in NCAA athletics and in the past decade, has captured four Division I-AA national football championships. During the same decade, the women’s basketball team won five Mid-Continent Conference titles and played three years in the NCAA tournament. The University fields ten women’s and eight men’s intercollegiate Division I teams. Fitness and recreational facilities are free to all YSU students in the Beeghly Physical Education Center and the Stambaugh Sports Complex, including track, tennis, swimming, racquetball, basketball, handball, Nautilus, aerobic conditioning, and free weights.

Of the 12,698 students at YSU, 11,375 are undergraduates. Multicultural students make up 13 percent of the student body and international students hail from fifty-five countries. Students benefit a wide range of student services: complete tutorial assistance in all subject areas, with special centers for writing, study skills, reading, and mathematics; counseling and health services; career testing, planning, and placement; special programs for multicultural, women, and adult students (those older than 25); and an orientation program that includes mentoring by faculty and staff members and upperclass students.

The University seeks a balance between teaching, service, and scholarly activity that serves both its students and the larger community of scholars. The University is committed to keeping its doors open to all who seek higher education and equally committed to giving students every opportunity to enrich their minds, develop their creativity and problem-solving abilities, and become informed, conscientious citizens of the world.

Location

Youngstown is at the center of a metropolitan area of 600,000, located 60 miles from both Pittsburgh and Cleveland. The campus is within easy driving or walking distance of restaurants, shopping centers, museums, and parks. The University is a major contributor to the city’s cultural and recreational vitality, each year presenting hundreds of concerts, exhibits, lectures, performances, and athletic contests. The city offers an outstanding symphony orchestra, three community theaters, a vital arts community, and unlimited recreational options provided by 2,500-acre Mill Creek Park, located a mile from the campus. YSU students can take advantage of close ties to area businesses for internships and work co-op programs, which provide valuable on-the-job experience.

Academic Programs

Youngstown State University is one of a few comprehensive metropolitan institutions in Ohio that provide associate, baccalaureate, and graduate instruction and continuing education in one location. Currently, the University offers a broad curriculum in the School of Graduate Studies and six colleges: Arts and Sciences, Business Administration, Education, Engineering and Technology, Fine and Performing Arts, and Health and Human Services. The spirit of cooperation among departments and colleges permits students to pursue interdisciplinary majors and minors, to major in one department or college and minor in another, or to pursue double majors. An individualized curriculum program is available to students whose needs are not met by existing conventional programs. Students may design curricula to suit their particular needs, allowing alternative paths for earning the undergraduate degrees currently offered.

Majors and Degrees

T
he College of Arts and Sciences offers majors in Africana studies, American studies, anthropology, biology, chemistry, computer information systems, computer science, earth science, economics, English, environmental studies, French, geography, geology, history, information technology, Italian, journalism, mathematics, philosophy, physics/astronomy, political science, professional writing and editing, psychology, religious studies, social studies, sociology, and Spanish.

The Beeghly College of Education offers majors in early and middle childhood education, gifted and talented educational specialist studies, multiage education (with specialized teaching fields), adolescent/young adult education (with specialized teaching fields), vocational education, and special education.

The Rayen College of Engineering and Technology offers majors in chemical engineering, civil engineering (structural and transportation option and environmental option), civil and construction engineering technology, drafting and design technology, electrical and computer engineering, electrical engineering technology, electric utility technology, industrial and systems engineering, mechanical engineering, and mechanical engineering technology.

The College of Fine and Performing Arts offers majors in studio art, art history, music/history and literature, music education, music/performance, music theory, music composition, communications studies, telecommunication studies, and theater.

The Bitonte College of Health and Human Services offers majors in allied health, Army and Air Force ROTC, clinical laboratory science, clinical laboratory technology, community health, criminal justice, dental hygiene, dietetic technology, emergency medical technology, family and consumer sciences education, exercise science, family and consumer studies, food and nutrition, health science, histotechnology, hospitality management, medical assisting technology, merchandising (fashion and interiors), nursing, nursing home administration, physical education, prekindergarten, pre–physical therapy, respiratory care, social service technology, and social work.
The Williamson College of Business Administration offers majors in accounting, advertising and public relations, business economics, finance, general administration, human resource management, management, management information systems, marketing, and marketing management.

Associate degrees are offered with concentrations in accounting, finance, labor studies, management, and marketing. Interdisciplinary minors are offered in gerontology, linguistics, peace and conflict studies, professional ethics, statistics, and women's studies. Students may also enroll for a combined B.S./M.D. program with the Northeastern Ohio Universities College of Medicine. Each student successfully completing this program is awarded the Bachelor of Science degree from Youngstown State University and the M.D. degree from the College of Medicine.

Academic Facilities

Maag Library houses more than a half-million books and more than 200,000 government documents and subscribes to more than 3,100 periodicals and scholarly journals. Online research services provide access to all state university libraries in Ohio and a wide range of other information sources. The library's resources are augmented by the Curriculum Resource Center in the College of Education. A Multimedia Center, housed in Maag Library, offers research materials in a variety of formats. Comprehensive computing facilities are readily available to students throughout the campus. Scientific laboratories at YSU are fully outfitted with up-to-date instructional and research equipment. Studios and performance halls in the College of Fine and Performing Arts have been recently renovated for acoustic excellence, and the McDonough Museum of Art is an innovative exhibit space for student and faculty work.

Youngstown Area Housing

Days Inn Youngstown
1610 Motor Inn Dr
Girard, OH 44420
Telephone: 330.759.3410
URL: http://www.daysinn.com

Days Inn Youngstown/Boardman
8392 Market St
Youngstown, OH 44512
Telephone: 330.758.2371
URL: http://www.daysinn.com

Econo Lodge Girard
1615 E. Liberty St
Girard, OH 44420
Telephone: 330.759.9820
URL: http://www.econolodge.com

Fairfield Inn
7397 Tiffany South
Poland, OH 44514
Telephone: 330.726.3979
URL: http://www.marriott.com

Hampton Inn Youngstown/Boardman
7395 Tiffany South
Poland, OH 44514
Telephone: 330.758.5191
URL: http://www.hamptoninn.com

Holiday Inn Express – North Lima/Boardman
10111 South Ave
North Lima, OH 44452
Telephone: 330.549.0070
URL: http://www.holiday-inn.com

Holiday Inn North Metroplex
1620 Motor Inn Dr
Girard, OH 44420
Telephone: 330.759.0606
URL: http://www.holiday-inn.com

Holiday Inn South
7410 South Ave
Boardman, OH 44512
Telephone: 330.726.1611
URL: http://www.holiday-inn.com

Microtel Inn
7393 South Ave
Boardman, OH 44512
Telephone: 330.726.1747
URL: http://www.mariott.com

Quality Inn & Suites North
4055 Belmont Ave
Youngstown, OH 44505
Telephone: 330.759.3180
URL: http://www.qualityinn.com

Ramada Limited of North Lima
9988 Market St
North Lima, OH 44452
Telephone: 330.549.0157
URL: http://www.ramada.com

Red Roof Boardman
1051 Tiffany South
Poland, OH 44514
Telephone: 330.758.1999
URL: http://www.redroof.com

Residence Inn Youngstown
7396 Tiffany South
Poland, OH 44514
Telephone: 330.726.1747
URL: http://www.marriott.com

Super 8 Motel Youngstown
4250 Belmont Ave
Youngstown, OH 44505-1004
Telephone: 330.726.1747
URL: http://www.mariott.com

MVR (Mahoning Valley Restaurant), 410 North Walnut Street (about 0.25 miles directly east of DeBartolo Hall on the far side of the Wick Parking [M1] Garage)

Taco Bell, 420 Fifth Avenue (across DeBartolo Hall)

The Beat Coffeehouse, 215 Lincoln Avenue (0.1 mile south of DeBartolo Hall)

Winslow's Café, YSU Campus on the west side of the Butler Art Museum (across campus directly east of DeBartolo Hall)

Maps will be made available at the meeting registration table.

NOTES

Friday's Welcoming Reception from 5:00-6:00 PM will be in Lobby of Moser Hall followed by the 6:00 PM Address of The President of The Ohio Academy of Science.

The Mineral Museum will be open during the social hour and there will be free planetarium show tickets for performances at 7:00 PM and 8:00 PM available during the social hours in the Moser Hall Lobby.

Saturday night's meal for OBASM will be in the Chestnut Room of Kilcawley Center. OBASM welcomes Academy members. Cost of the buffet dinner is $16.00. Reservations MUST be made to Dr. Chet Cooper no later than Friday, April 9th. Payment can be made at the door, but prior reservations are REQUIRED.

Phone 330.941.1361.
Email ccooper.01@ysu.edu
The Ohio Branch of The American Society for Microbiology (OBASM) will meet jointly with The Ohio Academy of Science. Please see the following schedule. Or contact: Dr. Chet Cooper at Youngstown State University. Phone 330-941-1361; fax 330-941-1483 or by email crcooper.01@ysu.edu

Saturday, April 17th
8:00 AM – 3:00 PM Registration
8:30 AM Welcome - Auditorium, DeBartolo Hall
9:00 AM – 10:00 AM My virus is nastier than your virus!! Strain dependent differences in the molecular properties of the ICP34.5 protein of HSV-1 that determine the virulence of HSV-1 Dr. Ken Rosenthal, Northeastern Ohio Universities College of Medicine
10:00 AM - 11:00 AM General Microbiology Lecture
Cepacia means more than onions Dr. Christine Weingart Denison University
10:30 AM – 11:30 AM Molecular Biology Forum: 50 Years of the Double Helix Co-sponsored by Sigma Xi, YSU Chapter
Chaired by Dr. Diana Fagan, Department of Biological Sciences, Youngstown State University
Clinical Applications of Genomics and Proteomics Dr. David Buzzee, Lab Corporation of Ohio
Ancient DNA Dr. Bruce Rothschild, Northeastern Ohio Universities College of Medicine
Other participants to be announced
3:00 PM – 5:00 PM “Late Breaker” Session – brief oral presentations on recent discoveries in the microbiological sciences
5:00 PM OBASM General Meeting
6:00 PM -OBASM Dinner and Student Awards Chestnut Room, Kilcawley Center. Contact Dr. Chet Cooper by April 9th. $16.00

Index to Sessions in DeBartolo Hall

Poster Session-Multidisciplines
09:00 AM – 10:00 AM p. 6

Poster Session-Multidisciplines
10:00 AM – 11:00 AM p. 13

Poster Session-Multidisciplines
02:00 PM – 03:00 PM p. 20

Pre-College Poster Session
03:00 PM – 04:30 PM p. 27

Physical Sciences & Education
09:00 AM Saturday, April 17, 2004 DeBartolo Hall Room 347 Dr. Paul Szalay-Presiding

Zoology
09:00 AM Saturday, April 17, 2004 DeBartolo Hall Room 358 Dr. Courtenay Willis-Presiding

Phycology & Aquatic Ecology
09:00 AM Saturday, April 17, 2004 DeBartolo Hall Room 356 Dr. Robert Heath-Presiding

Basic & Applied Microbiology
09:00 AM Saturday, April 17, 2004 DeBartolo Hall Room 346 Dr. Paul Baker-Presiding

Earth & Environmental Sciences
09:30 AM Saturday, April 17, 2004 DeBartolo Hall Room 345 Mr. Wilmer Stowe-Presiding

Genetics, Biochemistry & Physiology
02:00 PM Saturday, April 17, 2004 DeBartolo Hall Room 358 Dr. Kerry Cheesman-Presiding

Plant Ecology/Wetlands
02:00 PM Saturday, April 17, 2004 DeBartolo Hall Room 356 Mr. Tracy Engle-Presiding
9:00 am Poster Session De Bartolo Hall

**Board 01 - Development of a Geological Sequestration Simulation Facility (GSSF) to Advance the Underground Storage of Anthropogenic Carbon Dioxide.** Kenanatti A. Lawrence, LASCO@MU.C.EDU, DEPT OF NATURAL SCIENCES, ROBERT MORRIS UNIVERSITY, 500 FIFTH AVE, PITTSBURGH PA 15219-3099.

The production worldwide of more than nine billion tons of carbon dioxide each year by industrial processes is affecting greenhouse gas concentrations in the atmosphere. The injection and sequestration of carbon dioxide scrubbed from the flue gases of coal-fired power plants is an option. This problem is being investigated by the US Department of Energy's National Energy Technology Laboratory (NETL) in Bruceton, Pennsylvania. However, as the behavior of carbon dioxide in underground brine aquifers is not well understood, NETL is developing a Geological Sequestration Simulation Facility (GSSF) to gather data on the behavior of carbon dioxide, brine and reservoir rock in conditions that exist at depth. The GSSF is envisioned as being capable of subjecting carbon dioxide, brine and a variety of reservoir rocks to the pressure and temperature conditions that exist at depths up to 3,000 meters. The GSSF is envisioned as being instrumented to record real time as well as pre- and post- test data. Data acquisition is envisaged as being generated by instruments such as MRI, CAT scan, temperature and pressure sensors, x-ray diffraction, atomic absorption, and petrographic imaging equipment, among others. This study reports on the initial progress and conceptual design of the GSSF, including estimates for proposed instrumentation specifications and timeline for development.

**Board 02 - Characterization of Hydric Soils in Wetland Mitigation Sites in Central Ohio.** Kimberly A. Preest, kpreest@muskingum.edu, (James L. Dooley, jndooley@muskingum.edu), DEPT OF BIOLOGY, MUSKINGUM COLLEGE, 183 STORMONT ST, NEW CONCORD OH 43762.

This ongoing study will examine the hydric soil characteristics of three central Ohio wetland areas. The first of the three study sites is a natural wetland site located in Pickerington Ponds Metro Park in Fairfield County, a 1,200-acre park in the Blacklick Creek Watershed. The second site is a mitigated wetland located in Three Creeks Metro Park also in Franklin County, a 74.1-acre site that is fed by Blacklick Creek. The third and final site of this study is the New Albany Wetland Nature Preserve in Delaware County; a 30-acre mitigated wetland site in the Rocky Fork Watershed established by the Ohio Department of Transportation (ODOT). The Rocky Fork Site is currently considered to be successful by the Environmental Protection Agency (EPA). Data for this study will consist of six random core samples from all three wetland sites. These samples will be tested for the presence iron or manganese concretions, and others for organic matter will be tested via loss-on-ignition (LOI) technique. Samples will be analyzed to determine whether the soil is a mineral soil, the presence of sulfidic material, as well as their aqic/persico moisture regime. This will be evidence of reducing conditions, and proper matrix chromas, and motting.

**Board 03 - Temporal and Spatial Patterns of Nitrate and Phosphate in Agriculture and Forest Soils in Southeastern Stark County.** Frank Moraccco, morocccf@mu.c.edu, (Dr. Charles McClaugherty MCCLAUCH@MU.C.EDU), MOUNT UNION COLLEGE, 1972 CLARK AVE, ALLIANCE OH 44601.

Stark County, located in northeastern Ohio, is covered by a mosaic of forest and agricultural lands. Unharvested forests cycle nutrients internally, while croplands receive external nutrients such as manure and fertilizers and lose nutrients through harvest, erosion, and leaching. Nitrate, a highly mobile ion, and phosphate, a less mobile ion, can be used to understand nutrient dynamics in these landscapes. Through cultivation, homogenized by the surface horizon; in contrast, the same horizon is spatially variable in a forest. Understanding spatial variability of nutrients in the landscape is useful for studying patterns of productivity in future experiments. The goal of this study is to observe the spatial effects of land use by contrasting a seventy-five year old unmanaged ten acre forest and a six acre adjacent plot that has been farmed for the past fifty plus years, on the concentrations and spatial patterns of nutrients in soils. Forest levels of nitrate and phosphate should be lower due to the lack of external additions. The spatial variability of cropland should be lower due to constant tillage. Since the cropland has had treatment with manure, fertilizers, and legumes in rotation with wheat, the expected nitrate should be present at high levels. Ten samples of soil were taken from the forest and adjacent farmland at 1-meter intervals on three different dates. The soil samples were extract in a potassium chloride (1M) solution. Extracts will be analyzed spectrophotometrically with a Flow. Nitrate and values will be reported on a per gram of dry weight and organic matter basis.

**Board 04 - Evaluation of an In Vitro Assay for Predicting Fungicide Efficacy Against Sclerotinia homoeocarpa in the Field.** Amy L. Mooney, AMY.L.MOONEY@OSU.EDU, YOUKEI K. LASMA, K.17@OSU.EDU, Joseph W. Rimelspach, RIMELSPACH.1@OSU.EDU and Michael J. Boehm, Boehm.1@OSU.EDU, DEPT OF PLANT PATHOLOGY, THE OHIO STATE UNIVERSITY, 201 KOTTMAN HALL, 2021 COFFEY RD, COLUMBUS OH 43210-1087.

Dollar spot, caused by the fungus Sclerotinia homoeocarpa F.T. Bennett, is one of the most commonly occurring turfgrass diseases in temperate and subtropical regions and the most widespread and chronic disease of golf course turf in Ohio. The disease is typically managed through the combined use of a balanced fertility program, cultural practices aimed at reducing extended periods of leaf wetness and timely applications of fungicides. Resistance in Sclerotinia homoeocarpa to various classes of fungicides has been reported. The goal of this work was to determine the ability of a previously described in vitro fungicide screening assay to predict fungicide efficacy in the field. Sclerotinia homoeocarpa isolates were recovered from 42 golf course fairways throughout Ohio and screened using the in vitro assay to determine their relative sensitivities to thiophanate-methyl, propiconazole and iprodione. Each isolate was placed onto potato dextrose agar (PDA) and a series of fungicide-amended PDA plates. Fungicide sensitivities for each isolate were calculated based on relative growth rates of the isolates on PDA versus fungicide-amended PDA. Based on fungicide sensitivity profiles of the 42 isolates, replicated field fungicide efficacy trials were established on fairways at 12 Central Ohio golf courses. Fungicide applications were made and dollar spot severity was rated on a biweekly basis from April to July 2003. The in vitro screening assay was an excellent predictor of thiophanate-methyl, iprodione and propiconazole efficacy in the field except for isolates with propiconazole EC50 values ranging between 0.03 and 0.04.

**Board 05 - Effects of Roundup™ on Developing Rana pipiens.** Tera M. Robinson (ROBINSON54@hotmail.com), (David L. Reed) DEPT OF NATURAL SCIENCES, THE DEPIANCE COLLEGE, 1774 WHITEHALL DR, LIMA, OH 45805.

Over the last fifty years, many species of amphibians in the United States are experiencing a major decline in their numbers. United States, agriculture is a major employment factor and with agriculture there is runoff and over use of pesticides and fertilizers. Pesticides and fertilizers are having a harmful affect to the water and air. In this study an experiment was conducted to observe the effects of Roundup on tadpoles in one ten gallon tank will be exposed to a constant 3.4 grams of Roundup and the other ten gallon tank will receive an increasing amount of 0.1 gram a day for four months. The development rate will be measured between the tadpoles by obtaining a mean of the width and the length of the tadpoles in different tanks. Also the tadpoles will be monitored daily for deformities of overall deformities and changes in behavior. The tank that received a constant 3.4 grams of Roundup had visual abnormality, one including retained forelimbs, the frogs in this tank also showed a different behavior, swimming upside down and not being as active as the other tanks. The tank that increased daily visual abnormality and as the amounts increased the tadpoles’ behavior started to change. The tanks that had received the Roundup also developed into frogs at a much slower rate. The initial data shows that Roundup has a direct affect on the development of Rana pipiens tadpoles.

**Board 06 - Community - Level Response to Nutrient Supplementation in Ohio Freshwater Plankton Communities at the James H. Barrow Field Station.** Rudy J. Woznicki, WOJTJECKI@HIRAM.EDU, J.H. BARRON FIELD STATION, DEPT OF BIOLGY, HIRAM COLLEGE HIRAM, OH 44234 and (Samuel D. Marshall, MARSHALLS@HIRAM.EDU)

An analysis was conducted of the freshwater plankton community in the Nature Observatory Pond at the James H. Barrow Field Station.
in Hiram Township, Portage County, Ohio. Replicated mesocosm studies were performed to test the effects of nutrient supplementation on community structure using six 20 L plastic buckets as mesocosms. All were filled with 10 L of wellwater. Four were inoculated with 1.0 L of unfiltered pondwater, (38 species of plankton were found in these inoculations). Total phosphorus was elevated to 5.67 mg/l using a commercial plant food in two of the mesocosms. The controls total phosphorus was measured at 0.1 mg/l. The two remaining buckets were not inoculated with pond water as controls for airborne colonization by plankton propagules.

Initially, species diversity increased in the nutrient-treatment mesocosms. With the nutrient-enriched treatment mesocosms the controls began with communities dominated by desmids and diatoms. Green algae then began increasing in diversity. Within two weeks the diversity in the nutrient-enriched mesocosms diminished while the preponderance of cyanobacteria. Despite this, the nutrient-enriched environments were the most productive. The final biomass was measured by staining the contents of the mesocosms with a 2% plankton net then dried and weighed. The nutrient enriched and inoculated mesocosms produced an average of 1.5577 grams of biomass where as those only inoculated with pondwater averaged 0.1154 grams. The control mesocosms initially displayed an increase in diversity then stabilized after two weeks. There was a strong influence of nutrient supplementation on mesocosmic community diversity, leading to competitive dominance by cyanobacteria.

**Board 07** THE CALCIUM/CALMODULIN-DEPENDENT PROTEIN PHOSPHATASE, PP2B, HAS ROLE IN REGULATING EXOCYTOSIS IN *PARAMECIUM*. DEAN FRAGA (DEFRAGA@WOOSTER.EDU), SABRINA BOSCHINO (SBOSCHINO@WOOSTER.EDU), TREVOR WOSCHOFFIELD (WOSCHOFFIELD@WOOSTER.EDU) DEPT OF BIOLOGY, 931 COLLEGE MALL, THE COLLEGE OF WOOSTER WOOSTER OH 44691.

*Paramecium* tetraurelia are ciliated protozoa that contain membrane- docked vesicles called trichocysts. The trichocysts fuse with the membrane in a calcium-dependent manner and release proteins that form long crystalline spines, which help *Paramecium* escape predation. We used a bacteria-mediated RNA interference (RNAi) protocol to determine if the calcium/calmodulin-dependent protein phosphatase, PP2B, was involved in trichocyst discharge. *Paramecium* cells were fed *Escherichia coli* containing an inducible PP2B dsRNA expressing vector as described previously with minor modifications. After treatment, *Paramecium* cells were selected and exocytosis triggered by the addition of a saturated picric acid solution. Cells were viewed at 20x using a phase contrast objective and images captured digitally. Cells were scored visually to determine exocytosis efficiency. Scores were verified by digital image analysis and the total area covered by the discharged trichocysts was determined and normalized to the total cell body area and loss section. Normalized scores revealed the results indicated that PP2B RNAi treatment resulted in a reduced efficiency of exocytosis. The number of cells exhibiting full exocytosis was reduced from 76% in control cells (n=129) to 25% (n=105) in PP2B treated cells (n=157). The observed change in exocytosis (<50% full discharge) increased from 2% (control treatment) to 41% (PP2B treatment). Treated and control cells had no visible effects upon endocytosis, cell morphology, or cell division. PP2B appears to have a role in the regulation of calcium-dependent exocytosis in *Paramecium* tetraurelia.

**Board 08** P232 AND P258 ARE INVOLVED IN NiF MEDIATED FOLDING OF THE Fe PROTEIN OF NITROGENASE. SUDEEPA TONGUTUR, STUNEY@BGNET.BGSU.EDU; LAKSHMI PULAKAT, LAKSHMI@BGNET.BGSU.EDU; DEPT OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

Nitrogenase, the enzyme responsible for conversion of atmospheric nitrogen to ammonia, consists of two separable protein components designated the iron (Fe) protein and the molybdvenum-iron (MoFe) protein both of which are extremely oxygen-sensitive. The Fe protein is a 64 kDa γ, homodimer encoded by NiFH. The maturaton of the Fe protein which contains 8 proline residues is assisted by the NiF accessory protein NiHi that has peptidyl prolyl cis/trans isomerase activity. To identify the proline residues that function as the substrate for NHiF, a library of NiF mutants were generated by DNA Shuffling. This technique results in the generation of a large number of mutants that assist in the study of structure-function relationship of proteins and in obtaining insights into the evolution of the enzyme. This library was screened for NiFH independent mutants as follows. The NiF gene of these mutants were PCR amplified using the specific NiF primers and cloned into TOPO 2.1 vector. These were transformed into Azotobacter vinelandii BG98 a NiF mutant which has a nif- phenotype. One of the NiF mutants was able to complement the Azotobacter vinelandii BG98 and give a Nif+ phenotype. Sequence analysis of the NifH mutant from this strain showed that it encoded a Fe protein carrying two mutations, P232K and P258S. Further analysis showed that a single mutant P258S was sufficient to obtain partial complementation of the Nif- phenotype of BG98. This result implied that P258S region of the amino acid sequence is the major substrate for NiH.

**Board 09** DETERMINATION OF MITOCNDRIONAL ENRICHMENT AND ACTIVITY THROUGH VARIATIONS IN DIFFERENTIAL CENTRIFUGATION AND STORAGE CONDITIONS. CHANDA L. KIMES, CHANDA.LYNNÉ@HOTMAIL.COM 5240-B NORTHOWNE BLVD, COLUMBUS, OH 43229.

To study mitochondrial function in the laboratory, it is necessary to have reliable, reproducible methods to isolate and store mitochondria. However, most methods suggested for isolation and storage of mitochondria do not produce active mitochondria. This research determined the proper differential centrifugation speed that will cause the mitochondria alone to pellet in the appropriate fraction and the determination of the best time through which mitochondria can be frozen before they become inactive. An initial test was completed to conclude which centrifugal speed is appropriate to pellet the majority of mitochondria during the second spin and then anywhere from ten to fifteen days per run was needed to test the effect of the three different freezing possibilities. The centrifuge used (a Beckman J2-H15 Rotor and J2-16 centrifuge) was measured in the range from 1800 RPMs (250 x g) to 2700 RPMs (600 x g) and the freezing techniques include flash freezing versus normal freezing and a –20 and a –80 degree Celsius refrigerator. At 2000 RPMs, the –80 degree Celsius system produced the most desirable results after calculating mitochondrial activity in milligrams of protein per minute. However, at least two more runs will be conducted comparing two mitochondrial samples with a second spin and either 1800 or 2000 RPMs before the storage aspect of the experiment is attempted.

**Board 10** MUTATIONAL ANALYSIS OF THE LEU66-66 AND SERINE-66 MUTATIONS OF THE LACTOSE PERMEASE PROTEIN IN *ESHERICHIA COLI*. CONSTANCE A. CHANDEL (CNANCHEL@OTTERBEIN.EDU), ERIN N. TRACY (ETRACY@OTTERBEIN.EDU) DR. AMY JESSEN-MARSHALL (AJESSEN-MARSHALL@OTTERBEIN.EDU) OTTERBEIN UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, DEPT 1 OTTERBEIN COLLEGE, WESTERVILLE, OH 43081.

The lactose permease is a symport protein that functions in the inner membrane of *Escherichia coli*. This protein belongs to the USA superfamily, which shares a common 2-D structure with twelve transmembrane domains. In all members of this family, the hydrophilic loop connecting transmembrane domains two and three shown as highly conserved. The predicted sequence is G-X-X-X-D/E-R/K-X-G-R/K-R/K. The X represents positions that show variable conservation. However, closer analysis of amino acid chemistry suggests a higher level of specificity than previously presumed. Positions one and two are hydrophilic and any amino acid despite the evidence that sixty-percent of all members in the family have a leucine or isoleucine in position three and forty-percent show a serine or threonine in the fourth position. To test this we mutagenize lactose permease by site-directed mutagenesis to change leucine to isoleucine, aspartic acid or tyrosine at position 66. Also, serine was mutated to tryptophan at position 67. Qualitative analysis showed the S67W mutation to have a significant loss of transport activity based on white colony phenotype on MacConkey plates. A quantitative analysis of function will be performed through an ONPG bioassay. Initial results show that S67W transports 21% of wild-type levels, which is confirmed our hypothesis that a neutral substitution at the fourth position is inaccurate. Work on analysis of position 66 continues. We hypothesize that the isoleucine mutation will have little effect on the function of the protein, whereas the tyrosine and aspartic acid will greatly reduce function based on the results seen with S67W.

**Board 11** IDENTIFICATION OF SECOND SITE COMPENSATORY MUTATIONS IN THE FE PROTEIN OF AZOTOBACTER VINELANDII UW97. PADMA KOSARAJU, PADMAK@BGNET.BGSU.EDU; LAKSHMI PULAKAT, PULAKAT@BGNET.BGSU.EDU; NARA GAVINI, GAVINI@BGNET.BGSU.EDU; DEPT OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY; BOWLING GREEN OH 43403.

Azotobacter vinelandii UW97 lacks diazotrophic growth due to a single mutation in the nifH gene, which codes for the Fe protein of the nitrogenase. This mutation was identified to be the replacement of serine at position 44 in the nifH gene by phenylalanine. This mutation is located in a conserved domain of Fe-protein which links the nucleotide binding site and the MoFe-protein docking
surface of the Fe–protein. It was suggested that the loss of diastrophic growth in A. vinelandii UW97 may be due to global conformational disruption or by the disruption of the conformational change upon Mg-ATP binding. To isolate genetic revertants of A. vinelandii UW97 that can show diastrophic growth, Tn10 insertions were induced in the nifH gene. To do this, the region of nifH spanning codon 45 – 289 was PCR amplified and was cloned into pCR2.1-TOP10N. The clone was sequenced. This was done to ensure that the codon 44 would remain unchanged (44phe) throughout this mutagenesis process. Random mutations were introduced into this truncated nifH gene (nifH 45–289) by transforming red cell lysates. Transformants were isolated, and the mutated pBG3205 was isolated after propagation through red cells, and the ability of the mutated nifH 45–289 to complement the nif phenotype of A. vinelandii UW97 was analyzed. The pBG3205 carries only colE1 replication origin, and it is not capable of autonomous replication in E. coli. However, since A. vinelandii has a highly efficient homologous recombination, the mutated nifH 45–289 in pBG3205 could recombine with the chromosomal nifH of UW97 and lead to the production of nif+ revertants. A total of 130 nif+ revertants were isolated by this process. Analysis of these mutants showed a deeper insight into the folding patterns and activity of the Fe protein.

**Board 12**

**NIFM INDEPENDENT MUTANTS OF NITROGENASE REDUCTASE OF AZOTOBACTER VINELANDII.**

**BRIDGET K FOSTER (FOSTERA@BGSU.BGSU.EDU), L. PULAKAT (PULAKAT@BGSU.BGSU.EDU) AND N. GAVINI (NGAVINI@BGSU.BGSU.EDU).**

Directed evolution was used to screen mutants efficient in nitrogen fixation. Growth analysis of pBG1380, and designated the resultant plasmid as pBG2476. On the other hand, this mutation was able to recombine with the chromosomal nifH of UW97 and lead to the production of nif+ revertants. A total of 130 nif+ revertants were isolated by this process. Analysis of these mutants showed a deeper insight into the folding patterns and activity of the Fe protein.

**Functional and Structural Similarity of chlL, Chlamydomonas reinhardtii, and nifH, Azotobacter vinelandii, Senny Delacroix, sennydv@bgsu.bgsu.edu; LAKSHMI PULAKAT, pulakat@bgsu.bgsu.edu; NARA GAVINI, ngavini@bgsu.bgsu.edu; DEPT OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.**

Nitrogenase is an enzyme complex consisting of two oxygen-sensitive protein components, the Fe–protein and the MoFe–protein. The Fe–protein is a homopolymer (encoded by nifH), which contains a single Iron–Iron cluster (Fe₄S₄ cluster) whereas Iron–Molybdenum protein (MoFe–protein) is a 2x2 beta heterotetramer (encoded by nifDK) containing 2 Mo atoms and 30 Fe atoms consisting of two subunits. Two parallel copies of each metal are inserted into P clusters and MoFe–co. In vitro assays have identified that nifH is necessary for FeMo-co biosynthesis and the nifM gene product is required for activation and stability of the Fe–protein. The chloroplast genome of Chlamydomonas contains a gene encoding a protein that is 30% identical to nitrogenase Fe protein (encoded by nifH) subunit and the cysteine residues required for liganding the Fe₄S₄ cluster in Fe–protein are conserved in ChlL. Further using DNA shuffling technique we generated a nifM independent nifH mutant capable of nitrogen fixation.

**Board 15**

**MET225 AND TYR230 ARE INVOLVED IN THE NIFM INDEPENDENT FOLDING OF THE FE–PROTEIN.**

**PREET KAPOOR (PREETIK@BGSU.BGSU.EDU); PULAKAT LAKSHMI, pulakat@bgsu.bgsu.edu; GAVINI NARA, ngavini@bgsu.bgsu.edu; DEPT OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.**

Nitrogenase is composed of two separately purified components, the Fe–protein and the Molybdenum–Iron–protein. The Fe–protein is encoded by nifH and serves as the physiological donor to the dinitrogenase enzyme. The Fe–protein is a homopolymer with a molecular weight of approximately 60,000 daltons. The nifM is an accessory gene of nif–gene cluster required for the accumulation of active Fe–protein. The nifH gene product has been suggested to be involved in both the biosynthesis or insertion of the Fe₄S₄ cluster into the apo Fe–protein and synthesis of the inorganic sulfide needed for the 4Fe₄S₄ cluster assembly. Therefore, the role of NifM protein could be to impart activity and stability to the Fe–protein. Based on the model, we have been able to isolate an Azotobacter vinelandii strain BG1158, which codes for a Fe–protein containing the mutations M225ST and Y230H, which could functionally complement a NifM deletion strain. Methionine residue 225 is located in a non-conserved domain of the Fe₄S₄ cluster. Contrast, Tyrosine at position 230 is located in the alpha-10 helix. In order to facilitate purification of the Fe–protein containing these two mutations, we cloned the nifH from A. vinelandii BG1158 into the his-tag bearing vector, pBG1380, and designated the resultant plasmid as pBG2476. On the other hand, this mutation was able to recombine with the chromosomal nifH of UW97 and lead to the production of nif+ revertants. A total of 130 nif+ revertants were isolated by this process. Analysis of these mutants showed a deeper insight into the folding patterns and activity of the Fe protein.
Nitrogenase, which catalyzes dinitrogen to ammonium, is composed of iron molybdenum (MoFe) protein and iron (Fe) protein. The MoFe protein is required for the activation and the stabilization of the Fe protein. Therefore, the MoFe protein should be required to impart activity and stability to the Fe-protein through some sort of catalytic event. Based on this reasoning, we isolated a mutant Azotobacter vinelandii NifDK strain in which the NifM protein was deleted for nitrogenase activity. Further analysis showed that the nif/H gene from this mutant strain contained multiple mutations spanning three easily recognizable regions in the Fe-protein. We concluded that these amino acid codons may function in proper nitrogenase activity, and we performed genetic complementation experiments using growth curve analysis. Growth curve patterns showed that the mutants were able to grow independent of NifM. These analyses, combined with molecular modeling analysis, showed that the region spanning amino acids 220 to 240 is involved in the NifM-mediated folding of the Fe-protein of nitrogenase.

**Board 17 FUNCTIONAL NIF-D-K FUSION PROTEIN IN A. VINELANDII IS A HOMODIMERIC COMPLEX AS DETERMINED BY USING BACTERIOMATCH™ TWO-HYBRID SYSTEM.**

Surobhi D. Laheri; S. Ramamurthy; Pulakat P.; Pulakat B.; Gavini Nara; Laksmini Pulakat, L.; BGSU, Department of Biological Sciences, Bowling Green State University, Bowling Green OH 43403.

The MoFe protein of the complex metalloenzyme nitrogenase folds as a heterotrimer containing two copies each of the homologous alpha and beta subunits, encoded by the nifD and the nifK genes respectively. The functional expression of the NifD-K fusion protein was demonstrated in A. vinelandii, consistent with the MoFe protein being flexible as it could accommodate major structural changes, yet remain functional. This finding led us to further explore the type of interaction between the fused MoFe protein units. We aimed to determine whether an interaction exists between the two fusion proteins to form a homodimer that is equivalent to native heterotrameric MoFe protein. By using the Bacteriomeatch™ Two-Hybrid System, fused constructs of NifD-K (fusion) with the full-length αCI of the pBT bait vector and also NifD-K (fusion) with the N-terminal α-RNAP of the pTRG target vector were used. To compare the extent of interaction between the NifD-K proteins to that of the β-β interaction in the native MoFe protein, we proceeded to generate fused constructs of NifK with the β-RNAP of the pTRG vector and βCI protein of the pBT vector. The strength of the interaction between the proteins in studies was determined by measuring the β-α-galactosidase activity and extent of ampicillin resistance of the colonies expressing these proteins. This analysis demonstrated that direct protein-protein interaction exists between NifD-K fusion proteins, suggesting that these homodimers may be functional. We propose that these homodimers of NifD-K fusion protein may function in a similar manner as that of the heterotrimeric native MoFe protein. The observation that the extent of protein-protein interaction between the β-subunits of the NifD-K proteins to that of the β-β interaction in the native MoFe protein, we proceeded to generate fused constructs of NifK with the β-RNAP of the pTRG vector and βCI protein of the pBT vector. The strength of the interaction between the proteins in studies was determined by measuring the β-α-galactosidase activity and extent of resistance to ampicillin of the colonies expressing these proteins. This analysis demonstrated that direct protein-protein interaction exists between NifD-K fusion proteins, suggesting that these homodimers may be functional. We propose that these homodimers of NifD-K fusion protein may function in a similar manner as that of the heterotrimeric native MoFe protein. This disruption is comparable to the extent of protein-protein interaction observed between the NifD-K fusion proteins in the same system supports this hypothesis.

**Board 20 ISOLATION OF SECOND SITE FUNCTIONAL COMPENSATORY MUTATION FOR AZOTOBACTER VINELANDII UW97 Fe-PROTEIN IN THE BETA SUBUNIT OF MoFe-PROTEIN.**

Ritesh Tandon, Pulakat P., and N. Gavini. Department of Biological Sciences, Bowling Green State University, Bowling Green OH 43403.

Azotobacter vinelandii UW97 is not capable of diazotrophic growth due to a specific mutation in the nifH. This mutation replaces serine by phenylalanine at position 44 rendering the protein incapable of its functions. The loss of function of the iron-protein due to this mutation was modeled to be a conformational disruption of the Molybdenum-Iron -protein and other accessory proteins. We have isolated second site genetic mutants of A. vinelandii UW97, specifically in the beta subunit of the Molybdenum-Iron -protein by using cloned nifK and subjecting it to spontaneous mutagenesis in DNA repair compromised E. coli XL1-RED cells. Further analyses by nucleotide sequencing and genetic complementation showed that the A. vinelandii strain UW97 retained the original mutation at Ser44Phe while acquiring a suppressor mutation in the beta subunit of the Molybdenum-Iron -protein. The mutations in the Molybdenum-Iron -protein were mapped using mutagenesis and found that these proteins are most likely involved in facilitating binding to the defective Iron-protein from UW97. The purification and characterization of these altered proteins is consistent with a mechanism of the suppression of the mutation sites, leading to conformational changes during the nitrogenase complex formation.
Board 24  KERATINASE-PRODUCING FUNGI ISOLATED FROM THE PLUMAGE OF WILD SONGBIRDS AND SOIL. HEATHER M. COSTELLO, hmcostel@owu.edu, and JANN M. ICHIDA, hmic@owu.edu, DEPT OF BOTANY AND MICROBIOLOGY, OHIO WESLEYAN UNIVERSITY, DELAWARE, OH 43015.

The management of ten thousand pounds of feather waste produced every hour at a typical poultry processing plant presents a current environmental problem. Bacillus licheniformis and Streptomyces sp., isolated from the plumage of birds, have been used as an aid in poultry processing because they completely degrade the keratin, the recalcitrant protein of feathers. Keratinase-producing fungi have been reported. This study focused on isolation of fungi from avian sources, their keratin-degrading ability and interactions with bacteria. Seven fungi of fungi were isolated from bird contact plates and soil collected from five sites at Ohio Wesleyan University Kraus Wilderness Preserve. Feather degradation in defined basal media was tested for ten isolates. Keratinase activity of crude fungal extracts was also examined. Strong keratinase-producing fungi included Fusarium and Acremonium spp. Microbes compete for substrates in the same environment, so the antibacterial properties of these fungi were tested. Usnic acid, a compound from lichen material commonly used in nests, was examined for possible fungil inhibition using wells in agar plates. Fusarium sporotrichioides, identified by Microbial ID®, was the strongest keratinase producer and inhibited Escherichia coli, but not Gram-positive bacteria. Four of the fungal isolates were slightly susceptible to the usnic acid. The fungi tested in this study had exceptional ability in degrading feather barbs from the rachises. Because this can be difficult and costly to do mechanically, fungi may prove to be necessary for the development of an easy-to-use method of feather reuse. Such a method may increase the recycling of these materials, reduce feather waste by utilizing the end product for livestock feed, and degrade feather barbs from the rachises. Because this can be done to protect themselves against these bacilli and investigated whether plants brought to the nest might have an inhibitory effect to the nestlings from harmful bacteria.

Board 23  BACTERIAL MOTILITY OF FRESHWATER ISOLATES FROM THE Kraus WILDERNESS PRESERVE. AMANDA R. ROBINSON, arrobin@owu.edu, (LAURA TOHELA-REUNING, ltohela@owu.edu, and JANN M. ICHIDA, hmic@owu.edu, DEPT OF BOTANY AND MICROBIOLOGY, OHIO WESLEYAN UNIVERSITY, HCWC Box 2056, DELAWARE, OH 43015.

The low motility of freshwater systems require bacteria to express mechanisms which aid in their survival and growth. Pseudomonas spp. and Burkholderia spp. can move to areas of desirable concentrations of nutrients via chemotactic responses and also produce siderophores – low molecular weight compounds that chelate iron and make it available as a cellular nutrient. Because these bacteria live in oligotrophic environments, the goal was to investigate how the bacteria respond to various concentrations of nutrients via chemotaxis and the physical nature of the flagella used for this movement. The water samples were collected near the Kraus Wilderness Preserve in Delaware, OH. Bacteria were isolated from these water samples using modified W-R media containing either sodium citrate, mannitol, L-alanine, or glucose as the sole carbon source. Chemo-reproduced, motile bacteria were isolated, oxidase tests, catalase tests, and Gram stains were done. These tests were used to separate potential Pseudomonas spp. and Burkholderia spp. from other isolates. Further identification of the five most motile isolates, as determined by microscopy, was performed using the Vitek 2 MicroPlates™ and BBL® Enterotube™ II systems. Growth curves were made of the two most motile isolates showing a doubling time of 2727 minutes for isolate SWC1 and 567 minutes for isolate SWC2. Capillary tube chemotaxis assays were performed with the SWC1 isolates using sodium citrate, L-alanine, or a blue siderophore as a chemo-attractant. The blue siderophore elicited a chemotactic response as determined by the ratio of 2.236 for a 0.01 mM attractant concentration, while the remaining two substances were not chemotactants. This blue siderophore will be identified using spectrometry while other chemotaxants are tested with isolate SWC1.

Board 22  EVALUATION OF ELECTRON BEAM IRRADIATION ON ENDSPORE-CONTAMINATED MAIL. SHANNON L. HELFINSTINE, SLMILLE2@KENT.EDU, CARLOS VARGAS-ABURTO, cvargas@kent.edu, CHRISTOPHER J. WOOLVERTON, CWOOLVER@KENT.EDU, KENT STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, 500 E. MAIN ST., CHH 256, KENT OH 44324.

Concern of anthrax-tainted letters has necessitated a comprehensive investigation of the use of electron beam (e-beam) irradiation to sanitize US mail of endospore contamination. A culture of Bacillus atrophaeus, an anthroprophilic bacillus, was prepared, dried on membrane filters (0.22 μm), and irradiated with a 5 MeV electron beam accelerator at doses ranging from 0–40 kGy, in 5 kGy increments. In other experiments, doses were focused between 10–15 kGy, in 1 kGy increments. Irradiated (and unirradiated) bacteria were incubated in nutrient broth to determine culturability, via turbidity. Once the lethal dose was determined, additional experiments were performed with irradiated membranes vortexed in 10 ml water to release the endospores. Released endospores experiments were performed using the Biolog GN2 MicroPlates™ and BBL® Enterotube™ II systems. Growth curves were made of the two most motile isolates indicating a doubling time of 2727 minutes for isolate SWC1 in W-R plates and soil collected from five sites at Ohio Wesleyan University Kraus Wilderness Preserve. Feather degradation in defined basal media was tested for ten isolates. Keratinase activity of crude fungal extracts was also examined. Strong keratinase-producing fungi included Fusarium and Acremonium spp. Microbes compete for substrates in the same environment, so the antibacterial properties of these fungi were tested. Usnic acid, a compound from lichen material commonly used in nests, was examined for possible fungal inhibition using wells in agar plates. Fusarium sporotrichioides, identified by Microbial ID®, was the strongest keratinase producer and inhibited Escherichia coli, but not Gram-positive bacteria. Four of the fungal isolates were slightly susceptible to the usnic acid. The fungi tested in this study had exceptional ability in degrading feather barbs from the rachises. Because this can be difficult and costly to do mechanically, fungi may prove to be necessary for the development of an easy-to-use method of feather reuse. Such a method may increase the recycling of these materials, reduce feather waste by utilizing the end product for livestock feed, and degrade feather barbs from the rachises. Because this can be done to protect themselves against these bacilli and investigated whether plants brought to the nest might have an inhibitory effect to the nestlings from harmful bacteria.

Board 25  BIRDS, HERBS AND BACTERIA: THE EFFECTS OF ANTIMICROBIAL PLANT NESTING MATERIAL ON FEATHER-DEGRADING BACTERIA. NICOLE-MARIE K. COTTON, nmcotton@owu.edu and JANN M. ICHIDA, hmic@owu.edu, DEPT OF BOTANY AND MICROBIOLOGY, OHIO WESLEYAN UNIVERSITY, DELAWARE OH 43015.

Bacillus licheniformis, a feather-degrading bacterium, occurs in the plumage of birds. Plants in bird nests can gain resistance to antibiotics causing them to be ineffective. The overuse of antibiotics in medicine and agriculture is contributing to the development of antibiotic resistance. This study was to determine the extent of antibiotic resistance within lakes in the Maumee Valley Watershed Area of Northwest Ohio. It was hypothesized that isolated lake ecosystems will have less antibiotic resistant bacteria than lake ecosystems that receive water as run off from agriculture. In this study, four lakes were tested for the measure of antibiotic resistant bacteria and coliforms. To do this three, triplicate samples were taken at each site. Two lakes having drainage ditches that carry run off from farms were
Few studies have simultaneously documented seasonal changes in multiple habitats in streams. In this study, seasonal changes (October 2000 to 2001) in bacterial communities in three habitats: sediments, leaves, and water, in the West Branch of the Mahoning River, were from nitrate, phosphate, pH, temperature, conductivity, and turbidity were monitored. Total bacterial counts were done via epifluorescent microscopy using 3,6-diamidino-2-phenylindole (DAPI). Sediments was done using taxon-specific probes (Domain Bacteria and Burkholderia cepacia). On leaves, bacterial abundance peaked in January (1.00E +07 per cm²) then declined through April with a June peak (6.74E +05 per cm²). Abundance in the water peak occurred during 2000 (8.39E +05 per ml) and in July (9.71E +05 per ml). Sediments were peaked during February (9.86E +07 per g dry weight). Trends were similar with the Domain Bacteria probe. An autumn peak on leaves was followed by a second peak in July (1.82E +05 per cm²). In contrast, two peaks occurred with Burkholderia cepacia in water in February (1.32E +04 per ml) and September (1.92E +04 per ml). Burkholderia cepacia also peaked in autumn 2000 (1.94E +06 per g dry weight) on sediments. Domain Bacteria and DAPI counts reflected abiotic factors; conversely, Burkholderia cepacia exhibited different seasonal patterns.

**Board 27** PRODUCTION OF ANTIBODIES DIRECTED AGAINST STAPHYLOCOCCUS AUREUS SEROTYPE 8 CAPSULAR POLYSACCHARIDE. BY JUDY A. SANTMIRE, THOMAS A. SMILEY, DEPT OF CHEMISTRY (DIANA L. AGAN, dlagan@ysu.edu), YOUNGSTOWN STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, ONE UNIVERSITY PLAZA, YOUNGSTOWN, OH 44555.

The goal of this study was to isolate the capsular polysaccharide (CP) of *Staphylococcus aureus* serotype 8 (SA8) and to produce monoclonal antibodies directed against it by the use of hybridomas. Capsular polysaccharide from SA8 was used to grow approximately 60 grams of the SA8 bacteria. The cells were treated with lysozyme, DNase, RNase, and Proteinase K to remove the majority of the cellular components. Then ethanol precipitation (90% and 75%) and ion-exchange chromatography were used to obtain fractions containing CP8. Pools of fractions, as determined by absorbance readings (213 nm), that tested positive for reducing sugars and negative for phosphorus were lyophilized. One pool was then used for purification on immobilized mouse splenocytes with myeloma cells. One subclone was selected by ELISA with antibodies directed against CP8.

**Board 29** A REAL-TIME PCR-BASED SYSTEM FOR RAPID AND SPECIFIC DETECTION OF SPOILAGE YEASTS AND MOLDS IN FOODS. KAI WAN1 and HUA WANG1,2,3. 1DEPT OF FOOD SCIENCE, 2015 FYFFE RD., COLUMBUS, OH43210, 3DEPT OF MICROBIOLOGY, COLUMBUS, OH 43210. wan.31@osu.edu.

Every year about 10% of food supplies are lost due to spoilage. Spoilage yeasts and molds are responsible microbial agents. Proper and rapid detection of the presence of these agents in raw materials and final products are critical for quality control. The objective for this study was to develop a detection platform enabling rapid, specific and sensitive detection for spoilage yeasts and molds in foods.

**Board 31** CORRELATION OF MULTIPLE PRIMER T-RFLP PROFILES WITH IN SILICO AMPLIFICATION AND DIGESTIONS OF CONSERVED RIBOSOMAL GENES TO DEPTERIZE T-RFLP DATA TO ANALYZE MICROBIAL COMMUNITIES. FREDERICK C. MICHEL, JR. (michel.36@osu.edu) AND STEPHEN SCIARINI (sciarini.3@osu.edu), DEPT OF FOOD, AGRICULTURAL AND BIOLOGICAL ENGINEERING, THE OHIO STATE UNIVERSITY-OARDC, WOOSTER, OH 44691.

Terminal restriction fragment length polymorphism analysis of 16S rDNA was completed with a microbiodiversity profiling method involving nucleic acid extraction, PCR amplification with fluorescently labeled primers,restriction digestion, and automated sizing of labeled terminal restriction fragments (TRFs). T-RFLP has advantages over other community analysis methods in that phylogenetic information can be obtained without direct sequencing of 16S rRNA gene fragments. However, few methods exist to compare TRFs from multiple digestions to the TRFs expected based on phylogenetic relationships. T-RFLP is based on database sequences to access this valuable phylogenetic information. T-RFLP FRAGSORT is a MS Windows based program that compares TRFs obtained from samples processed with widely used primers (BF, 907R, 11F, 226F, 111R) and restriction enzymes (MspI, HhaI, RsaI, HaeIII, and BfaI) to TRFs from simulated amplification and digestions of 34,531 ribosomal gene sequences. The output is a list of microorganisms and TRF sizes that correlate with the TRFs from in silico digestion. This list is then arranged from the greatest to the least normalized TRF peak areas. Validation experiments showed that three different digestions must be used to identify accurately pure cultures and members of defined bacterial communities. A database of 34,531 TRFs expected based on DNA sequence comparison. The primer pair was used to amplify the 370 bp 18S rDNA sequences from representative molds and yeasts. The sequences of the newly obtained fragments were further aligned with other 185 rDNA sequences available from the database. Yeast-specific and mold-specific primer-and-probe pairs were designed from the primer assay were developed. Specificity studies indicate that these primer-and-probe pairs do not cross react with conserved food-borne bacteria and fungi. Furthermore, the presence of molds and yeasts was detected from industry environmental samples, apple juice and juice concentrate spiked with target organisms using the newly developed real-time PCR system.

**Board 32** THE USE OF QUEEN ANNE’S LACE (DAucus carota) IN AN ANALYSIS OF ROOT TO SHOOT RATIO TO DETERMINE THE EFFECTS OF WHITE-TAILED DEER (Odocoileus virginianus) HERBIVORY. ADAM A. HARTLEY ALUMNI ENGLISH (dha26 @wittenberg.edu) AND STEPHEN J. JODOOLEY (jdooley@muskingum.edu), DEPT OF BIOLOGY, MUSKINGUM COLLEGE, 163 STORMONT STREET, NEW CONCORD OH 43762.

During the last century increasing numbers of white-tailed deer (*Odocoileus virginianus*) and expansion of their range has increased concern for damage to plant populations in the eastern United States. The use of herbaceous plants to determine the effects of white-tailed deer on plants and plant populations also is increasing. This study focuses on the morphology of Queen Anne’s Lace (*Daucus carota*) to monitor the effects of herbivory. Fieldwork was done during the months of October and November of 2003 at Salt Fork State Park in Guernsey County, Ohio. The sample sites chosen are in two areas designated as hunting, with an assumed lower deer density compared to two areas designated as non-hunting, with an assumed higher deer density. From each site 50 plants were collected. The number of browsed stems versus flowering shoots will be used to determine the intensity of herbivory between sites. Root to shoot mass ratios will be used as an indicator of growth investment under various levels of herbivory pressure. Areas of
high deer density are expected to show higher browsing pressure than in areas of low density. Also, plants with higher browse pressure are expected to show an increase in the number of flowering shoots and less root biomass to increase the chance of reproduction. In areas of lower density it is expected that plants will have less shoots and more root biomass because the need for replacement of stem tissue is not as important.

Board 33  IMPACT OF DEER BROWSING ON SUGAR MAPLE (ACER SACCHARUM) REGENERATION  PHILIP K. NICKELL, NICKELL.3@WRIGHT.EDU 49 BOULDER DR.  FRANKLIN, OH 45005.

Deer populations in North America are larger now than previously described, exacerbatin their potential for damaging plants. Previous studies have described the effects of deer browse on herbaceous species, and have shown relatively quick vegetative rebounds after deer removal or exclusion. However, little work has focused specifically on regeneration of woody species. The existing literature is based on single plots. This study is designed to examine the impact of deer browsing on sugar maple (Acer saccharum) which is palatable to deer and of ecological and economic importance in midwestern and northeastern North America. The position of sugar maple as a major species in forest types in this region of the country means that the inability of sugar maple to regenerate can result in dramatic changes in forest composition. Sugar maple seedlings/saplings were aged using annual budscars in six second-growth forest stands in Hueston Woods State Park, Montgomery County, Ohio with deer densities ranging from 19 to 93 deer per mi². The Wright State University campus woods in Greene county, Ohio served as a control with its low deer density (<20 deer per mi²). All maple seedlings less than 1 m in height were collected in sixty (60) 1 m² plots randomly placed in each park. A total of 350 maple seedlings were sampled in 2003. Average ages of maple seedlings ranged from 2.8 to 4.6 years. Absence of age class associated with high deer densities suggests that deer are reducing the ability of sugar maples to replace themselves by browsing and killing seedlings.

Board 34  THE EFFECTS OF HERBICIDE (ROUNDUP©) APPLICATION ON GARLIC MUSTARD (ALLIARIA PETIOLATA) DENSITY AND SUBSEQUENT EFFECTS OF GARLIC MUSTARD ERADICATION ON THE FOREST FLOOR PLANT COMMUNITY.  JORDAN S. Slaughter, slaughters@muohio.edu, DAVID L. GORCHOV, gorchovd@muohio.edu, DEPT OF BOTANY, MIAMI UNIVERSITY, OXFORD OH 45056.

The invasive biennial herb Alliaria petiolata (garlic mustard) is considered a threat to native forest herbs in the eastern United States. We assessed the effects of herbicide (Roundup®) on A. petiolata density and native species richness in an on a second-growth forest stand in Hueston Woods State Nature Preserve, Preble Co., OH. In each stand 25 1 x 1 m plots were spot-sprayed each November 2000-2003 and 25 plots were unsprayed controls. In early May 2001 five second-growth A. petiolata adults and rosettes in each plot. Cover of forest floor plants was quantified in early May and late June 2003. Herbicide significantly decreased adult A. petiolata frequency in both the old-growth (r = -0.42, P<0.001) and second-growth (r = -0.52, P=0.040) stands. Log-transformed A. petiolata rosette density was not affected by treatment in the old-growth stand (Student t = 0.22, n= 45) but was reduced in the second-growth stand (t = 2.71, n= 48, P = 0.010). Native species richness was not affected by treatment in either stand (t = -0.75, P = 1.02). Local herbicide application reduced adult A. petiolata density but was less effective in reducing rosette density, likely due to the presence of nearby seed sources. Combining data from all plots, herbicide treatment decreased A. petiolata density and increased cover of forest floor plants.

Board 35  THE DISTRIBUTION AND ASSOCIATED PLANT SPECIES OF QUEEN OF THE PRAIRIE (FILIPENDULA RUBRA).  AMY L. SCHULER, SCHULER.2@OSU.EDU 2 & JORDAN BEACH, JORDAN.BEACH@OHIO.EDU  BOX #186  1972 CLARKE AVE.  ALLIANCE, OH 44601 (EPP, LEONARD).

Filipendula rubra (Rosaceae) is a perennial herb native to calcareous fens in the northcentral United States. Although only considered potentially threatened in Ohio, F. rubra is state listed as threatened or endangered in four states. The goal of this study was to determine the distribution of F. rubra and associated plant species in Ohio. The species distribution was determined by examining herbarium records from herbaria throughout the expected range of F. rubra and comparing where the plant occurred historically (<1960) and recently (>1960). According to herbarium records, F. rubra occurred in 35 counties historically and 30 counties recently. In Illinois, Ohio, Missouri, and West Virginia, F. rubra is expanding its range while in Indiana, Michigan, and Pennsylvania, F. rubra is decreasing its range. In New York, the distribution of F. rubra has remained constant. From May through September in 2001 and 2002, associated plant species were collected and used to generate a list for each study site: Jackson Bog in northeast Ohio and Gallagher/Seiber Road Fen in west-central Ohio. Population sizes of F. rubra were N = 30 (JB), N = 269 (GSF), N = 130 (KLW), and N = 81 (PRF). Voucher specimens were deposited in the Youngstown State University herbarium (YUO). The herbarium was searched for species commonly associated with F. rubra were Pychathemum tenuifolium Schrad. (Lamiaceae), Lythrum salicaria L. (Lythraceae), Andropogon gerardii Vitman (Poaceae), Phlox maculata L. (Polemoniaceae), Steiremona quadriflora Sims (Primulaceae), Potentilla fruticosa L. (Rosaceae), Calium aparine L. (Rubiaceae), and Thelypteris palustris Schott (Thelypteridaceae).

Board 36  LDH/ADH ACTIVITY IN VASCULAR AQUATIC PLANTS IN RESPONSE TO HYPOXIC STRESS.  JORDAN R. BEACH, BEACHJR@MUOHIO.EDU  JORDAN BEACH, BOX #186  1972 CLARKE AVE.  ALLIANCE, OH 44601 (EPP, LEONARD).

During hypoxic conditions, crop plants have been shown to switch from oxidative phosphorylation to fermentation in order to produce sufficient levels of ATP. The increase in fermentative glycolysis results in the production of pyruvate, which is converted to alanine, lactate, and alcohol dehydrogenase (ADH), which along with NADH reduces acetaldehyde into ethanol. The amount of fermentative glycolysis occurring and the relative increase under hypoxic conditions can be found through the enzyme activity of lactate dehydrogenase (LDH), which along with NADH reduces glutamate into lactate, and alcohol dehydrogenase (ADH), which along with NADH reduces acetaldehyde into ethanol. The amount of enzyme activity can be found by isolating and purifying the enzyme, followed by analyzing the amount NADH (usually in nanomoles) consumed per second in relation to the number of units. The number of crop plants response to hypoxia, little to no research was found on natural aquatic vascular plants and the levels of LDH and ADH associated with them. The purpose of this experiment is to analyze the response of four native Ohio aquatic vascular plants to anoxic conditions with regards to the levels of LDH and ADH. Hypoxic conditions will be induced using NO₂⁻. The extraction will be done using a KPi buffer and the amount of enzyme present will be found using spectrophotometry of NADH and pyruvate. The plants include Saururus cernuus, Pontederia cordata, Polygonum amphibium, and Mentha arvensis.

Board 37  SURVEY OF OHIO’S NURSERIES FOR THE SUDDEN OAK DEATH PATHOGEN, PHYTOPHTHORA RAMORUM, AND RELATED OOMYCETES.  JORDAN S. Slaughter, slaughters@muohio.edu, DAVID L. GORCHOV, gorchovd@muohio.edu, DEPT OF BOTANY, MIAMI UNIVERSITY, OXFORD OH 45056.

Phytophthora ramorum is an oomycete responsible for the Sudden Oak Death (SOD) disease currently affecting several species of oak and other woody species in the western USA. Despite attempts to quarantine the pathogen, there is an increasing concern that SOD may spread eastward to Ohio because many Ohio nursery growers import foliar hosts of Phytophthora ramorum (e.g., rhododendron) from the Pacific Northwest. The objectives of this study were to: 1) identify and quantify the frequency of Phytophthora ramorum on leaves and shoots of rhododendrons growing in Ohio nurseries and 2) determine whether P. ramorum is present in Ohio. Rhododendrons in 15 nurseries throughout Ohio were sampled for foliar/shoot disease during the first fifty-five cultural cycle to determine the presence of Phytophthora spp. in a selective medium from a total of 213 diseased leaves and shoots. Based on ELISA, 52 of the diseased tissue samples tested positive for the presence of Phytophthora spp., and 40 samples showed concurring positive results for Phytophthora spp. in culture and with ELISA. We successfully sequenced the ITS region of the rDNA operon of 51 isolates, and this information was used to determine species identity and whether P. ramorum was among the isolates. Based on ITS sequence data, P. cinnamomi, P. cactorum, and P. nicotianae are among the foliar and shoot pathogens of rhododendron in Ohio ornamental nurseries, while P. ramorum is not. Within a nursery sample set, one or two phytophthora species were typically isolated.

Board 38  GAMETOPHYTE DEVELOPMENT OF PTERIS VITTATA AND PLATYCERIUM BIFURCATUM IN THE PRESENCE OF POTASSIUM ARSENATE.  SARAH M. JURAK AND JEFFREY S. LEHMAN, 155 WEST MAIN ST, DEPT OF
Ferns differ in their ability to tolerate arsenic, a widespread environmental contaminant. This study describes gametophyte development of *Pteris vittata* (an arsenic hyperaccumulator) and *Platycerium bifurcatum* (a non-accumulator) in the presence of potassium arsenite. Specifically, the objective was to quantify the percentage formation and mean development time (MDT) of prothallia. Spores of *Pteris vittata* and *Platycerium bifurcatum* were grown on basal salts medium amended with arsenic (0, 100, 500, and 1000 ppm). Throughout development, numbers of prothallia that produced prothallia were counted and used to calculate the percentage formation and MDT (days) for prothallia. Data were analyzed as a completely random design with two fern species, four arsenic levels, and five replications. MDT values (+ S.D.) for *Pteris vittata* were 6.4 ± 0.6, 7.0 ± 1.0, 7.0 ± 0.3, and 7.2 ± 0.5 days at 0, 100, 500, and 1000 ppm of arsenic, respectively, and statistically were not different. In contrast, MDT values for prothallia of *Platycerium bifurcatum* were 8.1 ± 0.8 and 8.9 ± 0.9 days at 0 and 100 ppm, respectively. Values for 500 and 1000 ppm were statistically longer and were 18.8 ± 0.3 and 19.5 ± 0.7 days, respectively. Percentage formation of *Pteris vittata* prothallia was 63.6% ± 4.4, 64.2% ± 6.9, 61.0% ± 4.2, and 60.4% ± 3.0 at 0, 100, 500, and 1000 ppm arsenic, respectively; all values were statistically the same. Values for percentage formation of prothallia of *Platycerium bifurcatum* were 59.1% ± 20.1, 45.1% ± 26.6, 2.4% ± 0.5 at 0, 100, 500, and 1000 ppm, respectively. Percentages for prothallium formation at 0 and 100 ppm arsenic were significantly larger than values for 500 and 1000 ppm. Results indicate that prothallia of *Pteris vittata* are unaffected by high levels of arsenic while prothallia of *Platycerium bifurcatum* are greatly inhibited and exhibit delayed development by arsenic levels > 100 ppm.

### Board 03 MALE BISEXED SEX RATIO IN YOUNG OF EASTERN BLUEBIRDS (SIALIA SIALIS)

Eastern bluebirds (*Sialia sialis*) were studied in nest boxes to determine if environmental conditions influenced the sex ratios of young. According to sex ratio theory, a male-biased sex ratio favors hererogametic reproduction. If males play a greater role in male reproductive success because healthy males are more reproductively successful than healthy females. In 2003, unusually high levels of rainfall should have promoted resource richness in our study site. Twenty-seven nest boxes were monitored daily at the Brown Family Environmental Center at Kenyon College, Knox County, Ohio. Growth rates of chicks were determined and feeding rates observed. The sex of young was determined just prior to fledging; sex ratios were calculated towards the production of male young; in 11 nests there were on average 2.8 ± 0.33 (sd) male chicks born per nest and only 1.3 ± 0.20 (sd) females (One-sample t test, t=3.14, P=0.011). The mechanism for a male-biased sex ratio may involve differences in the experience of males and females. The results of this study predict high levels of extrapair paternity in this bluebird population because extrapair paternity would provide the variation in reproductively successful that drives male biased sex ratios in this socially monogamous species.
Climatic adaptation is of fundamental importance in classical biological control programs that consider the suitability of an arthropod’s natural enemy in a new geographic application. The present study was conducted to examine the possibility for release and establishment of the ladybird beetle, Stethorus punctum, a spider mite predator imported into New Mexico, for potential use in soybean fields in the midwestern United States. Typically water balance profiles in insects are given for life in a given environment and are derived mostly from analyzing water loss rates. Beetles were placed at varying relative humidities (0%, 85%, 93% and 98%) and body water levels were monitored with an electrobalance. Observations were conducted at 14:10h L:D and 22-24°C (15 per replicate; N=3 for each determination). Rapid water loss rates were characteristic of the tiny-sized adults (2.8%/h) and actively feeding larvae (0.9%/h). Neither adults nor larvae were capable of maintaining water vapor tension in subsaturated air. The high moisture requirement of S. nigripes may be one of the drawbacks when using this particular beetle species broadly for controlling mites. Our conclusion is that S. nigripes would be a poor choice of beetle for spider mite control in the temperate zone.

**BOARD 05 HATCHING VIABILITY OF LONE STAR TICK EGGS (AMBLYOMMA AMERICANUM) AS AN INTEGRATION OF CUES FOR MULTICOLORED ASIAN LADY BEETLES**

A new disease vector, the lone star tick, *Amblyomma americanum* (L.), carrier of *Babesia microti* and *Anaplasma phagocytophila*, has expanded its range into Texas and the midwestern United States (Clark Co., Indiana (Brown Co.) and Illinois (Morgan Co.) based upon field surveys. Re-production of the tick on multiple hosts can occur at relative humidities near saturation. Eggs were kept at different relative humidities (0%, 85%, 93% and 98%) and body water levels were monitored with an electrobalance. Observations were conducted at 14:10h L:D and 22-24°C (15 per replicate; N=3 for each determination). Rapid water loss rates were characteristic of the tiny-sized adults (2.8%/h) and actively feeding larvae (0.9%/h). Neither adults nor larvae were capable of maintaining water vapor tension in subsaturated air. The high moisture requirement of S. nigripes may be one of the drawbacks when using this particular beetle species broadly for controlling mites. Our conclusion is that S. nigripes would be a poor choice of beetle for spider mite control in the temperate zone.

**Board 09 NEUROTYPHIN-3 IMPROVES RECOVERY TIME FOLLOWING NOISE-INDUCED**

Grape *phylloxera*, *Daktulosphaira vitifoliae* (Homoptera: *Daktulosphiridae*), is an important pest of grapesvines. The foliar form of *phylloxera* has been a pest of grapes in the United States since the mid-1800’s. Since the mid-1900’s French-American hybrids and Vinifera grape cultivars susceptible to the leaf form of *phylloxera* have been planted throughout the state. Due to the economic importance of the wine industry in Ohio, a survey of infestation levels of the leaf form of the *phylloxera* was conducted in October, 2003 at the Grape Branch of the Ohio State University at Kingsville, Ohio. The survey was carried out on eleven cultivars (Traminette, Bianca, Frontenac, Chardonnay CL.76, Regent, Kozma 55, Kozma 525, Pinot Noir CL. 777, Seyval, Concord, and Pinot-Gris). Sixteen vines of each cultivar were evaluated. The cultivars Kozma 525, Frontenac and Bianca had the highest percentage of grapes with galls that had no galls present on the shoots at the time of the survey. Frontenac had the highest number of galls and was the only cultivar that had new *Phylloxera* on the first leaves and the galls were larger than those on other cultivars. The cultivar Traminette was found to have more galls when adjacent to Bianca and Kozma 525. The cultivar Kozma 525 had new *Phylloxera* on the first leaves and the galls were larger than those on other cultivars. The cultivar Traminette was found to have more galls when adjacent to Bianca and Kozma 525. The cultivar Kozma 525 had new *Phylloxera* on the first leaves and the galls were larger than those on other cultivars. The cultivar Traminette was found to have more galls when adjacent to Bianca and Kozma 525. The cultivar Kozma 525 had new *Phylloxera* on the first leaves and the galls were larger than those on other cultivars. The cultivar Traminette was found to have more galls when adjacent to Bianca and Kozma 525. The cultivar Kozma 525 had new *Phylloxera* on the first leaves and the galls were larger than those on other cultivars.
SENSORINEURAL HEARING LOSS AND CAUSES HAIR CELL GROWTH IN THE COLOURLESS MUTANT OF ZEBRAFISH. PATRICK McKENZIE (pmckenzie@wooster.edu), RICHARD LEHTINEN (klehtinen@wooster.edu), and DEAN FRAGA (dfraga@wooster.edu) C-2215 1189 BEALL AVENUE WOOSTER, OH 44691

Zebrafish (Danio rerio) contain the same hair sensory cells as humans, which makes them an excellent model for studying many hearing defects in humans. In particular, noise-induced sensorineural hearing loss and profound hearing loss due to the Shah-Waardenburg Syndrome has made them good mutants. To study deafness in fish, wild-type zebrafish were exposed to a white noise 168db tone for twenty-four hours causing temporary deafness. The fish were either injected with 0.05cc of a saline/BSA solution or a saline/BSA solution with Neurotrophin-3 (100ng/ml). Hearing recovery was measured using a behavioral assay that tested the fish’s response to a 400Hz tone. The colourless mutants were exposed to either a solution of saline/BSA or a saline/BSA solution with NT-3 (100ng/ml). Changes in inner ear morphology were studied using a Scanning Electron Microscope. Noise-induced deafness fish exposed to saline/BSA (n=63) had a recovery time of 11.2 ± 0.7 (s.d.) hours while the fish exposed to NT-3 (n=62) had a recovery time of 9.4 ± 0.7 (s.d.) hours. The NT-3 treatment group had a significantly decreased time to recovery compared to the control treatment. This indicates that NT-3 may be a therapy employed to treat humans that experience temporary hearing defects in humans. In particular, noise-induced hearing losses and profound hearing loss due to the Shah-Waardenburg Syndrome.

BOARD 10 EFFECTS OF EXPERIMENTALLY INCREASED COSTS OF REPRODUCTION ON THE PARENTAL INVESTMENT OF HOUSE WRENSES (TROGLODYTES AEDON). JESSICK, LASKY, lasky@kenyon.edu; ROBERT A. MAUCK, mauckr@kenyon.edu. DEPT OF BIOLOGY, KENYON COLLEGE, GAMBER, OH 43022.

Animals of different life expectancies face different reproductive challenges and should display different strategies. We expected that a short-lived species, the house wren (Troglodytes aedon), would prioritize maintaining chick provisioning over self-maintenance when faced with an experimentally increased cost of reproduction. Study wrens nested in wooden boxes at the Brown Family Environmental Center at Kenyon College from May-August 2003. Five days after their first egg hatched, female wrens of the treatment groups received a double-wingspan mealworm required for flight and adult field metabolic rate (FMR) was measured using the double-labeled water technique. Provisioning was measured by the number of feeding visits by adults to the nest and mass of nestlings on treatment days after treatment. Nestlings of control mothers (N=9), nestlings of treatment mothers (N=6) were not significantly different in mass (Mann-Whitney U-test, p=0.7983) nor were their feeding significantly less often (Mann-Whitney U-test, p=0.4060). FMR data are not yet available. Greater sample size is needed to confirm the result of no difference between control and treatment groups.

BOARD 11 THE EFFECTS OF PP1c, PP1y, and PP1w IN THE PARAMECIUM CELULAR DIVISION. SABRINA BARROS (SBRAROS@WOOSTER.EDU). DR. DEAN FRAGA (DFRAGA@WOOSTER.EDU). DR. WILLIAM MORGAN (WMORGAN@WOOSTER.EDU). DEPT OF BIOLOGY, 931 COLLEGE MALL, THE COLLEGE OF WOOSTER, WOOSTER OH 44691.

Paramaecium tetraurelia is a ciliated organism that is complex and interesting because it contains two nuclei: a micronucleus and a macronucleus. The macronucleus contains the expressed genes and undergoes mitotic cell division. The micronucleus contains the germline genome and undergoes meiotic division. It has been shown that the regulation of cellular division of mammalian cells is thoroughly affected by the expression of Protein Phosphatase type-1 (PP1). Paramaecium has three PP1 isoforms: the PP1c, PP1y, and PP1w. This study will determine if those isoforms have an effect on the nuclear division in Paramaecium. In order to determine the importance of the PP1 genes in the regulation of Paramaecium cell division, the genes will be silenced by RNA interference (RNAi). To accomplish the effect of RNAi, 1-5 Paramaecium is/are fed bacteria expressing PP1c, PP1y, or PP1w dsRNA. After feeding, the cells are counted using a light microscope at 48 and 72 hours after initial feeding. It has been currently observed that the Paramaecium cells containing γ γ vectors divide slower, especially the cells containing the γ vector. In addition, cells fed PP1 γ dsRNA seem to be dying after 48 hours. In the following weeks, DAPI stain will be used to identify the stages of meiosis in which the RNAi-treated Paramecium cells are affected.

BOARD 12 THE EFFECTS OF VALPROIC ACID ON LIMB DEVELOPMENT IN CHICKEN EMBRYOS. DENISE M. POST, d-post@onu.edu, (AMY L. AULTHOUSE, a-althouse@onu.edu), 116 FRANKLIN STREET, APARTMENT C, ADA OH 45810.

The antiepileptic drug valproic acid (VPA) is a teratogen whose embryopathic mechanisms remain uncertain. VPA is known to cause several disabilities in the body including defects in posterior neural tube closure, cardiac malformations, cleft palate, and limb defects. An in ovo model was used to reproduce the teratogenic effects of VPA on limb development in chicken embryos. It is anticipated that limb deformities in VPA treated embryos will be apparent when compared to controls. In phase I, White Leghorn eggs, from LaRue Hatchery in Marion County, (N=22) between the stages of 14-16 are double stained for cartilage and bone using three different protocols. During phase II, mixed Bantam eggs, from St. Charles Seminary in Mercer County, (N=38) between the stages of 14-16 are treated with VPA (n=19) and Ringer’s solution (n=19). A dosage of 20 ml VPA in chicken Ringer’s solution (15 mg VPA/ml which approximates the human dosage) was applied topically to chicken embryos in ovo between the stages of 14-16. Some embryos are treated only with Ringer’s solution and will serve as controls (N=19). To monitor the limb development whole embryos will be double stained using Hanks’ (1981) protocol. Cartilage will be detected using alcinian blue, which stains the sulfated proteoglycans, and bone will be detected using alizarin red s, which stains the calcified matrix. Embryos will be evaluated for the presence of cartilage and bone in the limbs, using a vernier caliper. Total length of cartilage and bone will be compared using a t-test.

BOARD 13 POPULATION STRUCTURE AND EVOLUTION OF THE HAWAIIAN CHIRONOMID TELMATOGETON TORRENTICOLA (DIPTERA). MARINA STANBERY, mstanberry@notes.udayton.edu, (MARK G. NIELSEN, mnielsen@notes.udayton.edu), DEPT OF BIOLOGY, UNIVERSITY OF DAYTON, OH 45469-2320.

The Hawaiian Islands provide an exceptional opportunity to address evolution because of their isolation and known age. Chironomids (midges) colonized the oldest island, Kaua‘i, 3-5 million years ago from a marine form. From this marine ancestor, terrestrial forms have evolved and colonized the other islands. As these insects cannot fly, there are two plausible hypotheses for this colonization: 1) the terrestrial form on each island evolved independently from a panmictic marine population or 2) the terrestrial form evolved only once, and was carried to the different islands by means of dispersal via larval stages representing three different streams on Maui. Sequence comparisons resolve these insects into two groups, those individuals from Hanavi and Kehoma streams, and those fromiao stream. There is no geographic barrier that can explain these data. Researchers are using the remaining DNA samples representing marine and terrestrial forms from three islands are analyzed, patterns may emerge that could resolve the hypotheses and serve as a model to understand the more general phenomenon of insect evolution in these islands.

BOARD 14 THE EFFECTS OF NOCTURNAL LIGHT ON ODONTOTANUS DISJUNCTUS (COLEOPTERA: PASSALIDAE). M. POST, D-POST@ONU.EDU, (RAVENSEEKER1978@yahoo.com, COURTENAY N. WILLIS, cnwillis@ysu.edu), YOUNGSTOWN STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, YOUNGSTOWN OH 44555.

Little is known of the effects of nocturnal light on the activity of insects, particularly burrowing insects that rarely may be exposed to light. The goal of this study was to examine the effects of nocturnal light intensity on nocturnal activity of Bess beetles (Odontotanius disjunctus). Individuals (n=12) were exposed to one of three artificial light treatments (25w, 50w and 75w Exo terra™ Night glo® bulbs) that were used to simulate nocturnal light (near full moon phase) at the time of one of the lunar phases. Aboveground nocturnal activity, which includes feeding, walking, and burrowing, of O. disjunctus was videotaped for four h under artificial light on the three nights around each lunar phase and compared to determine if time spent feeding, walking, and burrowing differed between the three light treatments. Amount of time spent feeding, walking, and burrowing differed significantly between the high light treatment and the medium and low light treatment (Kruskal Wallis, P <0.001). However, there was
no difference either in time spent feeding, walking, or burrowing when considered separately. These results suggest that nocturnal light intensity may have an effect on the total nocturnal activity of _O. disjunctus_.

**Board 15**  
**STARVATION AFFECTS MOVEMENT OF SAND FIDDLER CRABS, UCA PUGILATOR, BETWEEN WATER AND LAND**  
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Sand fiddler crabs ( _Uca pugilator _ ) are sexual, diurnal, semiterrestrial and live in estuaries. It has been shown that differences in energy acquisition strategies exist between males and females. We tested the hypothesis that energy status affects time spent by crabs on the land compared to water. Crabs ( _n=96_ ) were randomly assigned to two groups, and then starved or fed for one week prior to testing. They were observed for one hour in isolated divisions of ten-gallon aquaria. In each division, crabs had access to both a sandy terrestrial environment and seawater. Fed crabs spent 84.8% of the time on land while starved crabs spent 76.1% of the time on land. Thus energy status did not have an effect on where crabs spent their time (two-sample t-test, _p=0.177_, _n=96_). Starved animals moved 2.7±0.6 times between land and water, which was more than fed animals (5.4±0.2, times two-sample t-test, _p=0.001_).

Gender affected movement in starved crabs but not in fed crabs. Starved males moved 2.2±0.6 times while starved females moved 1.0±0.4 times ( _p=0.00_). 44% of the starved animals foraged, while only 6% of the fed animals foraged (chi-square, _p=0.00, n=96_). Burrows were dug by 67% of the fed animals, but by only 23% of the starved animals (chi-square, _p=0.00_). In conclusion, starved crabs moved more than fed crabs. Furthermore, starved males moved more than starved females.

**Board 16**  
**MECHANICALLY EFFECTIVE AGENTS IN THE MUTABLE COLLAGENOUS TISSUES OF THE CLASS HOLOTHUROIDEA ALSO AFFECT THE TISSUES OF THE CLASS ASTEROIDEA**  
MONICA L. DURBEN, durbenl@hiram.edu, LAURA T. MOLE, mollet@hiram.edu, and GREG K. SZULGIT, szulgitgk@hiram.edu, HIRAM COLLEGE, DEPT OF BIOLOGY, POB 67, HIRAM, OH 44234.

Echinoderms such as sea cucumbers (Class: Holothuroidea) and sea stars (Class: Asteroidea) are able to rapidly and reversibly alter the stiffness of their connective tissues, which are known as mutable collagenous tissues. Previous research has shown that two distinct extract solutions can be made from the inner and outer tissues (116.2 ± 80.4 s at 1.5 ± .29 MPa) and these solutions can affect the stiffness of the tissues of members of a different class: Asterida. Two web choice tests were conducted on Agenlopsidus pennsylvanica and Agenlopsis utahana: 1. own web vs. conspecific web, and 2. own web vs. heterospecific web. In the conspecific web choice test 18/20 A. pennsylvanica chose their own web. In the heterospecific web choice test, five chose their web, five did not choose, and two escaped. Based on the results a binomial test of an _a priori_ expectation of random settlement (i.e. 50/50 own web vs. strange web) A. pennsylvanica chose their own web more often than expected ( _P_= 0.0440). Of the _A. utahana_ spiders tested, seven chose their own web, six chose the other web, and six did not choose. Based on a binomial probability, _A. utahana_ did not discriminate between webs ( _P_= 0.2095). For the own web vs. heterospecific web choice test six _A. pennsylvanica_ chose their own web, two chose the heterospecific web and four did not choose. Based on a binomial test the _A. pennsylvanica_ did not discriminate between webs ( _P_= 0.2095). Taken together, these results indicate significant differences between these two spider species in web discrimination. Evidence was found that _A. utahana_ settled randomly with respect to web identity.

**Board 19**  
**DIEL VERTICAL MIGRATION IN LAKE ERIE: IMPORTANT PELAGIC-BENTHIC LINKAGE?**  
HEATHER M. HICKIE, hhickey@bgsu.edu, TODD A. HAYDEN, and JEFFERY G. MINER, PROGRAM IN ECOLOGY, EVOLUTION, AND CONSERVATION BIOLOGY, GREEN STATE UNIVERSITY, BOWLING GREEN, OH 43403.

Vertical migration of zooplankton is generally acknowledged but not well quantified. Historically, Lake Erie has been relatively clear, but the reduction in loading of phosphorus and the presence of dreissenid mussels have caused water clarity to increase and thus may have a strong influence on the extent of vertical migration. Migrating zooplankton may impact a variety of lake ecosystems and may become an important nutrient mixing. In order to determine the extent of zooplankton vertical migration in the shallow waters of western Lake Erie, replicate horizontal tows (500µ m mesh net) were taken on three dates in summer 2002 at three depths (2, 5, and 8m) in water 10 meters deep at 0100 and 0700 hours (nocturnal and diurnal samples, respectively). Nocturnal abundance of herbivorous _Daphnia retrocurva_ increased as much as eight fold in the upper 2 m of the water column as compared to the diurnal period, while abundance at 5m and 8m did not change between day and night. For the carnivorous cladoceran _Leptodora kindtii_, nocturnal abundance was two-fold greater at all depths (2, 5, and 8m) compared to the diurnal period. This increase in nocturnal abundance cannot be explained by individuals moving upward from the sampled depths; clearly, individuals must have been migrating upward from the epibenthic region below 8m. These data indicate that diurnal sampling may strongly underestimate zooplankton biomass unless samples are also taken near the bottom. These data may provide supporting evidence that there may be an important plankton-based nutrient link between the pelagic and benthic regions of Lake Erie.
This study will determine the predation habits of the Eastern Coyote (*Canis latrans*) in southeastern Ohio during the months of mid-May through late November of 2003. Through collection of scat samples data will be gathered on content, amount of each prey species, and environmental of scat dropping site. The study sites, Blue Rock State Forest/Park area, Chandleersville/Salt Creek, and the Wilds reclamation area, all located in Muskingum County, Ohio, have been selected to represent many different areas supporting coyote. While sites are somewhat similar in local vegetation and prey species, with the exception of the exotic species found at the Wilds, there are some important differences. The Wilds sites consist of prairie-like habitat which are dominated by gathering-collectors, with some functional groups (e.g., filtering-collectors and predators) missing due to limited deciduous forest cover. The Chandleersville sites provide some dense forest cover mixed with a large water source, agricultural fields, and domesticated cattle and sheep areas. The Blue Rock sites are located in densely wooded settings mixed with hay fields and domesticated cattle and sheep fields. These differences have played a role in determining the predation habits of *Canis latrans*. Larger amounts of scat were collected at the Wilds and Blue Rock sites than the Chandleersville sites due to differences in understory and forest cover. Samples have been analyzed by first drying then identifying the fecal material of each scat using bone identification and hair analysis techniques. Preliminary results have shown remains of small mammals, insects, and some vegetation. By identifying the predation of these species, specifically in southeastern Ohio a further understanding of the regional ecology of the area will be gained.
research wetland facility called the Aquatic Ecology Research Facility (AERF). The AERF contains 10 constructed wetlands (10 m x 30 m) along a first-order stream. In summer 2003, five wetlands (flood-pulse wetlands) were allowed to fluctuate with creek water levels to simulate hydrologic regimes in natural floodplain wetlands; the other five wetlands (stable wetlands) were maintained at constant water levels. We monitored wetland water levels to determine flooding periodicity. Following heavy rain events, water levels in flood-pulse wetlands could exceed 160 cm whereas stable wetlands maintained a constant level of 80 cm. It took an average of 7 days after storms for flood-pulse wetlands to return to baseline levels. Many wetland invertebrate diversity was higher in stable wetlands (p<0.02). Trophic analyses revealed that collector-gatherers and predators were more abundant in flood-pulse wetlands than in stable wetlands (p<0.02). Based on these results, it appears that hydrologic regime significantly influences macroinvertebrate community structure in headwater systems.

Board 26

SURVEY OF TWO LONG-TERM REPTILE POPULATION STUDIES AT THE J. H. BARROW FIELD STATION: TURTLES AND SNAKES.

TIMOTHY GUHIER, guihertj@hiram.EDU, J. H. BARROW FIELD STATION, HIRAM COLLEGE, HIRAM OH 44234, (SAMUEL MARSHALL, marshallsd@hiram.EDU, AND WALTER MESHAKA,) THE STATE MUSEUM OF PENNSYLVANIA.

We report on two ongoing reptile population monitoring studies at the J. H. Barrow Field Station in Hiram Township, Portage County. The first is a cover board study of snake populations and the second is a trapping survey of the turtle population of a 1.0 ha pond. Each of five cover board arrays consisted of 10 pieces of 1.2 by 1.2 m pieces of 1.3 cm thick exterior grade plywood and five 0.5 by 2.0 m pieces of corrugated sheet steel. We captured snakes under the boards and ad hoc by hand and measured and immediately released them where they were captured. Species captured were eastern garter snake (Thamnophis s. sirtalis), northern brown snake (Storeria d. dekay), northern red belly snake (Storeria o. occipitomaculata), black rat snake (Pantherophis spiloides), northern water snake (Nerodia s. sipedon), and eastern garter snake (Thamnophis s. triangulum). Snakes greater than 20.0cm snout-vent length were also PIT (passive integrated transponder) tagged using AVID Music Chip Identification System Tags (AVID Identification Systems Inc., Norco, CA). We tagged 65 garter snakes, 10 milk snakes, 8 water snakes, 1 brown snake, and 2 black rat snakes. We used two types of turtle traps: hoop-net traps baited with sardines in late summer, and passive basking traps in the early summer. Turtles captured were eastern box turtle (Terrapene carolina), common snapping turtle (Chelydra serpentina) using both methods. We tagged a total of 84 painted turtles and 7 snapping turtles.

Board 27

EFFECTS OF TEMPERATURE LEVELS AND FLUCTUATIONS ON THE GROWTH AND DEVELOPMENT OF RANA PIPIENS. JENNIFER M. KAROW, JKAAROW@CMNH.ORG, DEPT OF BIOLOGY, MUSKINGUM COLLEGE, 163 STORMONT STREET, NEW CONCORD, OH 43762.

This study observed the effects of temperature and temperature fluctuations on the hatching success and rates of metamorphosis of Rana pipiens (the Northern leopard frog) in the laboratory. Due to anthropogenic influences, amphibian habitats have been greatly altered, and the treated lumbars and decidology uses are evident. Many causes for these declines have been suggested, such as disease, climate change, habitat alteration, environmental contaminants, and increased exposure to ultraviolet-B radiation. This study was designed to examine climate change as a possible complicating factor in the declines. Larvae are known to have higher mortality rates in warmer temporary ponds, and this study will investigate whether this could be due to decreased hatching success, deformities, or slowed metamorphosis that could lead to a higher susceptibility to disease, predation, and/or depletion of resources. The study will be performed in the laboratory to maximize control over variables. Constant temperatures range from 72 to 82 degrees F. After some larvae will be exposed to fluctuating temperatures. It is expected that hatching success will be greatly decreased while mortality and deformities are increased at higher temperatures and in fluctuating environments. Results will be compared against these expectations using a regression-level analysis.

Board 28

GIVING-UP DENSITY VARIATION IN THE EASTERN CHIPMUNK, TAMIAS STRAITUS: THE

IMPORTANCE OF DISTANCE FROM THE BURROW.

JENNIFER B. WILSON, jbwilson@muskingham.edu, (JAMES L. DOOLEY, jdooley@muskingham.edu) DEPT OF BIOLOGY, MUSKINGUM COLLEGE, 163 STORMONT STREET, NEW CONCORD, OH 43762.

This study examined the influence of distance on the foraging of the eastern chipmunk (Tamias Stratus). Giving-up densities (GUD) were used as the indication of this study in order to draw conclusions about the impact on foraging of chipmunks at the State Museum of Pennsylvania, located in Guernsey County, Ohio. The individual sites, or chipmunk burrows, were mostly on the east side of the Ohio and are remote from contaminated areas. The diverse environment is an ideal habitat for chipmunks. The study was performed during the months September, October and November of 2003. Artificial patches were made using pans holding fifty grams of seeds and sand on which to stand with the sand in order to keep the chips from getting wet. It is expected that GUD will decrease as distance from the burrow increases.

Board 29

GEOCHEMICAL MATERIALS STORED IN CADDISFLY (TRICHOPTERA) CASES: PRELIMINARY RESULTS ON CADDISFLY SELECTIVITY IN NORTHEASTERN OHIO. DAVID B. SAJA, dsaja@cmnh.org, CLEVELAND MUSEUM OF NATURAL HISTORY, 1 WADE OVAL DRIVE, CLEVELAND, OHIO 44106.

Many genera of caddisfly larvae (Trichoptera) construct cases from available materials, such as leaves, seeds and sand grains. These cases provide protective shelter, and help weight the larvae down in the stream where they hatch. Previous workers have shown that caddisfly larvae can build cases out of unusual materials, like gold, given only gold sand for construction. The purpose of this study was to determine whether caddisfly larval building in nature is selective in the geologic materials (preferably choosing heavy minerals, or completely random. To test this, the genera Neophylax and Helicopsyche, which construct cases predominantly of sand grains, were collected from two Northeastern Ohio rivers: West Branch Mahoning River, Portage Co., dominated by glacial sediment, and Ashtabula Creek, Ashtabula Co., dominated by weathering products. One-liter sediment samples were collected on one side of the stream and the sandy material was sorted out, identified, and dried through a riffle. Each sample was sieved through 4, 2, 1, 0.5, 0.125, 0.063 mm screens, and weight proportions and bulk compositions determined for each sieve. From each traverse, a dozen caddisfly cases were collected, disaggregated, and the material optically analyzed for shape, size, and mineral composition. Helicopsyche in both rivers constructed their cases almost entirely out of rounded quartz grains (~0.7 mm avg. dia.), but in the Ashtabula, the sand grains were much larger (3.3 mm avg. dia.), whereas in the Ashtabula Creek, the Ashtabula, the sand grains were much larger (3.3 mm avg. dia.).

Board 30

CHELATING LIGAND EXTRACTION OF HEAVY METALS FROM CHROMIUM TREATED COPPER ARSENATE TREATED LUMBER. NICOLE M. DICKSON, ndickson@muskingham.edu, (RAYMOND RATAICZAK, ray@muskingham.edu), MUSKINGUM COLLEGE, NEW CONCORD OH 43762.

The process to phase out chromated copper arsenate (CCA) from the treated lumber market began on February 12, 2002 in response to a request by the Environmental Protection Agency to ban the use of any CCA treated lumber. CCA treated lumber is known to leach heavy metals into soil and water. The water metals in the soil and water may possibly cause adverse health and environmental effects. Proper disposal of CCA treated lumber in the future may continue to be a significant environmental challenge due to the possibilities of heavy metal leaching. The removal of heavy metals from the lumber should allow the safe disposal of the wood. The relative effectiveness of chelating ligands, such as ethylenediaminetetraacetic acid (EDTA), cyclohexanediaminetetraacetic acid (CyDTA) and diethylentriamine-pentaacetic acid (DTPA) by Soxhlet extraction and pressure assisted extraction will be compared. In pressure assisted extraction, a pressurized sample is placed in a Soxhlet extractor with 50 ml of a chelating ligand solution. The pressure is increased on the bomb using nitrogen gas. This method is hypothesized to take less time than the extraction of heavy metals from the sawdust sample. The purpose of this study is to hypothesize the ligand with the highest binding affinity for metals, will extract the heavy metals most effectively. Graphite furnace atomic absorption spectroscopy will be employed to measure the amount of heavy metals present in the leachate and will thus allow for the
**Board 31** SYNTHESIS AND CHARACTERIZATION OF CYANIDE COORDINATION COMPLEXES AS PRECURSORS TO COMPOUNDS WITH MAGNETIC PROPERTIES. Ashley L. Leach, (Paul S. Szalay, phszlum思想政治学分校), 163 STORMONT STREET, NEW CONCORD OH 43762, leach50@hotmail.com

The field of cyanide coordination chemistry has developed over the last three centuries based on the versatile bridging capabilities of cyanide that were first observed in Prussian Blue. Despite these efforts, little progress has been reported in the preparation of homoionic complexes composed of low-valent transition metals and covalent cyanide ligands. These complexes' intense color is one of the many remarkable characteristics of the ligand, cyanide. The goal of this research is to synthesize coordination complexes of these metals from anhydrous metal starting materials. These coordination complexes will be utilized as building blocks in future experiments to create cluster compounds or solid state compounds with magnetic properties. Initially, cyanide salts of potassium, tetrabutylammonium, and tetraethylammonium will be used in reactions with metal starting materials such as gadolinium (III) nitrate and tetraethylammonium octachlorodirehenate. The resulting coordination complexes’ structures and physical properties will be elucidated using UV-Visible spectroscopy, X-ray diffraction, nuclear magnetic resonance spectrometry, and single crystal X-ray diffraction.

**Board 32** HIGH RESOLUTION NMR IMAGING OF OBJECTS WITH DIPOLAR-BROADENED SPECTRA. M.-J. Kim, mkn2@kent.edu, A. K. Khitrin, akhirtin@kent.edu, DEPT OF CHEMISTRY, KENT STATE UNIVERSITY, OH 44200-0001.

Magnetic resonance imaging (MRI) is among the most powerful techniques for nondestructive study of various objects. MRI has been widely used in biological science and medicine. The images are reconstructed from Fourier transform of nuclear spins in the presence of radiofrequency and magnetic field gradient pulses. The achievable spatial resolution is restricted by the linewidth of NMR signals. For high spatial resolution, sharp NMR signals are desirable. Gradients of the radiofrequency and magnetic field within the existing techniques, the resolution is considerably less for solids or “soft solids” where, in comparison to liquids, dipolar interactions between nuclear spins are not averaged out by fast molecular motions. We have experimentally demonstrated that long-lived coherent response signals, excited by long and weak radio frequency pulses, can be used to produce high resolution NMR images for objects with dipolar-broadened conventional NMR spectra. This high spatial resolution led to line-narrowing achieved with this new type of signal excitation. Compared to other techniques, the method does not require strong gradients of the magnetic field or radio frequency fields and, therefore, can be applied to large objects.

**Board 33** DISSOLUTION OF COPPER(II) OXIDE IN VARIOUS CONCENTRATIONS OF NITRIC ACID TO DEFINE THE SURFACE COMPOSITION USING ATOMIC ABSORPTION SPECTROSCOPY. Erica J. Newbould, enewbould05@jcu.edu (Michael P. Setter, msetter@jcu.edu), Box 221, JOHN CARROLL UNIVERSITY, 20700 NORTH PARK BLVD., UNIVERSITY HEIGHTS OH 44118.

Examination of the surface of fine powders is an important process in characterizing materials. For example, the power of a battery depends on the rate that ions can pass through the surface of the powdered material within a battery. In this project, copper(II) oxide was chosen for dissolution in nitric acid concentrations ranging from 9% to 0.0001%. CuO, 3H2O + 2HNO3 → Cu(NO3)2 + 4H2O. It was hypothesized that the powder would dissolve in the acidic solution and the amount of dissolution could be monitored by atomic absorption spectroscopy (AAS). Preweighed samples of copper(II) oxide were added to the nitric acid solutions. Small volume aliquots of the resulting mixtures were passed through a 0.1µm filter and then analyzed for copper using AA. It was found that the best way to linearly relate the AA data to time was a square root model. For short periods of dissolution (<2 hours), this square root model yielded correlation coefficients of 0.95 for twelve trials. The fraction of powder that would dissolve was linearly dependent on the pH of the solution; the lower the pH of the solution, the higher the fraction of powder that would dissolve. This research was supported by the power of those results being a lower fraction of the powder with a pH higher than 6.3 ± 0.8. When copper(II) oxide was placed in deionized water, no dissolution could be detected. This supports the linear model of the pH dependence of the dissolution.

**Board 34** STUDIES ON THE DEVELOPMENT OF THE ASEXUAL AND SEXUAL REPRODUCTIVE STAGES OF THE PATHOGEN GNOMONIA LEPTOSTYLA (Fr.) Con. B.e de Not., ON PHOT’S HOST JUGLANS NIGRA L. IN VITRO. David L. Mason, dmason@wittenberg.edu, DEPT OF BOTANY, WITTENBERG UNIVERSITY, SPRINGFIELD, OH 45501.

Host tissues expressing the asexual and sexual reproductive stages during the pathogen's life cycle on its host were chemically fixed, embedded (paraffin or Spurr plastic), sectioned, stained, and viewed by light and transmission electron microscopy (TEM). For scanning electron microscopy (SEM) small pieces of diseased tissues were placed onto holding stubs and viewed directly at 30KV. In vitro cultures of the pathogen derived from conidia and ascospores were studied primarily by light microscopy. The results from the sections on the conidial section indicated that the fungus formed acervular bearing structures, two-celled conidia and nectric areas of the host, primarily on the upper side of leaves, during the summer months. During the fall months, spongiospermia bearing small, rod-shaped spermatia and ascogonial coils with extending trichogyne were observed. Developing perithecia containing ascogenous hyphae were detected during late fall, and in November and December on old partially decayed leaves, acervulus bearing two-celled ascospores were observed. Cultures started from conidia and ascosporites were induced to produce conidia, spongiospermia, ascogonial coils with trichogynes and developing perithecia. Successful inoculations were carried out on healthy leaves from conidia produced in acervuli on infected leaves and from those produced in vitro.

**Board 35** DISTRIBUTION OF THE FERNS AND FERN ALLIES IN WEST VIRGINIA BASED ON THE HOLDINGS OF THE HERBARIUM OF YOUNGSTOWN STATE UNIVERSITY. John J. Atwood, s0184779@cc.yusu.edu, Carl F. Chuey, cfchuey@ysu.edu, YOUNGSTOWN STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, ONE UNIVERSITY PLAZA, YOUNGSTOWN OH 44555.

The bryoflora of West Virginia has a diverse amount of species and a few dozen new species. Recently, the "Annotated Checklist of the Hornworts, Liverworts, and Mosses of West Virginia" published by Studlar et al. in 2001 listed the known taxa for the state, based on the holdings of specimens at the Herbarium of West Virginia University (WVU). The herbarium, in cooperation with the Herbarium of Youngstown State University (YUO) provide for 219 additional county distribution records. Also, one state distribution record, Sphagnum tenellum, is reported new to West Virginia. This disjunctive species from the upper northeastern coast has been collected only once outside of its range. All of the represented taxa from both WVU and YUO are plotted on county dot maps for the state. Mapping bryophyte distribution can be an effective way to show where the amount of cryptogamic diversity can be found. Since the destruction of habitat through strip-mining and moss harvesting threatens bryophyte diversity, these distribution maps also establish a baseline by which the gain or loss can be determined. Furthermore, the distributional maps show regions where collecting is strongly localized, as in the mountainous counties of Pocahontas, Randolph, and Greenbrier counties. Areas that remain relatively unstudied are also highlighted as in the counties along the Ohio border.

**Board 36** MORPHOLOGICAL AND PHYSIOLOGICAL TRADEOFFS OF AMERICAN CHESTNUT (CASTANEA DENTATA) AND OTHER HORNWOODS IN VARYING NUTRIENT AND LIGHT REGIMES. Dana J. Thomas, thomas6@muohio.edu, Henry H. Stevens, stevemm@muohio.edu, Carolyn Howes Keiffer, keiffer@muohio.edu, DEPT OF BOTANY, MIAMI UNIVERSITY, OXFORD OH 45056.

American chestnut (Castanea dentata) once dominated the eastern deciduous forest, but was virtually eliminated in the early 1900's by the exotic fungus, Cryphonoectria parasitica. Understanding the morphological and physiological traits that contributed to the former success of American chestnut would enhance understanding of temperate deciduous forest dynamics and help lay the groundwork for reintroduction of resistant chestnut strains. Seedlings of American chestnut, red oak (Quercus rubra), tulip poplar (Liriodendron tulipifera) and bitternut hickory (Carya cordiformis) were grown in a factorial experiment with three levels of each factor. Thirty seedlings of each of the three species were grown in small pots. Seedlings were grown in two different nutrient density treatments (5% and 27% of ambient sunlight) and within each light treatment, slow-release fertilizer (13-13-13 NPK) was applied at three levels for a total of 90 individuals of each species. After four months of growth, we measured specific leaf area, foliar nitrogen content and...
root and shoot biomass of each seedling. Results indicate clearly that American chestnut outperformed the other hardwoods in all treatments. The strong competitive ability of chestnut under a wide range of light and nutrient conditions could help explain chestnut’s former dominance in the temperate deciduous forests. This research also suggests that chestnut will be able to thrive in a wide variety of intact forests when reforestation experiments begin.

Poster Session 2:00-3:00PM

Board 01 A COMPARISON OF ORDER DIVERSITY OF PLANKTONIC CRUSTACEANS IN STRIP MINED AND UNDISTURBED AREAS. SARAH K. McBeth, smcBeth@muskingum.edu, (DANNY IGLESCIA). MUSKINGUM COLLEGE, 163 STORMONT ST., NEW CONCORD OH 43762.

Planktonic crustaceans are an important part of the aquatic food chain, consuming algae and bacteria while providing food for insects, fish, amphibians and waterfowl. Because of their ubiquity and their sensitivity to environmental variation, these organisms often serve as indicators of water quality. This study compared the diversity of orders from the Phylum Crustacea in samples taken from a wetland on a reclaimed strip-mine (The Wilds - Muskingum Co., OH), to a similar body of water in an area that was not strip-mined (Otsego Field Station- Muskingum Co., OH). Samples (n=6) were collected from a plankton net retained in solution of formalin, sucrose, and glycerol. A light microscope was used to key the organisms. Representatives of the orders Podocopa, Notostraca, Cladocera, and Eucopepoda were found on both sites. Additionally, the abundance of day for each order was different for the strip-mined site. A contingency table revealed significant differences in the frequencies of the orders at the two sites (μ = 15.38, df = 4, p<0.01).

Board 02 ASSESSMENT OF SOIL MOISTURE CONTENT BELOW SOYBEANS GROWN WITH DIFFERENT [OZONE], [CARBON DIOXIDE] AND RAINFALL IN THE UNIVERSITY MARINE LABORATORY. 1CHALANCE WILLIAMS, 2CHALANCEW@HOTMAIL.COM, 12DEPT OF NATURAL SCIENCES, MATHEMATICS & COMPUTER SCIENCE, CENTRAL STATE UNIVERSITY, PO BOX 1004, WILDERFORCE, OH 45384 (ANDREW LEAVEY2, anleavey@csu.edu, STEPHEN LONG, stephen@csu.edu), 3TUNIVERSITY OF ILLINOIS, DEPT OF PLANT BIOLOGY.

The SoyFACE (Free Air Concentration Enrichment) facility operated by the University of Illinois aims to determine how soybeans will perform in the year 2050 in response to elevated concentrations of CO₂ and O₃, and greater drought caused by global climate change. Research at the site investigates a wide range of topics from crop productivity and canopy energy fluxes to leaf physiology, and interactions with herbivores. The objective of my research during the summer of 2003 was to measure the water content of the soil profile under soybean plants grown at different concentrations of CO₂ and O₃, and under drought and non-drought conditions. The site consisted of 16 experimental plots. There were four replicate plots growing soybeans at each of the following atmospheric treatment conditions: (1) ambient conditions (370 ppm CO₂/ ~60 ppb O₃), elevated CO₂ (550 ppm), elevated O₃ (~90 ppb) and elevated CO₂/ O₃ combined (550 ppm CO₂/~90 ppb O₃). Elevated CO₂ and/or O₃ levels were generated by rings of pipes surrounding the plots at canopy level and releasing CO₂ or O₃. Natural wind mixed and carried the gases through the canopy. A gutter system also was carried the gases through the canopy. A gutter system also was used to intercept rainfall inputs. Where rainfall inputs were intercepted, soil moisture was up to 13% lower in the rooting zone. For most of the season, there were significant differences in soil moisture at different concentrations of CO₂ and O₃. However during a two-week period of low rainfall in August, soil moisture averaged 30% lower under ambient conditions than the combined elevated CO₂/ O₃. This finding suggests that soybean crops may suffer less drought stress in 2050.

Board 03 THE IMPACT OF AVIAN PREDATION ON SEA URCHINS ARBACIA PUNCTULATA: INHABITING A SEA WALL IN BEAUFORT NC. ADRIANNA N. Zito1*504, zito@wittenberg.edu, JAMES M. WELCH1, WILLIAM W. KIRBY-SMITH2, DEPT OF BIOLOGY, WITTENBERG UNIVERSITY, PO BOX 398, SPRINGFIELD, OH 45501; 1DUKE UNIVERSITY MARINE LABORATORY.

The purple sea urchin Arbacia punctulata inhabits subtidal hard-bottom habitats on the southeastern coast of the United States. Where natural rocky substrate is rare, the urchins inhabit intertidal pilings and sea walls. However, this alternate habitat may come with a cost: in other intertidal areas, gulls have been observed feeding selectively on sea urchins in late winter and early spring, while Slaty-backed Gulls (sterns fuscus) have been documented that gull predation would have a significant effect on the population of A. punctulata living on the seawall at the Duke Marine Laboratory in Beaufort, NC. To test this hypothesis, dead urchin remains (overturned tests pecked clean from the bottom) were counted daily along 450m of seawall from March through April 2003. The population size was estimated (n=83) by visual survey during a spring low tide in April to determine the proportion of survivors killed during the study (the survey total was added to the number killed n=157). Since daily predation varied (range = 0-16), weather and tide effects on predation were also examined. Gulls removed 74% of the sea urchin population over three months. Cloud cover was an important abiotic which may effect gull predation upon urchins; higher cloud cover correlated with greater predation. This study supports the hypothesis that gulls prey upon sea urchins on seawalls. Thus these man made intertidal structures, while providing alternate habitat in the absence of subtidal rocks, simultaneously expose urchins to high levels of avian predation.

Board 04 BATS AND DIETARY PATTERNS AT A SUMMER ROOSTING SITE AT OHIO NORTHERN UNIVERSITY’S CAMPUS, ADA, OHIO. LAUREL B. HRICIK, l-hricik@onu.edu, 312 SOUTH SIMON STREET, ADA OH 43810.

A barn on the Ohio Northern University campus in Ada houses a summer colony of brown bats (Eptesicus fuscus). Their numbers and activity patterns were studied by counting bats as they departed from the barn. Counts were made from ground level without disturbing the activity patterns of the bats. The highest exit counts for fall 2002, spring 2003, summer 2003 and fall 2003 were 90, 100, 100, and 70 respectively. The spring, summer and autumn exit counts for 2003 were compared and found to differ (Chi square = 7.79, c = 3, p < 0.05). The small autumn count was the basis for the differences and probably reflected early departures to explore hibernacula. In the fall of both years the bats disappeared gradually, but with a major decline in an one or two week period in late September and early October. The bats reappeared gradually in the spring of 2003 with a distinct change, from 10 to 47 bats, between April 13, and April 14.

Board 05 AVIAN SPECIES DIVERSITY IN A CONTAMINATED RIPARIAN ECOSYSTEM. SHAWN U. BLOHM, shawnblohm@yahoo.com, COURTNEY N. WILLIS, cwillis@ysu.edu, YOUNGSTOWN STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, YOUNGSTOWN OH 44555.

An avian species diversity study was conducted along a 25.6 km portion of the Mahoning River located in Mahoning and Trumbull counties in northeast Ohio. Sediments in the Mahoning River are heavily contaminated from steel mill pollution, particularly near low head dams. The goal of this study was to examine the relationship between sediment contamination and avian species diversity in a riparian ecosystem. During June of 2003, avian point counts were conducted at Lowellville, Youngstown, and Girard. At each study site, four avian point counts were conducted above and below low head dams and were at least 200 m apart. The American Robin (Turdus migratorius), Northern Cardinal (Cardinalis cardinalis) and House Sparrow (Passer domesticus) were the most common species observed. Diversity was estimated using the Shannon-Weiner diversity index and indices were compared using a Student’s t-test. Diversity did not differ at Lowellville (n = 21 sp.), Youngstown (n = 21 sp.) and Girard (n = 19 sp.). However, diversity was higher below the dam (n = 16 sp.) than above it (n = 8 sp.) in Girard (t=3.625,P<0.05) and diversity tended to be higher the dam (n = 16 sp.) than above it (n = 12 sp.) in Lowellville (t=1.698,0.10>P>0.05). Although diversity did not differ between study sites it was significantly greater below than above low head dams. Diversity of plants and insects will be investigated to better understand the observed differences.

Board 06 THE EFFECT OF FEEDING ON GLAND CELL PROLIFERATION IN HYDRA. KELCEY K. ANDERSON, L.EPP@MUCA.EDU MOUNT UNION COLLEGE, 1792 CLARK AVENUE, ALLIANCE, OH, 44601.
This study is investigating the rate of proliferation of gland cells compared to epithelial cells. Gland cells in Hydra are endodermal cells that secrete proteolytic enzymes into the gastrovascular cavity. Gland cells maintain their population both by mitosis and by differentiation from interstitial cells. Observations of gland cell populations in epithelial Hydra, hydra which have had their interstitial cells and their interstitial cell progeny eliminated, seem to indicate that the gland cells are the only cell type that differentiates. After feeding, the rate of gland cell proliferation increases dramatically so that it does epithelial cells. Proliferating cells are being labeled with BrdU by injecting BrdU into the gastrovascular cavity of the animal. After staining with BrdU antibody, proliferating cells were then identified and counted. After baseline labeling indices of gland cells and epithelial cells are known, the relative effect of feeding and starvation on the proliferation of these two cell types will be determined.

Regulatory peptides have been found to influence pattern formation and regeneration in Hydra. For example, the peptides pedin, pedibin, and Hym 323 have a positive effect on the rate of foot regeneration. Peptides isolated from Hydra tissue have not been biosynthesized. In this study the effects of 15 such peptides on foot regeneration are being compared to different species and strains of hydra. The rate of foot regeneration in peptide-treated Hydra is being compared to that of controls by timing the onset of basal disk specific peroxidase staining during regeneration. Peptides which prove to have an effect in this regard will then be tested to determine their effect in lateral transplantation (grafting) experiments. These tests for a change in positional values of Hydra tissue; that is, these experiments will test for the effect of regulatory peptides on the determination of polarity during regeneration.

Asthma is a globally prevalent disease. Theophylline was once a popular and inexpensive medication prescribed for asthma, however adverse side effects such as nausea, headache and rapid heartbeat occurred when given at its optimal dosage. Recently, the LoDo Trial investigated the effectiveness of theophylline as an add-on therapy in lower than usual doses which may decrease side effects in patients. The study included 627 asthma patients from 19 clinical centers in the United States. Three follow-up visits were performed over a six-month period tracking patients treated with theophylline, montelukast and a placebo. For our sub-study, serum samples collected during each visit were processed and analyzed for several oxidative metabolites including bromotyrosine, a sulfated metabolite of tyrosine, which is specific to the oxidation of Amplex red to its oxidized fluorescent form, resorufin, and is a determination of hydrogen peroxide scavenging activity. The results of this work can be compared to previous work done with a similar probe, Homovanillic acid (HVA). This method of implementing Amplex red to determine hydrogen peroxide has a wide application in determining and monitoring the activity of many oxidase enzymes, owing to the usage of higher wavelengths that reduce the background fluorescence and quenching of most biological samples. Resorufin has an excitation maximum at 563 nm and emission maximum at 587 nm, both of which lie in the visible region of the spectrum as opposed to the ultraviolet region. This makes it of particular interest for the detection of biological samples because most other probes use wavelengths in the ultraviolet spectrum and cannot be used to detect oxidative activity in crude biological samples.

Although much data has been obtained regarding the human genome, there is very limited knowledge about the human proteome. The proteome refers to the protein component of the genome and is essential for determining the functional and physical characteristics of tissue. This research aims to determine what proteome is critical in proper growth hormone function, thus expanding our knowledge of the proteome. Samples from the livers of mice (n=12) with altered growth hormone physiologies were taken, and their proteins were identified, they will be tested for presence in various other organs and eventually utilized to optimize growth hormone function in the body.

The detection of small concentrations of amino acids presents challenges using popular methods such as electrophoresis. Only three of the twenty common amino acids found in proteins, proline, glutamic acid, and aspartic acid, can be detected with conventional electrophoresis. Using a boron-doped diamond thin-film (BDTDF) electrode, amino acids can be oxidized and are therefore detectable. A mechanism of oxidation, specific to diamond thin-film electrodes, has been developed from previous research. Results supporting this mechanism for individual amino acids were obtained through various electrochemical experiments, primarily cyclic voltammetry (CV), run in aqueous pH buffers ranging from pH eight to twelve. To assess the feasibility of electrochemical detection with liquid chromatography
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for amino acid analysis, flow injection analysis (FIA) was utilized. In FIA the amino acid is injected in a mobile phase that flows over a diamond electrode. Positive results of this work will provide the means to detect small concentrations of specific amino acids.

**Board 13**

**EVIDENCE FOR RNA INTERFERENCE IN THE PLANT PATHOGEN Phytophthora infestans**

**MARK L. HANKE**

Bioinformatic studies of the fungal pathogen Phytophthora infestans, one of the most devastating plant diseases, have led to the introduction of PCB into the environment. As PCB is a harmful environmental contaminant, leakage during the production, and continued effects of the RNAi after electroporation. Additionally a standard probe analysis was performed to examine short-term and long-term memory respectively. On day 29, rats were euthanized and Choline Acetyltransferase (ChAT) activity was also examined, as acetylcholine is expected to play a role in learning and memory. Rats receiving PCB showed an initial increase in short-term memory on day 24 and a decrease in long-term memory on day 29 when compared to the control. These increases and decreases were not statistically significant, observational results showed behavioral differences between the PCB and control rats during probe analysis. Though it has been shown that PCB may impair cognitive ability, these results suggest that PCB may affect short-term and long-term memory as well and may do so in a differential manner; increasing short-term, while decreasing implicit long-term memory.

**Board 16**

**IDENTIFICATION OF IMMUNOREACTIVE AUTOANTIGENS PRESENT IN SEROPOSITIVE AND SERONEGATIVE MYASTHENIA GRAVIS.**

**KRISTY J. ARNOCZKY**, **MASON**, **KARNOCZKY**

Myasthenia gravis (MG) was the first autoimmune disorder of the peripheral nervous system to be characterized, and is still the best understood. As one of the few conditions in which the effector mechanisms are thought to be entirely antibody-mediated. This disease is generally caused by autoantibodies that bind to the nicotinic acetylcholine receptors (AChR) at the post-synaptic muscle membrane. However, about 15% of patients do not have detectable levels of this antibody and are diagnosed to have seronegative myasthenia gravis (SNMG). Previous research in this lab has focused on autoimmune rippling muscle disease (ARMD), which occurs in cranial muscles prior to the onset of MG. Autoantigens have been characterized through the immunoblotting of human skeletal muscle cDNA expression libraries using sera from patients with seropositive myasthenia gravis (SPMG) and (SNMG). SDS-PAGE analysis and Western Blot studies have been carried out to better understand these target proteins. Immunoreactivity of the patient’s IgG and IgM antibodies has been used to identify the muscle protein titin is a well known protein in skeletal muscle. The protein extends from the Z line to the M line of the sarcomere that provides passive tension to the muscle and acts as a template for normal muscle formation. Previous researchers have reported that the ARM proteins seem to be related to titin isoforms of titin. The Western blots of both the ARM and the SPMG sera showed a unique doublet at about 123k.d. and 140k.d. The significance of this study is that the SPMG titin doublet is not present in the MG sera, and this doublet may represent a novel target protein. This region is believed to play a possible role in myasthenia gravis. Future studies are aimed at 2DE proteomic comparative analysis to help understand the connection or the link between ARM and SPMG.

**Board 17**

**THE INFLUENCE OF TIA-1 ON HSV-1 REPLICATION.**

**NEASHEKHAR SINGA**, **HANNAH COOPER**, **LINDA M. COOPER**

Eukaryotic initiation factor 2α (eIF2α) is phosphorylated by PKR or PERK when stimulated by endoplasmic reticulum stress or Type 1 IFN and dsRNA that prevent incorporation into a preinitiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules. The ICP34.5 protein of HSV-1 binds protein phosphatase 1 (PP1) and promotes the removal of eIF2α phosphate from the viral translation initiation complex (PIC). TIA-1, an RNA binding protein, binds and directs the incomplete PIC to stress granules.
comparing to WT cells depending upon the virus strain. Viruses lacking ICP34.5 replicated poorly in both cell types and there was no difference in virus production. TIA-1 acts as an antiviral protein possibly by sequestering the PICs and reducing the number of functional viral procapsid. Late in infection, different variants of ICP34.5 may determine differences in levels of sequesteration of PICs into stress granules resulting in differences in viral protein synthesis and hence replication.

**Board 18**
**EFFECTS ON BACTERIA IN THE DENTAL FLORA EXPOSED TO DIFFERENT CONDITIONS. PIPIT SUTTHANAPONG, pipit@umiami.edu, JSI. THE OHIO STATE UNIVERSITY, COLUMBUS, OH 43210.**

While eating and drinking habits vary greatly from person to person, little is known about how these habits influence the natural flora of the human oral cavity. *Streptococcus salivarius*, *Neisseria* sp., and *Streptococcus mutans* are of particular interest because in previous research some variation in occurrence was observed in S. salivarius and *Neisseria* sp. colonies from dental flora of adults consuming alcohol and tobacco. *S. mutans* play a role in the formation of dental caries. Therefore, the occurrence of these three bacteria in relation to various eating and drinking habits was chosen for this study. Young adults (N = 47; aged 18 – 23 years) were questioned about their eating, drinking, tobacco use, and antibiotic use prior to sampling their teeth to obtain bacterial samples (High levels of usage – daily; moderate levels of usage – every two weeks to occasionally). Dental plaque samples from the biting surface of the lower jaw molars were collected with Dacron-tipped swabs and transported to the lab in Brain Heart Infusion Broth. Within two hours after collection, samples were cultured onto Mitis Salivarius Agar (MTS) for *S. salivarius*, Chocolate Agar for *Neisseria* sp., and MTS with 30% sucrose for *S. mutans* and were incubated in a 4% CO$_2$ atmosphere at 37 °C. Bacterial colonies were isolated and identified from each sample. The presence of adults with no use of alcohol or tobacco was 71.4% of adults with high levels of alcohol and tobacco use, whereas its presence in adults with no use of alcohol or tobacco was 71.4%. This difference is not statistically significant. The data indicate that *S. salivarius*, *S. mutans* and *Neisseria* sp. are not significantly affected by alcohol consumption and tobacco use.

**Board 19**
**INVESTIGATING THE ROLE OF DSBR PROTEINS IN ADENOVIRUS REPLICATION. SHIONTA S. MATHews - mathews@muohio.edu, DEPT OF MICROBIOLOGY, PEARL HARBOR, MIAMI UNIVERSITY, OXFORD, OH 45056. EILEEN BRIDGE - bridgee@muohio.edu.**

Eukaryotic cells possess mechanisms that monitor breaks in genomic DNA and repair them. The effectors of this double strand break repair (DSBR) process comprise a variety of proteins including the Mre11/Rad50/Nbs1 complex. When a cell is infected with Adenovirus which has a linear DNA genome with double stranded ends, host DSBR proteins recognize the viral DNA as broken ends and repair them by linking them end-to-end to form concatemers. This process is referred to as “DSBR repair” by producing large intranuclear proteins of 11kDa and 34kDa from the early region 4 (E4), which relocalize Mre11 and target it for degradation respectively. We were interested in studying the relationship of Mre11 re-localization and translation to the onset of DNA replication. Our preliminary data, suggests that during a time course of wild-type Adenovirus (Ad5) infection, Mre11 is relocalized first and subsequently degraded. Mre11 degradation coincided with the appearance of viral replication centers. In contrast, an E4 mutant virus infection lacking 11 kDa and 34kDa fails to redistribute or degrade Mre11 and is significantly delayed for the onset of viral DNA replication. This leads us to hypothesize that Mre11 might bind to viral DNA in the absence of E4 proteins, and dissociation is necessary in addition to contributing to commitment of the viral genome. We are currently carrying out experiments to measure binding of host DSBR proteins to viral DNA, and to investigate their effects on viral DNA replication by immunofluorescence and immunoprecipitation.

**Board 20**
**PRODUCTION OF MONOCLONAL ANTIBODIES AGAINST THE CAPSULAR POLYSACCHARIDE OF STAPHYLOCCUS AUREUS TYPE B. JEREMY J. MASHBURN, jermymashburn@yahoo.com, CHRIS M CALDWELL, cmcaldwell22@hotmail.com, (DIANA L Fagan, dlfgangan@ysu.edu), DEPT OF BIOLOGICAL SCIENCES, YOUNGSTOWN STATE UNIVERSITY, YOUNGSTOWN, OH 44555.**

Recently, many bacteria, including *Staphylococcus aureus* have become increasingly resistant to the antibiotics used for treatment. A novel approach to treatment has been the production of antibodies against the capsular polysaccharide of those bacteria in which they are present. The goal of this study is to develop monoclonal antibodies against the capsular polysaccharide of *Staphylococcus aureus* type B. The capsular polysaccharide was purified by enzymatic digestion of a bacterial preparation with Lysozomant, DNase, RNase, and proteinase K, followed by DEAE column chromatography. A Bradford protein assay was performed with the injections of *Staphylococcus aureus* capsular polysaccharide with absorbance read at 630 nm. The purified capsular polysaccharide was found to be below baseline (0.158 at 530 nm) with values between 0.132 and 0.065 with the exception of the 4th dilution (0.159). Hybridoma production via cell fusion was performed. Monoclonal antibodies were isolated and a secondary subcloning and isolation was performed. An indirect ELISA was performed on the supernatants of the primary clones to isotype the antibodies. All six supernatants tested were all above baseline (0.079 at 450 nm) with values from 0.147 to 0.419 for mouse IgM. All other isotypes were within baseline ranges. Studies in progress will determine monoclonal antibody affinity and opsonophagocytic activity. These studies were supported by a YSU PACE grant.

**Board 21**
**BONE MARROW RECONSTITUTION OF AN IMMUNODEFICIENT MOUSE MODEL. NICOLE R. TOTH, tallsrx@aol.com (DIANA L. FAGAN, dlfgangan@ysu.edu) DEPT OF BIOLOGICAL SCIENCES, YOUNGSTOWN STATE UNIVERSITY, YOUNGSTOWN, OHIO 44555.**

Preeclampsia is a disease involving endothelial cell damage, affecting 4-5% of all pregnancies, and is one of the leading causes of maternal and infant mortality and morbidity. However, the cause of the endothelial damage remains uncertain. Interestingly, lymphocytes that contain cytoplasmic granules become prevalent in the uterus of several mammalian species during pregnancy. Previous studies have not only determined this lymphocyte population to be uterine natural killer (uNK) cells, but also as deficient in NK cells demonstrate symptoms, which parallel those found in preeclampsia. This suggests a role for uNK cells in the prevention of this disease. RAG2–/– mice are an immunodeficient mouse strain lacking T cells and NK cells. This study seeks to observe the specific trafficking of this disease. The virus defends itself against this “repair” by producing regulatory proteins. Infection of mice with *Staphylococcus aureus* at 11kDa and 34kDa fails to redistribute or degrade Mre11 and degrades. Mre11 degradation coincided with the appearance of DNA replication to the onset of DNA replication. Our preliminary data, suggests that during a time course of wild-type Adenovirus (Ad5) infection, Mre11 is relocalized first and subsequently degraded. Mre11 degradation coincided with the appearance of viral replication centers. In contrast, an E4 mutant virus infection lacking 11 kDa and 34kDa fails to redistribute or degrade Mre11 and is significantly delayed for the onset of viral DNA replication. This leads us to hypothesize that Mre11 might bind to viral DNA in the absence of E4 proteins, and dissociation is necessary in addition to contributing to commitment of the viral genome. We are currently carrying out experiments to measure binding of host DSBR proteins to viral DNA, and to investigate their effects on viral DNA replication by immunofluorescence and immunoprecipitation.

**Board 22**
**THE EFFECT OF KAVA ON THE ESTROUS CYCLE OF A RAT WITH POSSIBLE CONTRACEPTIVE ACTION. KATE JENNINGS, kjenning@kent.edu, (JENNIFER L. MAREKIN, jmarcin@kent.edu), KENT STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCES, PO BOX 5190, KENT OH 44242-0001.**

Polyynes use kava in elaborate rituals involving extracting a drink from the root of the Piper methysticum plant for its relaxing properties. In America, kava is a herbal supplement available over-the-counter and is sold for its anti-anxiety properties. The active ingredients are lipid soluble chemicals called kava-lactones. According to many women in Polynesia, kava has a contraceptive effect and is given to women who have just given birth to prevent another immediate pregnancy. This effect has not been systematically studied in these populations. The model system is ideal for evaluating kava’s effects because the rat reproductive system mimics humans, but the estrous cycle is 4-5 days long. It is hypothesized that the kava will alter the estrous cycle, and this alteration should be a greater change in the estrous cycle producing more of a contraceptive action than lower doses. Estrous cycles can be monitored by viewing the cells of the vagina daily under a microscope. One group of ten rats will receive plain water; the next group of ten rats will receive a moderate dose (30mg/kg body weight) of kava, and the third group of ten rats will receive a large dose (50mg/kg body weight) of kava, administered daily by a gavage tube directly into the rat's stomach. The length of each phase of the estrous cycle will be examined 30 days prior to the kava administration, 60 days during the kava administration, and 60 days after the administration has ended. The rat receiving the water by gavage will serve as a control, and also monitoring the cycles prior to the dosage will eliminate rats with an unusual cycle.

**Board 23**
**PLANT LIGNAN INDUCTION OF APOPTOSIS IN CERVICAL CARCINOMA CELLS CONTAINING INTEGRATED HUMAN ANTIBODIES AGAINST THE CAPSULAR POLYSACCHARIDE OF STAPHYLOCCUS AUREUS TYPE B. J. S. WELLS, js wells@umiami.edu, DEPT OF MICROBIOLOGY, PEARL HARBOR, MIAMI UNIVERSITY, OXFORD, OH 45056.**

Phytoestrogen is a class of dietary factors that are chemically related to the estrogen with estrogenic properties. Phytoestrogens are produced by plants and can affect mammalian physiology. Estrogens, which are required for placental production during pregnancy, and for the normal development of the female reproductive system, have been shown to play a role in the prevention of certain types of cancer. However, the precise mechanism of action of these compounds is not fully understood. The presence of phytoestrogens in many plant foods has caused concern about the potential health effects due to their estrogenic activity. The estrogenic activity of phytoestrogens has been the subject of much debate in recent years. The effects of phytoestrogens on human health are still not fully understood, but they may have an impact on the risk of breast and prostate cancer. Phytoestrogens have been shown to have the potential to interfere with the normal function of the endocrine system. This may lead to an increased risk of certain types of cancer. Therefore, it is important to understand the mechanisms by which phytoestrogens exert their effects and to determine whether they are safe for human consumption.
PAPILLOMAVIRUS DNA. Deidra R. Tschantz, drtschanc@neochem.com, Kristi L. Allen, kalen@neochem.com, Angelo L. DeLucia, adl@neochem.com, Dept of Microbiology and Immunology, Northern Ohio Universities College of Medicine, 4209 SR 44, Rootstown OH 44272.

Human papillomavirus (HPV) infections are the cause of several diseases. The interaction of viral proteins with the host cell genome permits continuous expression of viral E6/E7 genes. The E6 and E7 proteins interfere with functions of the tumor suppressing proteins, p53 and p21. E6 protein binds to p53 protein to accelerate its degradation thus preventing its ability to induce apoptosis or growth arrest. Plant lignans, 3'-O-methyl-nordihydroguaiaretic acid (3'-O-methyl-NDGA), derived from the creosote bush can be used as anti-tumor agents by targeting HPV DNA. (Hela, HeLa and CaSkI) were treated with 3'-O-methyl-NDGA to determine the effects of the lignan on E6 mRNA and p53 protein stabilization. The cells were treated with various concentrations of lignan over a series of time points to determine the response of the cells to the lignan. Treatment of HPV positive tumor cells caused a stabilization of p53 protein and induced apoptosis. However, surprisingly, there was no induction of p21, a cyclin-dependent kinase inhibitor. Quantitative real-time RT-PCR analysis of Hela RNA shows a ten-fold reduction in E6 expression in treated cells compared to untreated cells. Apoptosis is induced as noted by activation of caspase 9 and 3. Programmed cell death was confirmed by flow cytometry analysis of Annexin V and by DNA fragmentation. The plant lignan, 3'-O-methyl-NDGA, acts as an anti-tumor agent by suppressing E6 expression, permitting stabilization and activation of p53 protein, and bypassing growth arrest but inducing apoptosis in HPV positive cervical carcinoma cells.

Cyclin dependent kinase inhibitors (CKIs), play important roles in regulation of cell growth by causing G1/S phase arrest. Cdkn2b (p15) gene is a member of the INK4 family of the CKIs. This is located on the chromosome 9p21, which is a hotspot of genomic alterations in cancer. Inactivation of CKIs by methylation, mutation or deletion, leads to uncontrolled cell growth. We analyzed the regulation of Cdkn2b in mouse melanoma cell type B16 CG using microarray analysis and Western blotting and probing with anti-p15-antibody. While, normal B16 CG cells showed no expression of Cdkn2b, high level expression of Cdkn2b was observed when these cells were exposed to extracts of the plant Euphorbiaceae family (EPE). Western blot analysis further confirmed that this increased transcription resulted in increased protein levels. The growth of B16 CG cells was arrested when they were exposed to the plant lignan 3'-O-methyl-NDGA. Tumors generated in C57-B16 mouse by subcutaneous injection of B16CG cells also had highly reduced growth when treated externally with the EPE, and showed increased expression of Cdkn2b. In cancers including melanomas, p15 expression is regulated by E6E7 down-regulation. The microarray analyses indicated that Myc levels remained unaltered in B16CG cells before or after exposure to EPE. Since hypermethylation of the Cdkn2b promoter region is a reversible process, and increased transcription of Cdkn2b in B16 CG cells exposed to EPE resulted in increased protein levels, we presume that EPE exposure might have caused de-methylation of the Cdkn2b promoter.

Cyclin dependent kinase inhibitors (CKIs), play important roles in regulation of cell growth by causing G1/S phase arrest. Cdkn2b (p15) gene is a member of the INK4 family of the CKIs. This is located on the chromosome 9p21, which is a hotspot of genomic alterations in cancer. Inactivation of CKIs by methylation, mutation or deletion, leads to uncontrolled cell growth.
response to the SdiA regulon. This fusion becomes active in the presence of synthetic AHL. A vector control strain was used to check whether the strains were still reactive on the other genes being tested. In order to carry out this experiment, each mRNA will be relative quantitated using Quantitative RT-PCR with carefully chosen primers and the concentration of individual mRNA will be measured. For specific focus of this study the mRNA will be measured in order to have increased resistance in the presence of chemoattractants. The mechanisms by which most organims’s mtDNA replicates are not well understood. The mtDNA of the eukaryotic Schizosaccharomyces pombe has similarities to mammalian mtDNA, including small size, a circular genetic map, and little non-coding DNA. It has been hypothesized that S. pombe mtDNA replicates through a rolling circle mechanism but there has been conflicting data. Using Fangman-Brewer 2-dimensional gel electrophoresis modified to allow analysis of substantially larger DNA molecules, intact S. pombe mtDNA has been analyzed for replication intermediates. We observed long heterogeneous double-stranded DNA molecules in size ranges well above through well below the unit genome length of 19,000 bp as has been previously reported. No specific origin of bi-directional replication was discovered through standard 2-D gel analysis of fragment. However, the modified 2-D gel revealed circular forms attached to larger molecules forming an “eyebrow” structure that has previously been shown to be a hallmark of rolling circle replication.

Mitochondria are responsible for the vast majority of biological ATP energy production through aerobic metabolism in eukaryotic cells. They are presumed to have evolved from early aerobic bacteria living in symbiosis with ancient archaeabacteria anaerobes. Mitochondria are involved in almost all processes of cell metabolism and they are essential for the life of any organism. Mitochondria are responsible for a significant part of the organism’s energy metabolism and their proper functioning is crucial for the organism’s survival. Mitochondria are involved in the production of ATP, which is used by the cell for energy. They also play a significant role in the regulation of cell death, apoptosis. Mitochondria are the site of oxidative phosphorylation, the process by which the cell produces ATP from the breakdown of glucose. They also contain a large number of enzymes involved in the citric acid cycle, which is part of the process of cellular respiration. Mitochondria are also involved in the production of heat, which is a byproduct of the metabolic processes. Mitochondria are essential for the proper functioning of the cell and their impairment can lead to a variety of diseases, including neurodegenerative diseases, heart disease, and cancer.
The physical effects of testosterone are well-documented, but the role testosterone plays in a social context is less clear. Previous studies have indicated that testosterone levels may predispose men to divorce or abusive relationships, or conversely, to successful long-term marriages. Therefore, we aim to study this relationship in college-aged males. Two groups of men, ages 18-23, will be recruited from the ONU student body (n=1500). The control group consisted of single men (n=7) and the test group consisted of men in a committed, monogamous relationship of 12 months or more (n=7). Prior to any experimentation or sample collection, participants were asked to fill out a questionnaire about general health and previous and current relationship history.

Participants were asked to give a saliva sample, passive drool (6 ml), and a colorimetric test for testosterone will be determined. The testosterone standards curve will be obtained, using the testosterone standard provided in the purchased kit (Salimetrics, PA) and diluents thereof. Participant samples will be mixed with a diluted conjugate solution of testosterone and peroxidase; followed by tetrathymylbenzidine, a coloring agent, and then a stop solution, according to kit directions for sample preparation. The samples will then be read in an optical density reader at 490 nm and the corresponding testosterone levels will be determined. The testosterone levels corresponding to the two samples from each participant will be averaged and all testosterone levels will be expressed as mean values and the standard error of the mean. The testosterone levels of the two groups will be compared using the t-test for paired samples. We predict that the transgenic mice that over-express NMDA receptors in the forebrain region, over a continuous 38 day period. We predict that the transgenic mice that over-express NMDA receptors in the forebrain will perform better than the control mice on the complex stages of both the traditional and non-traditional setups of the Hebb-Williams maze. A total of 24 mice are being tested (NR2B=12, Control = 12).

The theory of the scanning electron microscope (SEM) was credited to E. Ruska and M. Knoll in Germany in 1933. Since then, nearly every aspect of the SEM has undergone some type of change. New sample preparation techniques such as critical point drying and cryogenic preparation have expanded the range of samples that can be examined in the SEM. The introduction of new instrumentation like the Everhart-Thorley detector and CRT display have also contributed to the development of the SEM. Since its inception in the early 20th century, numerous scientists, such as M. von Ardenne, V.K. Zwoyrkin, K.C.A. Smith, T.E. Everhart and R.M.F. Thorley have advanced the development and applications of the SEM. The goal of this project was to review the development of the SEM from its inception to its current uses and to speculate what the future holds for SEM methodology and application. To do this, past images associated with specific developments of the SEM as they were developed over the years, the Everhart-Thorley detector, have been recreated using a LEO 435VP SEM with an Oxford CT1500 cryo preparation system and an Oxford ISIS System for energy dispersive spectrometry. These recreated images were compared to images acquired with contemporary SEM to compare the level of improvement. Generally, images were found to have better resolution and overall picture quality. Included also are examples of contemporary uses of the SEM in archeological research, medical, and private industry. Based on this review, it seems that the SEM has been and will continue to be an important tool in academia, professional community, and culture.

Previous studies indicate childhood abuse victims tend to have a smaller corpus callosum than those not abused in their childhood. This reduction leads to less integration of the hemispheres, thus creating dramatic alterations in mood and personality. However, the linkage between child abuse and its effect on the corpus callosum still remains unexplored. The purpose of this study is to establish a definitive connection between childhood abuse victims and the reduction of their corpus callosum. Twenty-two women in the age range between 20-40 participated in the study. Women who used illicit drugs, suffered major depression, or used marijuana or alcohol excessively were excluded. Based upon Childhood Trauma Questionnaire scores, the women were divided into either an abused or non-abused group. The 22 participants had a magnetic resonance imaging (MRI) performed using the 3D BrainStation. To avoid any confounding factors, a univariate analysis revealed no significant differences in the number of alcoholic drinks per year (p=0.413), years of smoking (p=0.133), and scores on the Wonderlic Personnel assessment (p=0.135) between the two groups. The average abuse revealed a significant difference with (p=0.000). Currently with three measurements of the corpus callosum in each group, the differences in size appear to be less than expected. Therefore, the hypothesis that childhood victimization results in a smaller corpus callosum. An overzealous intellectual property movement in the late 20th century, spurred by major corporations, specifically Mattel’s pursuit of the Barbie™ copyright, gained much media attention. Under the fair use portions of the United States Code for copyright, it is acceptable to use Barbie™ in art, to portray a message in a social context. These uses do not violate Mattel’s copyright. A survey was administered to thirty-three participants with artistic backgrounds to see if they correctly identified 4 images using Barbie™ as fair use in a social context. The survey was a paper and pencil test with a number of questions but only two items were relevant to the issue at hand. The persons surveyed lived locally in Kent, Ohio. The study included professional artists with art training or advanced art students. A significant number of the respondents failed to identify the pictures as "fair use." Though only one picture was significantly identified as "fair use," it was considered significantly objective. This was determined by applying a t test to each mean and standard deviation determined on an n of 13. This result is consistent with the conclusion that the respondents failed to identify the images as fair use even though they were in a social context. The result supports the fact that the pursuit of copyright seems to have had a negative impact on this process though other aspects of this issue need to be studied before this conclusion follows.

Research has shown that NR2B transgenic mice, genetically engineered with an increase number of the NR2B component of the NMDA receptor, exhibit enhanced long-term potentiation, are better at novel-object recognition tasks, cued fear conditioning, and the Morris water maze. This study examines the performance of the NR2B transgenic mice in the Hebb-Williams maze. This is a complex closed-field intelligence test for rodents, with 12 different maze configurations of increasing complexity. We predict that because these mice over-express the NMDA receptor in the forebrain region, they will perform better than the control mice that do not over-express NMDA. The mice will also be tested on a manipulated, non-traditional, version of the Hebb-Williams apparatus. The non-traditional setup will be identical to the traditional apparatus; except the animal will be trained to use the internal barriers within the maze, as cue for locating the goal box. The experimenter is blind to the genotype of the mice during behavioral testing. This study begins when the mice are approximately 3 months old and is conducted once daily, every year more than 100 million tons of Coal Combustion Products (CCPs) are produced in the United States with only approximately one-third being reused to create new products. Most CCPs are alkaline and rich in essential plant nutrients like Ca, Mg, Mo, S and B. While other chemical properties of CCPs are beneficial to texture, high B and As, negatively influence plant growth, thus restricting their horticultural uses. Organic materials like animal manures, yard-trimmings and biosolids are produced in large quantities and some are composted. Our objective was to determine if the carbohydrate and landscape media containing CCPs mixed with composted organic matter (COM) that maximized use of CCPs while maintaining economic plant growth. Mixes were formulated by adding CCPs to COM in ratios ranging from 7:3 to 3:1 (v/v).
respectively. The pH of mixes ranged from 5.9 – 9.74 and the electrical conductivity (EC) was between 2.46 – 12 dS/m. We also measured the chemical properties of the mixes for different elements including N, P, K, Ca, B etc. by the saturated extract method of Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). We evaluated 44 mixes, with 4 replicates for each, for their ability to support growth of wheat (Triticum sativum), tomato (Lycopersicon esculentum) and marigold (Tagetes patula) by weighing the biomass produced at the end of each trial. Our results showed that significantly (p<0.0001) higher growth (7-130%) was achieved with experimental mixes containing CCPs (as 1/3 w/v) compared to a commercial mix MetroMix 130% (control). There however wasn’t one mix suitable for all plants. We conclude that CCPs can be used as a readily available raw material for creation of plant growth mixes that can be beneficially used by the greenhouse and landscape industries.

Pre-College Poster Session 3:00-4:30 PM

**Board 01**

**A STUDY OF THE USE OF STRONG GRAVITATIONAL LENSING IN DETERMINING THE MASSES OF GALAXIES.** *Amy Hollinger, ahollinger05@hbl.edu, Katie Trostel, Lauren Berger, 2301 Brigadoon Court, Westlake OH 44145 (Hathaway Brown School).*

Gravitational lensing is a tool that can prove useful in exploring distributions of dark matter, which does not reflect light but does interact gravitationally. The phenomenon of gravitational lensing occurs when massive objects, such as galaxies, “warp” space-time, causing light from a more distant source to bend as it travels through a lens, to appear bent. This results in the formation of multiple images of the source. A formula, known as the Lensing Equation, can be used to describe this phenomenon. Because one of the properties that the bending of light depends upon is the mass of the lens, one can set the mass as the unknown variable in the equation, and solve for its value. The information for the other variables in the equation can be gained from an observational survey such as CLASS, or Cosmic Lens All-Sky Survey. CLASS uses a radio survey to map instances of gravitational lensing, and publishes its results on a site accessible to the public. However, it is not simply a matter of substituting this information into the equation, as the general equations are adapted depending on the model selected. Also, some information, such as the angle of the source with respect to the observer, cannot be directly observed, and so instead must be indirectly calculated. Although there are many different models used to describe the gravitational lens, focus was first placed on the point-source, point-lens model, as it is mathematically and conceptually the simplest form. By comparing the results obtained by the model to the typical range of masses for galaxies (10^9-10^12 solar masses), the accuracy of the model could then be assessed. The three CLASS lenses that contained sufficient information to complete the calculation were examined, and in fact, the results did fit this range. The singular isothermal sphere model was also studied, but although more complex than the point-source, point-lens model, it is a more likely candidate for the actual distribution of the mass, as it follows more accurately the expected distribution of dark matter. The singular isothermal sphere model also includes an elliptical correction factor depending on the model selected. Approximately the same range of masses was found using the isothermal sphere model, supporting the mass estimates from the point-source, point-lens model.

**Board 02**

**ROTATION = +/- ROTARY Nystagmus.** *Kaleigh E. Gallagher, DancingOte@adm.com 5768 Colonial Blvd., Willoughby Ohio, 44094, Beaumont School.*

This study compared sensory processing, specifically the vestibular systems of children with Autism compared to children without the diagnosis of Autism. Post-rotatory nystagmus is an involuntary rapid rhythmic, movement of the eyeballs that usually takes place after rotational stimulation. The hypothesis was that providing rotational stimulation to children with the diagnosis of autism as well as to children without the diagnosis of autism will result with the children with autism having significantly less post-rotatory nystagmus response then children without autism. Seven children were tested with the diagnosis of Autism and seven children without the diagnosis of Autism. The Occupational Therapist spinning each child on a special rotational swing and recording in seconds, with a fly-back switch stop watch, the duration of post-rotatory nystagmus. Results were visually recorded on a video camera, and it was noted that all seven children with Autism have little or no post-rotatory nystagmus reaction. Some researchers would believe that this is suggestive of poorly integrated vestibular systems in children with Autism. Implications of study findings were that the vestibular system of children with Autism is poorly integrated. These findings may be used when diagnosing children with Autism, or with sensory processing disturbances in general.

**Board 03**

**FACTORS INFLUENCING THE GROWTH OF PROTEIN CRYSTALS.** *Jason A. Robson, jrobson@access.net 2873 Township Road 179 Bellefontaine OH 43311.*

Proteins are the vital elements that make up life. They are responsible for every physical trait and every life process in all living things. An assortment of 22 amino acids that bond together to form polypeptide chains make up the structure of a protein. The structure of a protein directly correlates with its function. To study the structure of a protein, protein crystals are grown and, if large enough (.2-6mm) go through x-ray diffraction. This will create an electron density map that indicates the sequence of amino acids. The most difficult step in this process is growing crystals to a size of .2mm or greater. Finding more reliable ways of growing these crystals is the focus of this experiment. In this experiment, samples of protein solution grown in environments of pH’s 4,5,6,7,8,9,10, and temperatures of 4°C, 22°C, and 30°C were or will be taken and run on an electrophoresis gel checking contamination along with the possibility of multiple proteins. In all trials that have been tested (pH 4.5,6,7, and 22°C) contamination was a common problem and probability for multiple protein structures appearing occurred only once in the pH trial. Finding a more efficient, reliable way to grow protein crystals will lead to a quicker and easier analysis of amino acid sequencing in different proteins, which in turn will lead to a better understanding of the basis of life’s functions and processes.

**Board 04**

**THE ROLE OF ENOLASE PHOSPHORYLATION IN SALMONELLA TYPHIMURIUM.** *Taruna Singh, tsingh06@hbl.edu, 25405 Bryden Road, BEAVERTON OR 97006 503-445-8889.*

Little is known about the specifics of protein phosphorylation in bacteria, despite the abundant information known about it in eukaryotes. The Salmonella genome encodes hundreds of phosphorylated proteins and at least nine protein kinases and phosphotases. Two approaches are being taken to dephosphorylate the Salmonella “phosphoprotein.” One approach entails for the overall surveillance in phosphoprotein patterns in mutants that lack kinases or phosphotases. The second approach is to study specific phosphoproteins that we have identified in surveys using the ppBPB double mutant. This study seeks to characterize one such candidate, the central carbon metabolic enzyme, enolase. In addition to its role in carbon metabolism, enolase is associated with a RNA degradation complex, and is also expressed on the cell surface where it binds to mammalian plasminogen. Furthermore, several distinct phosphorylated forms of Salmonella enolase were found on 2-D polyacrylamide gels. The working hypothesis is that it is the phosphorylation of enolase will affect its physiological activity. That is, phosphorylation determines the number of functions enolase performs, and/or modulates the efficiency of those functions. In addition to finding the several distinct forms of enolase and characterizing PrpA and PrpB, two Mn++ dependent phosphoprotein phosphatases, enolase has been cloned onto a plasmid and will be used to complement a strain that is under construction whose enolase gene has been deleted. These constructs will provide the foundation for answering the two critical questions: 1.) What are the protein’s phosphorylation sites? 2.) What impact does this phosphorylation of enolase have on its physiological activity?

**Board 05**

**PRESSURE VARIATIONS WITHIN BONE GRAFT AFTER SPINE FUSION SURGERY.** *Madeline M. Coquillette, coquill@bme.rscc.org, (216) 624-5780 DSC engineering, 1325 Euclid Avenue, OH 44106.*

The goal of this study was to investigate pressure fluctuations within bone grafts during vertebral fusion after spine stabilization surgery. Radiation based methods to observe pressure fluctuation such as x-ray and MRI, are not optimal in their ability to accurately monitor the bone fusion process. Consequently, we are investigating the feasibility of monitoring bone fusion using microelectromechanical systems (MEMS) technology. MEMS can produce miniature wireless sensors for direct implantation within bone grafts to monitor healing. The range of pressure variations, which might indicate vertebral fusion status, was investigated in a caprine (goat) model with 2 test groups, each with a sample size of 3 male goats.
An autologous bone graft was implanted in the C3-4 intervertebral space and a commercially manufactured telemetric pressure catheter was implanted at top and bottom of each bone graft. Data was transmitted to an external portable data acquisition system to record the in vivo pressure variations as the animal was ambulatory for months post surgery. Pressure data was analyzed to determine pressure ranges and fluctuation patterns. The pressure at top of the bone graft at time just after 1 week post-surgery, and gradually decreased to 21 mmHg at the end of the study period. In contrast, the pressure at the bottom of the bone graft increased to a maximum of 245 mmHg after 8 weeks post-surgery, and gradually decreased to 185 mmHg after 9 weeks post-surgery. These results confirm the feasibility of monitoring pressure fluctuations within bone graft, which might be a determinant of fusion status. Future experimentation in vivo is required to examine pressure reactions of the telemetric catheter in specific conditions and to further substantiate the previous findings.

Board 06 QUANTITATIVE ANALYSES OF CONNECTIVE TISSUE PROGENITORS FROM BONE MARROW BETWEEN GENDERS. Ingrid P. Baumann, ibaumann07@hhb.edu, Chizu Nakamoto (lead faculty)* (nakamoto@ccf.org), Cynthia A. Boehm* (boehmc@ccf.org), Mounita Kundu* (kundum@ccf.org), and George F. Muschler* (muschgl@ccf.org) - 520 Riverview Road, Gates Mills, Ohio, 44040 *Dept of Biomedical Engineering, Cleveland Clinic Foundation.

Bone is a dynamic tissue that is created by osteoblasts, and continuously resorbed by osteoclasts. Imbalance between osteoblasts and osteoclasts will result in either excessive or reduced bone density. Osteoclasts are a type of cell that forms, resorbs, and detoxifies vitamin D, a factor that affects bone metabolism. Osteosclerosis is a condition characterized by increased bone density in the elderly and primarily in postmenopausal women. Various factors that lead to reduction of osteogenesis have been implicated in pathogenesis of osteoporosis. In this study, quantitative analyses were performed on connective tissue progenitor cells (CTPs). CTPs are cells that give rise to osteoblasts when they are appropriately stimulated. Bone marrow cells were isolated from eight women and eight men, and the prevalence of CTPs was assessed by the formation of cell colonies in tissue culture. The results showed that the mean colony prevalence (CTPs per million cell) was not different between men and women (p=0.102). Women had a higher effective proliferation rate (Mean± SD= 0.797±0.161) compared to men (Mean± SD= 0.731±0.075). However there was no significant difference between the two groups (p=0.469). There was a trend in women toward a higher effective proliferation rate (Mean± SD= 0.686±0.123) compared to men (Mean± SD= 0.534±0.10). The mean area per colony also showed no significant difference between the two groups (p=0.130). This was probably due to the small sample size. There was no difference between men and women when looking at mean colony area density. These data show that, although women are more likely to have osteoporosis, there is no evidence that this can be attributed to a difference in CTP prevalence or biological potential.

Board 07 BLOWING THE WHISTLE ON FRAGILE X. McKinsey R. Muir, mck1405@aol.com, 8402 Edge Lake Oval, Sagamore Hills OH 44067 (BEAUMONT SCHOOL).

This cell biology project examines the distribution of proteins within cells. Some proteins travel back-and-forth, “shuttling,” between the nucleus and cytoplasm. Fragile X syndrome occurs when human cells do not produce Fragile X Mental Retardation Protein, FMRP, similar to the Rev protein in that both are RNA-binding proteins. These similarities allowed the investigation of the properties of Rev before investigating those of FMRP. Rev is an essential protein of HIV that can target cytoplasmic mRNAs and bind the mRNAs in the nucleus, exporting them, and returning to the nucleus. This study asked, “Does cytoplasmic diffusion of the Rev-GFP protein occur within a cell?” and “Does shuttling of the Rev-GFP protein occur between the nucleus and cytoplasm?”. At the Research Institute of University Hospitals of Cleveland, a two-photon confocal microscope was utilized to test cellular fluorescence intensity levels. The method of photobleaching cellular regions and monitoring their ensuing fluorescence return is termed F.R.A.P., Fluorescence Recovery After Photobleaching. The cytoplasmic diffusion of Rev-GFP protein was examined by photobleaching a region in the cytoplasm and monitoring the return of fluorescence, which was rapid and complete, averaging four seconds. Diffusion was proven to occur in the cytoplasm. The nuclear-cytoplasmic shuttling of Rev-GFP protein was then investigated by bleaching a region in the nucleus and observing the intensity changes in the cytoplasm. This process is known as F.I.L.P., or Fluorescence Loss In Photobleaching, quantifies the extent to which regions outside a photobleached box contribute to fluorescence recovery in a bleached site. Less than one quarter of the coupled cytoplasmic-nuclear regions of interest, when photobleached, showed significant losses and subsequent gains in intensity, respectively. Results show some evidence of the shuttling, but there appears to be too much photodamage to formulate a simple conclusion at present. Nuclear-cytoplasmic shuttling seems to occur in warrants further investigation, leading to an examination of the possible shuttling of FMRP.


Atherosclerosis, the primary cause of heart disease and stroke, is a disease of major arteries. During atherosclerotic lesion formation, monocytes from the blood migrate through the endothelial cell layer. There, in the inner layer (the intima), monocytes become macrophages and take up oxidized low-density lipoprotein (LDL), a chemically modified form of LDL, which is normally involved in cholesterol transport. The cholesterol-engorged macrophages are called “foam cells.” Smooth muscle cells (SMC) also migrate into the lesion and proliferate during lesion development. SMC and foam cells in the lesion die by programmed cell death, called apoptosis. Apoptosis pathways involve the activation of enzymes called caspases that lead to fragmentation of DNA (DNA laddering) and programmed cell death. Cultured cells were treated similarly, followed by treatment with anti-apoptotic drugs in lesions, with 7-ketocholesterol (7K), a toxic component of oXLDL. DNA-laddering and caspase-3 activity were examined in untreated cells, 7K-treated cells, and 7K-treated cells pretreated with the antioxidant vitamin E. In SMs, 7K-treatment induced significant DNA laddering and caspase-3 activity; both processes were inhibited by vitamin E. Interestingly, in SMC, 7K induced DNA laddering but not caspase-3 activity. The results in endothelial cells were similar for cells, 7K, and SMC, which can be inhibited by antioxidant pretreatment; however, apoptosis in SM may proceed by a pathway independent of caspase-3. Further studies will determine other caspases and other mechanisms of vitamin E inhibition. Revealing the mechanisms of cell death in atherosclerotic lesions may suggest targets for therapy against the disease.

Board 09 DESIGN AND DEVELOPMENT OF A创造 CK-MB BIOSensor. Julia R. Jarrell*, jarrell07@hbc.edu, (Chung-Chiu Liu2, CXLL@cwru.edu), 'HATHAWAY BROWN SCHOOL, 19600 NORTH PARK BOULEVARD, SHAKER HEIGHTS OH 44122 and CASE WESTERN RESERVE UNIVERSITY, ELECTRONICS DESIGN CENTER, CLEVELAND OH 44106.

Creatine kinase-MB (CK-MB) levels in the blood inform health professionals on the extent of heart damage. Two types of CK-MB exist: CK-MB 1 and CK-MB 2. CK-MB 1, which is used to detect early signs of a heart attack or heart surgery and aid in determining the course of treatment. Patient studies have shown that CK-MB levels 3-5 times above normal (4 mg/dL) indicate serious damage to the heart. The objective of this study is to design a microfabricated thick-film biosensor that can quantify CK-MB levels in the blood. The completed sensor will provide a more efficient and cost-effective means to monitor CK-MB levels. The principle of the sensor is based on the following reaction:

\[ \text{CK-MB} \rightarrow 2\text{C}_2\text{H}_4\text{O}_4 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}_2 + 2\text{C}_2\text{H}_4\text{N}_2\text{O} \]

In this reaction, creatine (C\(_4\)H\(_9\)N\(_3\)O\(_2\)) is the substrate. In the presence of CK-MB, creatine is oxidized, producing hydrogen peroxide (H\(_2\)O\(_2\)). The detection of hydrogen peroxide is then used to quantify CK-MB. CK-MB levels are used to test three standards of CK-MB concentration including gold working and counter electrodes and a silver-silver chloride reference electrode is used. Three concentrations of CK-MB (1, 3, and 5 mg/dL) are used in this study, covering the normal physiological range of CK-MB. The detection of hydrogen peroxide is accomplished by applying an oxidation potential and measuring the oxidation current produced in this system. A linear relationship between the current output and the CK-MB concentration exists, serving as the calibration basis for this biosensor. Based on the experimental results, a practical sensor microsystem will be developed. Reproducibility, accuracy, sensitivity, and effective detection range of CK-MB of the practical sensor microsystem will be investigated. This biosensor will have unique scientific and clinical applications.

Board 10 THE PRIME ANNELING TEMPERATURE FOR THE POLYMERS CHAIN REACTION TECHNIQUE IN THE DETECTION HEREDITARY HEMOCROMATOSIS ON THE HFE GENE. Caitlin A. Midkiff, FAIRLAND HIGH SCHOOL, SCIENCE DEPARTMENT, PROCTORVILLE OH 45669.
Bioremediation of runoff water was studied using duckweed (Lemna sp. and Wolffia sp.). Runoff water toxicity was evaluated with Fathead Minnows (Pimephales promelas). All tests were performed in September and October of 2002. Rainwater precipitation was the site. Each trial had five test containers holding 7.5 L each. These containers were aerated. Test and log the following: pH (standard units), total solids level, and oil and grease. The greater solids level and oil and grease would create a more toxic environment. The hypothesis was supported. A ring of inhibition was observed. This behavior, a survey consisting of 524 test subjects was concluded. To ascertain reasons motivating this behavior, a survey consisting of 524 test subjects was concluded.
Bone marrow (BM) contains CTPs that can be activated to proliferate and differentiate into new tissues including; bone, cartilage, fibrous tissues, muscle, and fat. Optimization of the use of CTPs in therapeutic cellular grafts requires an improved characterization of CTPs and their protein expression and developmental pathways. One such protein, b-Catenin, is essential in intercellular junctions and regulates gene expression in the highly conserved Wnt signaling pathway. Wnt genes determine cell fate including; growth, differentiation, and embryogenesis. When mutated, the Wnt pathway activates oncogenes facilitating cancer progression via the b-Catenin transcription factor complex. We hypothesized that b-Catenin is present in CTPs and used Western Blot analysis for detection. BM was harvested from the iliac crest of patients who had undergone surgery, and the CTPs were cultured for 15-days. Protein content was quantified using the Bradford method. 10mg were loaded onto a polyacrylamide gel. The protein was electrophoretically transferred to a nitrocellulose membrane. The membrane was blocked to prevent non-specific binding, incubated overnight in 1° antibody (mouse monoclonal) and then in anti-mouse IgG-HRP with rinses before and after. Protein antibody complexes were detected by chemiluminescent film destaining. b-Catenin was detected at an antibody specific protein at 92KD, thus indicating the presence of b-Catenin in the CTPs cytosol and nucleus. This suggests that Wnt signaling is occurring and future studies will assay the presence of Wnt proteins. These results may have important implications in the development of CTPs and their use in therapeutic cellular grafts.

When the first accounts of anthrax were found in America, everyone began sneezing, as if being protected by turning to the other side of the street. When the first accounts of anthrax were found in America, everyone began sneezing, as if being protected by turning to the other side of the street. The purpose of this experiment was to find out how far the microorganisms in a sneeze travel, in order to avoid germs from a sweat. During a sneeze most of the microorganisms actually issue from the mouth, but others enter the air through the lungs. This project was conducted to determine the approximate size of a human lung. The diameter of the balloon was measured and compared to a lung capacity chart. The balloon was punctured with a sterile needle inside the sneeze chamber. The punch was made using a total of six balloons with various lung capacities and a control balloon containing no mucus. The chamber and petri dishes were sterilized before each balloon. The petri dishes were labeled and incubated at 37°C for 48 hours. The number of colonies of bacteria that had grown in each petri dish, were counted and recorded. The data shows that the largest concentration of microorganisms landed between the 0 cm and 15 cm marks. The data also shows that the farther out the sneeze travels the fewer colonies of microorganisms there were. However, even at six feet (170 cm) germs still reached the petri dishes. The conclusion was that the largest concentration of mucus falls directly in front of the person who sneezed. Though in order to avoid germs, a person must be farther than six feet (170 cm) away from someone who has sneezed.
nonlinear chromophore, and a plasticizer. The PR effect in the samples was studied using a four wave mixing set-up in which two writing beams interfere in the sample which leads to the PR effect and the diffraction of the probe beam. Each measurement was run by applying an electric field and then allowing the writing beams in the setup to interfere in the sample. The intensity of the resulting diffracted beam was recorded as a function of time. Results show that the efficiency of the diffraction depends on the applied electric field. The photorefractive response time decreased by a factor of three. These effects are thought to be the result of the nanoparticles concentrating the electric fields which would increase the amount of charge generated by the laser light and/or increase the electric field effect on the chromophore. It is also possible that the nanoparticles alter the trapping of charge. The results show that the nanoparticles aid in the creation of the diffraction grating within the polymer composites studied.

**Board 22** THE EFFECT OF ELECTROMAGNETIC RADIATION ON PLANT GROWTH. Scott R. Daniels, 3244 Spring Valley Road, Akron, OH 44333, Joggles01@adelphia.net, Tracy R. Chasar, TandTautos.1@netzero.net. (Cuyahoga Valley Career Center, Dept of Horticulture.)

Bean plants (Phaseolus vulgaris) were observed for the effect of electromagnetic radiation on growth rate. Plants were placed under two levels of electromagnetic fields (high voltage at 60watts and low voltage at 11watts) with a third group as a control. Bean plants placed under the electromagnetic fields were hypothesized to have a lower growth rate compared to the control group. Three groups of fifteen bean plants were placed into flat trays. Two 16-gauge wires carrying 110 volts were suspended at a height of 30cm over the base of each grouping. The experiment was conducted in a controlled greenhouse environment. The plants were observed daily for a total of three weeks. Bean plants grown under the high voltage electromagnetic field (gauss level 4.4mG at 15 cm) grew less (mean height = 9.5 cm) than those that were grown in the absence of an electromagnetic field (gauss level 0.0mG at 15 cm)(mean = 11.0cm). The low voltage group grew taller than the high voltage group (mean height 10.5 cm). A t-test was conducted to compare the high and low voltage trials to the control group. The difference in growth between the high voltage group and the control group was statistically significant (p<.05). The low voltage trials showed no significant growth but had a lower mean height. These results support the hypotheses that plants grown under electromagnetic fields have a lower growth rate.

**Board 23** DETERMINATION OF DNA MARKERS FOR POSSIBLE FIBER CHARACTERISTICS OF LAMA PACOS/Dezaray P. Reed, dppearl@logancore.com, 120 Cowntel Avenue, Bellemontaine, Ohio 43311.

The alpaca industry is the fastest growing textile market in the world, but farmers know little about genetic determination of factors influencing quality of fiber. DNA is extracted from alpaca fibers, alpaca skins placed under the electromagnetic fields were hypothesized to have a lower growth rate compared to the control group. Three groups of fifteen alpaca skins were placed into flat trays. The experiment was conducted in a controlled greenhouse environment. The skins were observed daily for a total of three weeks. Alpaca skins grown under the high voltage electromagnetic field (gauss level 4.4mG at 15 cm) shrunk more (mean height = 9.5 cm) than those that were grown in the absence of an electromagnetic field (gauss level 0.0mG at 15 cm)(mean = 11.0cm). The low voltage group shrunk less than the high voltage group (mean height 10.5 cm). A t-test was conducted to compare the high and low voltage trials to the control group. The difference in growth between the high voltage group and the control group was statistically significant (p<.05). The low voltage trials showed no significant growth but had a lower mean height. These results support the hypotheses that alpaca skins grown under electromagnetic fields have a lower growth rate.

**Board 24** A STUDY OF THE RELATIONSHIP BETWEEN BEAR ENRICHMENT FOODS AND DIGESTIVE DISTRESS. Gideon P. Steed, Falleangenel. 51@yahoo.com, 5979 Radnor Road, Radnor OH 43066. (Greater Columbus Zoo & Aquarium School).

Enrichment is anything given to an animal to reduce monotony in diet or behavior. Zoo animals are often given enrichment to their daily diet to reduce boredom, vary their nutrient sources and allow them to express their natural behavior. There is concern that the introduction of enrichment items might disrupt a zoo animal’s digestive system. Stool consistency is often used as a measure of digestive distress. Keepers recorded daily stool consistency and number for one male and one female black bear, Ursus americanus, and one female grizzly bear, Ursus arctos horribilis, at the Columbus Zoo and Aquarium, in Columbus Ohio, for one year. Stool consistency is determined using a Likert scale, one for normal dog-like scat to five for a watery diarrhea. An ANOVA, held at a p=.01 for alpha level confidence, of the tic-tac consistency and count one, two and three days after enrichment showed no significance. Each enrichment type examined separately did not show a correlation between enrichment and stool consistency. There was no correlation between enrichment items given to the American bear and the Columbian Zoo and Aquarium do not adversely affect the animals’ health.

**Physical Sciences & Education**

9:00 APPLIED ORGANIC ACID CHEMISTRY Paul Szalay, Heather Nees, Natalie Radt, Matthias Zeller, Allen Hunter. Dept of Chemistry, Muskingum College, New Concord, OH 43762. This research involves the synthesis and characterization of metal-organic compounds. This interest stems, in part, from the fact that the pores or cavities created in these metal-organic frameworks may be tailored for the inclusion of specific guest molecules. Crystalline molecular and solid state metal-organic compounds have been synthesized through reactions of solvated transition metal ions with organic ligands that serve as linking units. The results of reactions of copper (II) and cobalt(II) with the organic linker tetrabutylammonium 4,4’-diaminotetraphenylethene show that these compounds are compatible with the presence of solvent molecules. The methods used to characterize the products of these various studies include single crystal X-Ray diffraction and assorted spectroscopic techniques (IR, UV-Vis etc.).


The chemical synthesis of nucleic acids requires the protection of reactive groups along the backbone. This reaction is critical in the preparation of oligonucleotides for analysis. This research investigates the chemical synthesis of oligonucleotides. The protocol and methods used in this research are essential for the synthesis of nucleic acids that can be used in biological applications such as gene therapy.
is translocated into the nucleus. As a result, beta-catenin mediated Wnt-signaling can be easily detected using cell specific staining. Beta-catenin can therefore serve as a convenient marker for in vitro evaluation of strategies that can increase or decrease Wnt-signaling events, the effort to manipulate the in vivo behavior of CTPs. Bone Marrow was aspirated from 9 human donors. Marrow was processed to isolate CTPs in vitro using established methods and cells were plated onto 16-well Lab-Tech chamber slides. At day 6, the cells were fixed using 4% Paraformaldehyde in PBS, blocked with goat serum in PBS, and incubated/stained with a monoclonal mouse anti- beta-catenin Ab and then a fluorescent secondary Ab. Images were captured using an Olympus BX-50 fluorescent microscope and digital camera. Positive cytoplasmatic staining was seen, consistent with the expectation that beta-catenin mediated Wnt-signaling is present in the CTP population. The staining was uniformly distributed throughout the cytoplasm in clusters of varying intensities, becoming slightly brighter near the nucleus. These data suggest that beta-catenin provides a convenient and useful marker for early Wnt-signaling in human CTPs, which can be utilized in subsequent studies.

9:45 LEARNING STYLE PREFERENCES OF EXTENSION EDUCATORS IN OHIO, GREGORY A. DAVIS, davis.1081@oah.ohio.edu, OHIO STATE UNIVERSITY EXTENSION – WEST DISTRICT, 1219 WEST MAIN CROSS STREET, FINDLAY, OHIO 45840.

The Group Embedded Figures Test (GEFT) examines one’s mode of perception in relation to one’s surroundings, describing learning style preference using a bipolar continuum comprised of two modes of perception: field dependent (or field sensitive) and field independent. The perceptions of learning styles are influenced throughout the dependent end of the continuum by the surrounding field, whereas perceptions of learners leaning toward the field independent end of the continuum are separated from the surrounding field. Research shows that the majority of preservice agricultural educators favor field independence which relates closely with a preference for a subject centered approach to teaching. To determine if these findings would hold true with practicing agricultural Extension educators, the learning style preferences of Ohio Extension educators were measured in Spring, 2004 using the Group Embedded Figures Test. GEFT scores were examined in relation to programmatic area of focus, gender, age, academic background, level of education, and length of education. An improved understanding of Extension educators’ learning style and teaching style preferences can improve the extent to which Extension instruction meets the particular needs of learners. Furthermore, this knowledge can be useful in programmatic and organizational team formation and maintenance.

Zoology
9:00AM, Saturday April 17th 2004 DeBartolo Hall Room 358 Dr. Courtenay Willis

9:00 NESTLING PROVISIONING BEHAVIOR AND REPRODUCTIVE SUCCESS IN ACADIAN FLYCATCHERS. COURTENAY N. WILLIS cnwillis@ysu.edu, DEPT. OF BIOLOGICAL SCIENCES, Youngstown State University, Youngstown OH 44555 and LASHALE D. PUGH, pughl@geog.umd.edu, DEPT. OF GEOGRAPHY, UNIVERSITY OF MARYLAND.

Nestling feeding rate is one measure of feeding performance, and may be associated with both the net rate of energy intake by young and the risk of predation at the nest. The central hypothesis of this study is that adult prey choice influences feeding performance, and consequently, provisioning strategies used by adults to provision young reflects adaptations for maximizing reproductive success. Acadian Flycatchers (Empidonax virescens) in northeastern Ohio were observed to determine if nestling feeding rates differed between specialists and generalists. Specialists were classified as adult pairs for which greater than 50% of the food fed to nestlings consisted of a particular order of arthropods. Arthropods fed to nestlings by specialist pairs (n=4 nests) and generalist pairs (n=5 nests) were identified as Diptera (45%), Lepidopterans (18%), and Hymenoptera (17%). Arthropods were predominant arthropods in the nestling diet. In terms of feeding performance, specialist pairs fed young less often than generalist pairs (p=0.05). However, there was no difference in average nestling weight between specialist and generalist nests (p=0.28). Therefore, it appears that nestling provisioning behavior was influenced by adult prey choice since specialists made fewer visits to the nest yet young did not weigh less. These results suggest that a benefit of being selective may be a reduced risk of predation at the nest.

9:15 INSECT SUGAR FORAGERS (HYMENOPTERA:FORMICIDAE) AND THEIR UNIQUE NECTAR SOURCES. MARK E. HEADINGS, HEADINGS.1@OSU.EDU, THE OHIO STATE UNIVERSITY AGRICULTURAL TECHNICAL INSTITUTE, 1328 DOVER ROAD, WOOSTER, OH 44691.

Many insect species forage and utilize sugar carbohydrates in their diets. Some insects obtain sugars from inside of plants by using a piercing/sucking mouth, whereas, others obtain them from extrafloral nectary (floral and extrafloral nectaries are one of several different types of mouthings, including chewing/lapping. Some ant species also collect second-hand sugar (honeydew) from homopteran insects which had initially collected it from plants. The objective of this investigation was to compare specific extrafloral and homopteran sugar sources and ants (Formicidae) associated with them. Observation results were documented, along with supportive photographic evidence, of these nectar sources and their respective foraging ant species. The mound building ant, Formica obscuripes (Forel), was seen collecting honeydew from aphids, Cinara spp., on jack pine trees in Wexford County, Michigan. Other species such as Tapinoma sessile (Say), Leptothorax ambiguus (Emery), Formica emeryana (Forel), and Lasius niger (Forel) are seen foraging for nectar from extrafloral nectaries of cowweave, Melampyrum lineare (Desr.) in a jack pine forest in Grand Traverse County, Michigan. In 2002, the Allegheny Mound Ant, Formica parietina, was observed foraging on oak treehoppers, Oeciacus martenii (Stål), and oak treehoppers, Oeciacus actor (Latreille). Ant species were also seen feeding at extrafloral nectaries of mung beans in Wayne County, Ohio. The utilization of nectar sources utilized by ants serve as a basis for further investigation into the identification and quantification of sugars in different nectars.

9:30 MORPHOLOGICAL DESCRIPTIONS OF OXYURIDS FROM COCKROACHES. KATHRYN E. REIF, kereif@owu.edu, RAMON A. CARRENO, rcarreno@owu.edu, LAURA TUHLEA, lmtuhlea@owu.edu, DEPT. OF ZOOLOGY, OHIO WESLEYAN UNIVERSITY, DELAWARE, OH 43015.

The Oxyurida are a diverse order of parasitic nematodes that inhabit the hindgut of many vertebrates and invertebrates. Morphological information for species that have been described from cockroaches (Order Blattodea) is generally limited to descriptions based on light microscopy and many species have been poorly described. Our current research involves a re-evaluation of the morphology of oxyurids from cockroaches using light and scanning electron microscopy (SEM). We here report several new morphological characters, including new cephalic and tail papillae, from Leidyinema portentosae, a parasite from the Madagascar hissing cockroach (Gromphadorhina portentosa). Live nematodes were fixed in glutaraldehyde and dehydrated using HMDs (hexamethyldisilazane) or critical point drying preparation. Using SEM, several new characters have been observed including unusually wide lateral alar plates on the posterior end of both the male and female L. portentosae. Cephalic and tail structures are also described. These results indicate external morphological features not previously described or conflicting with the previous published description of L. portentosae.

9:45 THERMOCONFORMERS OR THERMOREGULATORS? THE TUATARA (SPHENODON PUNCTATUS) TRULY A MALADAPTIVE LIVING FOSSIL OR A RESULT OF NON-SQUAMATE LEPIDOSAURIAN ADAPTATION TO COLD CLIMATES. CHRISTOPHER K. CARMICHAEL, ccarmichael@malone.edu, and JAMES C. GILLINGHAM, gillingham@malone.edu, MALONE COLLEGE, DEPT. OF NATURAL SCIENCES, 515 25 ST., NW, CANTON, OH 44709-3897, and CENTRAL MICHIGAN UNIVERSITY, DEPARTMENT OF BIOLOGY.

The tuatara (Sphenodon punctatus) is one of two sole surviving species of sphenodontids that is often viewed as a "living fossil" that has remained unchanged since the Triassic. Although the tuatara possesses many ancestral characteristics such as acrodont dentition, lack of a male copulatory organ, gastralia, a diapsid temporal region and fixed quadrate, a thorough study of the tuatara’s current thermoregulatory regime does not necessarily imply the retention of ancestral physiological adaptations to a cooler climate nor can we make direct inferences about the climates in the Triassic. We observed adult male and female tuatara continuously during day and night time hours within the two predominant habitats (forest and open paddock habitat) on
Many aquatic crustaceans use water-borne chemical cues in ecologically critical activities such as finding food, mates, suitable habitat, detecting predators, and communicating with conspecifics. The olfactory cues are often present as odor plumes, which consist of fine filaments containing high concentrations of odor molecules interspersed with the surrounding fluid. Several parameters affect the structure of an odor plume and thus, how the plume is encountered by navigating animals. These include the size, shape, and flow characteristics of the underground carrier as well as the mean velocity, turbulence level, and the gradient of flow speed above the substratum. Several species of Ohio crayfish (Cambarus cavatus, C. robustus, C. thomai, Orconectes immunis, O. sanborni and O. virilis) were collected from a variety of flow habitats, including streams with silt, sand, gravel, cobble, boulders, spring-fed streams, and stagnant lakes. Since odor plume structure varies according to flow habitat, we hypothesized that crayfish antennules from species living in different flow environments would have different patterns of chemosensory arrangements on their antennules, to best encounter odors in that habitat. Antennules were examined from at least three species of crayfish using electron microscopy, and measured structural parameters at three positions along the antennules from micrographs using Scion Image Software (Scion Corporation). The number of aesthetasc, aesthetasc length, and diameter increased in aquatic habitats, and the ratio of the gap between aesthetasc rows to the aesthetasc diameter (a critical parameter for calculating sample volume) varied with position on the antennule.
While algae represent integral components of aquatic ecosystems there are at least 27 major taxa from which the presence/absence of species from various habitats and regions. One such region that has been the focus of sporadic algal inventory is the unglaciated Western Allegheny Plateau (UWAP) in Ohio. The primary purpose of this study was to compile a comprehensive list of algal taxa found within this distinctive ecoregion. Two groups of data were referenced to form a list for the survey. The first data set was composed of taxa identified from field samples collected from 11 varied habitat sites throughout the UWAP. These collections were made in conjunction with various projects, theses, and dissertations conducted at Ohio University. Habitats sampled included streams, lakes, vernal pools, cliffs, walls, springs and wetlands. Systems in this aspect of the study had mean species richness values of 54 species with a minimum of one species and a maximum species richness of 273 being recorded. Depressed levels of species richness recorded were often attributed to the prevalence of acid mine drainage in this region. The second data set was accumulated by performing a literature search of 22 previous investigations conducted in the region. The combination of both data sets yielded a total of 1,716 infrageneric taxa for this survey. Groups that exhibited significant species richness included the Chlorophyta (39%), Bacillariophyceae (34%), and the cyanobacteria (15%). Additional groups of lesser taxonomic dominance included the Euglenophyta (6%), Chrysophyta (2%), Xanthophyta (2%), Cryptophyta (1%), and the Rhodophyta (0.5%).

9:15 NEW LEPTOOLYNGBYA (CYANOBACTERIA) REPORTED FROM THE ALL TAXA BIODIVERSITY INVENTORY OF GREAT SMOKY MOUNTAINS NATIONAL PARK. CATHERINE E. OLSEN (COLSEN06@SCU.EDU), JEFFREY R. JOHANSEN AND REX. L. LOWE. DEPARTMENT OF BIOLOGY, JOHN CARROLL UNIVERSITY, UNIVERSITY HEIGHTS, OH 44118. DEPARTMENT OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY.

The All Taxa Biodiversity Inventory (ATBI) began in 1997 with the goal of inventorying and providing a database of information for every species located in the habitat replete Great Smoky Mountains National Park (GSMNP). The ATBI work on the algal communities of GSMNP has yielded many new records to the park and possible new records to science. In this study, algal samples were collected from three wet rock seeps within GSMNP. Both living and preserved material was examined and photographed. Eight Leptolyngbya (Oscillatoriales; Cyanobacteria) species were identified from the three sites. In an effort to conform to recent taxonomic trends, the ecological preference of the cyanobacterial species was taken into consideration. Of the eight Leptolyngbya observed, three are putative new taxa. A new genus of Leptolyngbya was found in the park, and two others did not fit any previously circumscribed taxa. There are currently no European keys to identify species of cyanobacteria. Rather than depending on these descriptions as the sole basis of classification, morphological, ecological, and biogeographical data were combined in this study to determine taxonomic identification. Forcing potentially new taxa into previously described morphologically similar, but ecologically very different, species has been avoided by the inclusion of ecological and biogeographical data in addition to morphology as species descriptors.

9:30 TWO NEW CYANOBACTERIAL TAXA FROM THE GREAT SMOKY MOUNTAIN NATIONAL PARK (USA). DAE A. CASAMATTA, SCASAM@COLUMBUS.EDU, SHANNON R. GOMEZ AND JEFFREY R. JOHANSEN. DEPARTMENT OF BIOLOGY, JOHN CARROLL UNIVERSITY, UNIVERSITY HEIGHTS, OH 44118.

The Great Smoky Mountain National Park (GSMNP) serves as a refuge for one of the largest, richest collections of plants, animals and cryptogamic taxa in the world. Here, we describe two new taxa from the park. First is a species of Capsosira from a vernal pool in the Great Smoky Mountains that is characterized by having a distinctive secondary structure in their 16S-23S rRNA ITS regions. These molecular structures provide molecular evidence that the likelihood that significant autapomorphies will be discovered. The genus Capsosira is currently placed in the Capsosiaceae of the Stigonematales due to its ability to divide in two planes. However, molecular evidence gathered in this study based on 16S rRNA gene data indicates closest affinity with Alulosira and Nostoc commune Vauch, both in the Nostocaceae, Nostocales. Rixia erectus was also isolated from concurrently collected epilithic, aerophytic sites. The hormogonia production, near absence of heterocytes, and division in two planes are all typical of the Stigonematales. However, Strixia fits none of the currently described morphological criteria that are used to delimit species in accordance with a polyphasic approach to morphospecies descriptions under the International Code of Botanical Nomenclature. Although recommendations have been made to delimit species in accordance with a polyphasic approach under the Bacteriological Code of Nomenclature, very few taxa have actually been described in this way. Consequently, additional groups of lesser taxonomic dominion included the Euglenophyta (6%), Chrysophyta (2%), Xanthophyta (2%), Cryptophyta (1%), and the Rhodophyta (0.5%).

9:45 A NEW APPROACH TO CYANOBACTERIAL SYSTEMATICS AND TAXONOMY. JEFFREY R. JOHANSEN, JOHANSEN@SCU.EDU, AND DAE A. CASAMATTA, SCASAM@COLUMBUS.EDU.

In the past, cyanobacterial species delimitation has been confined to morphospecies descriptions under the International Code of Botanical Nomenclature. Although recommendations have been made to delimit species in accordance with a polyphasic approach under the Bacteriological Code of Nomenclature, very few taxa have actually been described in this way. Consequently, additional groups of lesser taxonomic dominion included the Euglenophyta (6%), Chrysophyta (2%), Xanthophyta (2%), Cryptophyta (1%), and the Rhodophyta (0.5%).

10:00 SEASONAL AND ANNUAL METAPHYTON DYNAMICS IN A RECENTLY CONSTRUCTED WETLAND IN DEFENCE COUNTY OHIO. SARAH E. HAMSHUE (HAMSHUE5@HOTMAIL.COM), LEE M. LUCKEYDOOD, DAE A. CASAMATTA AND NORMAN R. FAUSEY. UNITED STATES DEPARTMENT OF AGRICULTURE, 590 WOODY HAYES DR., COLUMBUS, OH.

Algae are one of the primary components of wetland community structure and function, responsible for the majority of carbon fixation and nutrient removal from these systems. Constructed wetlands are increasingly being utilized as a method of reducing nutrient enrichment to aquatic ecosystems due to anthropogenic effects. The purpose of this research was to document the seasonal and annual metaphyton (algae not directly attached to substrata, but loosely associated) community over a four year period (2000-2003) in a recently constructed wetland used to ameliorate acid mine drainage in Defence County, Ohio. Metaphyton were identified, enumerated, and biomass was calculated to determine dominant biomass. In each year, chlorophytes (green algae) and bacillariophytes (diatoms) comprised the majority of biomass showing marked seasonal periodicity in taxa present and overall biomass. Further, biomass was highest in September in three of the four years. Cyanobacteria, common components of constructed wetlands, were not dominant in any samples collected. Whether this is a result of nutrient saturation or extensive zooplankton herbivory remains unknown. A comparison of biomass between years shows that the algal community structure changed in biomass and taxa present while simultaneously decreasing nitrate and orthophosphate levels.
20:15
DISSOLVED ORGANIC PHOSPHORUS (DOP) COMPOUNDS AS A SOURCE OF PHOSPHORUS AND CARBON TO FRESHWATER PLANKTON COMMUNITIES, EAST TWIN LAKE, PORTAGE COUNTY, OHIO

Robert T. Heath (heath@kent.edu) and Dennis Hansen (hade0201@stcloudstate.edu) Department of Biological Sciences, Kent State University, Kent, Ohio 44424.

Although dissolved organic phosphorus compounds (DOP) have traditionally been thought of as a source of P for bacteria and algae in freshwater environments, the significance of DOP as a C-source has largely been ignored. Because recent findings indicate that labile dissolved organic compounds (LDOC) may greatly influence phosphate uptake by bacterioplankton and because bacterioplankton generally C-limited, the possibility that freshwater bacteria may use DOP as a source of both P and C was examined. The purpose of this study was to follow the assimilation of the P- and C-moieties from glucose-6-phosphate (G6P) and the 5'-mononucleotide, adenosine-triphosphate (ATP), by a natural plankton assemblage drawn from a hardwater glacial kettle lake (East Twin Lake, Portage County, Ohio). Uptake of \textsuperscript{32}P-glucose and \textsuperscript{32}P-phosphate from G6P and \textsuperscript{3}H-adenosine and \textsuperscript{3}P-phosphate from equimolar quantities of \textsuperscript{3}P-ATP and \textsuperscript{3}H-ATP, ranging from 10 to 80 nM (total conc.), was followed by filtration onto 0.2 \textmu m and 1.0 \textmu m filters. Both bacterioplankton and phytoplankton assimilated the phosphoryl moiety in preference to the organic moiety; bacterioplankton thus not only phytoplankton assimilated the significant fraction of the organic moiety from DOP compounds, too. Our findings are consistent with the view that bacteria may utilize DOP as a source of P and C, while phytoplankton use DOP only as a source of P. This study was supported in part by the NSF and Ohio Sea Grant.

10:30
LABILE DISSOLVED ORGANIC CARBON (LDOC) AND DISSOLVED ORGANIC PHOSPHORUS (DOP) INFLUENCE PHOSPHATE UPTAKE IN LAKE ERIE BACTERIOPLANKTON. Tracey Trzebuckowski Meilander, trzebuckow@kent.edu, Robert T. Heath, heath@kent.edu, DEPARTMENT OF BIOLOGICAL SCIENCES, 256 CUNNINGHAM HALL, KENT STATE UNIVERSITY, KENT OH 44424.

While phosphorus is the major limiting nutrient in the Great Lakes eutrophic systems, which have high loads of labile organic carbon (LDOC) and dissolved organic phosphorus (DOP) in the water column, a view called the Microbial Shunt Hypothesis (MSH) of phosphate apportionment in freshwater plankton communities. According to the MSH, in low LDOC (<50 nM) environments, bacterioplankton will uptake most available P; but, in high LDOC environments (>70 nM), phytoplankton will uptake most available P. The purpose of this study was to determine whether field observations of plankton communities in Lake Erie behaved according to predictions of the MSH. We examined phosphate-uptake velocity, LDOC, and particulate P at seven stations on Lake Erie in August 2003. Phosphate uptake was measured radioimetrically using \textsuperscript{32}P-phosphate from G6P and \textsuperscript{3}H-adenosine and \textsuperscript{32}P-phosphate from ATP, by a natural plankton assemblage drawn from a hardwater glacial kettle lake (East Twin Lake, Portage County, Ohio). Uptake of \textsuperscript{32}P-glucose and \textsuperscript{3}P-phosphate from G6P and \textsuperscript{3}H-adenosine and \textsuperscript{3}P-phosphate from equimolar quantities of \textsuperscript{3}P-ATP and \textsuperscript{3}H-ATP, ranging from 10 to 80 nM (total conc.), was followed by filtration onto 0.2 \textmu m and 1.0 \textmu m filters. Both bacterioplankton and phytoplankton assimilated the phosphoryl moiety in preference to the organic moiety; bacterioplankton thus not only phytoplankton assimilated the significant fraction of the organic moiety from DOP compounds, too. Our findings are consistent with the view that bacteria may utilize DOP as a source of P and C, while phytoplankton use DOP only as a source of P. This study was supported in part by the NSF and Ohio Sea Grant.

9:15 MICROBIAL COMMUNITY STRUCTURE IN LEAF LITTER IN A STREAM. T RACEY TRZEBUCKOWSKI M EILANDER, trzebuckow@kent.edu, ROBERT T. HEATH, heath@kent.edu, DEPARTMENT OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44424.

In woodland streams, leaf litter serves as an important energy source for microorganisms. Leaf litter is the point at which the breakdown of leaf litter occurs. Fungi dominate in the early stages and bacteria in the later stages of decay. In a preliminary study in a Northeast Ohio stream (the West Branch of the Mahoning River), as high as 1.84 \times 10^7 CFU/gm of bacteria were isolated from the leaf litter. The bacterial community was dominated by Gram-negative bacteria and was composed of many different genera. The water column was dominated by filamentous cyanobacteria and was composed of many different species.

9:30 DETECTION OF HELICOBACTER PYLORI ORGANISM IN REGULARLY-SUBMITTED STOOL SAMPLES USING RAPID ENZYME IMMUNOASSAYS. SAROJ K SIGDEL, MD SWAHAB SAROJ K SIGDEL, MD SAROJ SIGDEL, MD swahab@forumhealth.org, SYED WAHAB, MS swahab@forumhealth.org, DEPT OF PATHOLOGY AND LABORATORY MEDICINE, FORUM HEALTH, 500 GYPSY LN, YOUNGSTOWN OH 44501.

Helicobacter pylori is a common gastrointestinal pathogen in humans and is associated with chronic gastritis and peptic ulcer disease. Approximately 50% of the population in the developed world and 90% of the population in the developing world are infected with H. pylori at some point in time. Ninety percent of patients with chronic gastritis and the majority of patients with peptic ulcer disease are positive for the organism. The objective of this study was to determine the prevalence of H. pylori in regularly-submitted stool specimens at Northside Medical Center, Youngstown, OH, using two rapid enzyme immunoassays (HpSA™ microtiter wells and HpsA™ immunocardi). In a prospective study, 38 regularly-submitted stool specimens at Northside medical center, Youngstown, OH, were evaluated for the presence of H. pylori. Two rapid immunoassays, HpSA™ micro titer wells and HpsA™ immunocards (Meridian Diagnostics, Inc., Cincinnati, OH), were employed in the detection of the H. pylori antigen in the stool samples. Of the 38 regularly-submitted stool specimens at Northside Medical Center, Youngstown, OH, one sample was positive for both rapid immunoassays (HpSA™ microtiter wells and HpsA™ immunocard). The study shows that approximately 2.6% (1/38) of patients whose stool samples were sent to the lab for various reasons were positive for H. pylori organism.

9:45 MOTILITY ASSAYS OF BACTERIA ISOLATED FROM WATER SOURCES AT KRAUS WILDERNESS PRESERVE, LEILA S. CORTHELL, lscorthee@owu.edu, (LAURA G. LEFF, leff@kent.edu, DEPT OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44424.

Twenty bacterial isolates supplied by NASA from the Mir space station water system were identified using traditional methods and 16S rRNA gene sequencing. Results from Vitek® GNI+ test card, API® 20NE and 16S rRNA gene sequencing methods showed considerable discrepancies. Strains were also characterized based on motility and hydrophobicity. About 40% of the strains were motile. Hydrophobicity was determined using the n-octane method (values ranged from 73.38 to 2.51%) and 4 strains were hydrophilic. Only 6 species were identified the same between the MSH gene method and API® 20NE while 5 species matched between 16S rRNA gene sequencing method and Vitek® GNI+ test card. Only 4 species were identified the same between the MSH gene method and API® 20NE while 5 species matched between 16S rRNA gene sequencing method and Vitek® GNI+ test card. API® 20NE was unable to identify 6 strains and 2 strains were not identified by Vitek® GNI+ test card. Based on the MSH gene method, the following five taxa were found: Arthrobacter sp., Stenotrophomonas maltophilia, Raistonia pickettii, Pseudomonas sp. and Chryseobacterium sp. API® 20NE and Vitek® GNI+ test card were limited in their utility for identifying environmental isolates and failed to corroborate identifications. Their use for the identification of environmental bacteria is cautioned, but may be acceptable when more environmental bacterial profiles are added to their database.
Aeromonas hydrophila is a motile, aquatic bacterium with a single polar flagellum and has been reported as a pathogen to numerous aquatic animals and humans. To study the chemotactic abilities and flagellar structure of Aeromonas spp., aquatic bacterial isolates were obtained from water samples from the Krueger Marine Preserve, Delaware, OH. The 60 bacterial isolates were screened for characteristics of Aeromonas spp. including oxidase and catalase positive, Gram negative, motile bacilli. Of the 11 isolates presumptively identified as positive, 9 were Aeromonas. These isolates were identified by microscopy to be most highly motile were selected for further study. To confirm the identification of the isolates as A. hydrophila, the BBL Enterotube II system and Biolog Micro Plates were used. Growth characteristics of one isolate, TA-Ca, showed a doubling time of 60 minutes and the highest percentage of motile cells at 24 hours. Chemotaxis assays were done using 24 hour old TA-Ca cultures with aqueous solutions of 100 mM, 10 mM, 1.0 mM, 0.1 mM, and 0.01 mM of glucose, L-histidine, or L-arginine as possible chemotactants. A relative response ratio of 2.2 indicated that L-histidine at a 100 mM concentration was a chemoattractant for TA-Ca. Relative response ratios of less than 1.0 were observed for all three chemicals at concentrations of at least 0.1 mM or lower, suggesting that these chemicals might actually repel Aeromonas at low concentrations. In order to examine another aspect of Aeromonas motility, flagella were isolated from the S. marcescens strain. A. hydrophila was isolated from water samples collected from the two Cleveland Shale collections.

9:30 PRELIMINARY ANALYSIS OF THE PALEOFLORA OF THE DOAN BROOKS EXPOSURE OF THE UPPER DEVONIAN OHIO BLACK SHALE. Wilmer C. Stowe (wllst0@ncwcd.com) and Shiva Chitaley (schitaley@cmhh.org). The Ohio Journal of Science Vol. 104 (1) A-36.

The lactose permease couples the transport of lactose with proton movement, acting as a secondary active solute transporter in the Major Facilitator Superfamily (MFS). Members of this family can transport proteins such as the tetracycline antipporter and transport proteins implicated in diabetes, stroke, and depression. Lactose permease has been a model system in studies of transport activity for over 40 years. Studies to determine structure of the lac permease in Escherichia coli have led to a model of twelve transmembrane domains in a helical conformation, with eight amphipathic helices responsible for solute transport, and four hydrophobic helices, which work together to stabilize the protein in the membrane. To test functional significance of these stabilizing helices, helix III and VI have been studied using site-directed mutagenesis by placing charged amino acids into both hydrophobic helices. From previous and present research, mutations at positions V85K, M86K, F87E (helix III), and I1179K, L1180R, and A1181R (helix VI), have shown the importance in function of helix III and VI, with a decrease in lactose activity of 6.53% of wild type activity (W.T.) in the mutants. The different orientations of these helices in the permease play an important role in structural and functional activity in the lactose permease.
Recent advances in computer applications for mapping, especially in Geographic Information Systems (GIS), have resulted in a much more rapid change of data and dissemination during emergency situations. Despite these, during the September 11, 2001 event a significant lack of standardized emergency symbols on emergency maps was revealed. First Responders created the symbols for various features they needed to display on emergency maps. Emergency managers from different governmental and private agencies that were responding to the disaster, experienced conflicting symbols, making it a time-consuming process to interpret. Recognizing the problem, the Federal Emergency Management Agency (FEMA) led research efforts and launched reviews of the emergency and hazard management symbology used by the First Responders in their disaster operations. The Homeland Security Working Group of the Federal Geographic Data Committee’s (FGDC) joined FEMA’s efforts to support the development of National Standards for Emergency Symbology. In an attempt to standardize the symbols, various sources were searched in order to collect as many existing symbols as possible. The first step required the identification of existing emergency and hazard mapping symbols. The second step included the compilation of a matrix to a) identify information for which symbology was used, b) to identify the agencies that currently use hazard and emergency symbology, c) to identify hazard mapping symbols embedded in commercial software, d) to identify data elements in emergency information on hazard and emergency symbology was not readily available. The preliminary results indicate that most of the information on symbology is geared toward specific hazards such as hurricanes, tornadoes, and earthquakes. Symboology for evacuation during terrorist activities are almost non-existent. Another problem is that of conflicting symbols in all types of styles and formats between agencies which make standardization very problematic. The lower Alum Creek watershed encompasses portions of the Delaware and Franklin counties of central Ohio. This area is experiencing rapid population growth and concomitant changes in land use. Previous researchers have documented that the process of urbanization alters the hydrology of a watershed by shortening its circuiting the hydrologic cycle. Our hypothesis was that the Alum Creek watershed would exhibit similar hydrologic changes. The lower Alum Creek watershed encompasses portions of the Delaware and Franklin counties of central Ohio. This area is experiencing rapid population growth and concomitant changes in land use. Previous researchers have documented that the process of urbanization alters the hydrology of a watershed by shortening its circuiting the hydrologic cycle. Our hypothesis was that the Alum Creek watershed would exhibit similar hydrologic changes. The study used Ohio Department of Natural Resources GIS data from aerial photographic surveys and Landsat to quantify the percentage of urban land use of the Alum Creek watershed urbanized for the years 1976, 1979, 1994, and 1998. Water discharge data from U.S. Geological Survey gauging stations were analyzed to determine the hydrologic impact of urbanization on surface water. Urbanized land use increased from 66% to 80% in the Franklin County portion of the watershed between 1976 and 1998. Examination of hydrologic data included analysis of percent exceedance, seven-day low flow, and peak discharge data from 1942-2000. Results of these analyses suggest that increases in both short flows and shorter lag times between precipitation and surface discharge events often associated with urbanization. This is supported by decreasing seven-day low flows and decreasing percent exceedance. However, the Spearman and Spearman- Conley serial correlation tests provided no evidence to support a trend indicating increased discharge and shorter lag times (at 95% CI). Additional analysis utilizing climatologic data such as hourly rainfall records may be necessary to offer evidence of the impact of urbanization within the Alum Creek watershed. Agricultural drainage in the upper Midwest has been recognized as a major source of excess nitrogen in aquatic ecosystems. This research investigates the potential for nitrogen removal in one- and two-stage agricultural drainage ditches. Our hypothesis was that naturalized two-stage ditches would be more favorable for denitrification than traditional one-stage ditches. To achieve the objective, rate of denitrification, denitrification potential, plant nitrate uptake, and denitrification efficiency were measured in 10 one-stage and 10 two-stage ditches throughout Hancock County in the Portage River watershed in Northwest Ohio during the summer of 2003. Rate of denitrification was calculated by measuring in-situ denitrification in sediment incubation cores (N=480). Denitrification potential was determined by incubating sediment slurries (N=1440) under three different conditions (addition of nitrate, addition of nitrate plus glucose). Peak rates of denitrification were 1.73 ± 0.17 mg N2O g-1 DW h-1 and 0.54 ± 0.08 mg N2O g-1 DW h-1 in one-stage and two-stage ditches, respectively. In presence of glucose and nitrate, denitrification potential was 0.45 ± 0.07 and 0.12 mg N2O g-1 DW h-1 in one-stage and two-stage ditches, respectively. The rate of denitrification was significantly higher (p<0.001) in one-stage ditches, whereas the denitrification potential was significantly higher (p<0.001) in two-stage ditches. Our data suggest that differences in denitrification rate and potential in the one-stage and two-stage ditches may be more dependent on the amount of organic C and NO3 concentration present, as well as the type of sediment.
The sites of cytosine methylation. The expression of the gene of interest will be monitored using RT PCR, electrophoresis, and Northern blot analysis. This will provide a quantification of the transcription of mRNA in relation to the treatments. Both experiments will be carried out in a temperature and light controlled chamber. Cold treatments (4-8°C) will be administered to the plants with the hypothesis that this will demethylate the gene and activate pigmentation. In a separate experiment 5-aza-2′-deoxycytidine, a known demethylating agent, will be applied to plants with the hypothesis that this will demethylate the gene and activate pigmentation. An interval mapping of the chromosomes was calculated for mouse strain parents was identified. Using WebQTL, traits in the specific trans-acting region that differed in DBA2 and C57B/6 were identified. Studies have attributed inducible antibiotic resistance to a variety of antibiotic mechanisms and structures and was induced by chemotactic repellants that differ chemically from the antibiotics tested. Further studies by College of Wooster students have attempted to specifically define the interaction of chemorepellants and chemotactic repellants with different chemically from the antibiotics tested. The effect of aspartic acid and sodium acetate on bacterial cells when subjected to different concentrations of sodium acetate and L-aspartic acid. Pulsed field gel electrophoresis studies have shown that this approach, c-Fyn, non-receptor tyrosine kinase whose gene is strongly expressed in just the brain of both species. Human glioma cell lines that are infected with E4 mutant and measured the late gene expression by western blotting. Preliminary studies have shown that E4 mutant virus express late gene in the MO59K cells, with the hypothesis that it will turn on the gene's expression, viral DNA replication, apoptosis, and cell transformation. Recently these proteins were shown to be involved in regulating double strand break repair (DSBR) process by degradation and religation of cellular enzymes that are involved in repair, proliferation and joining of double strand break. We found that in the absence of the 11kDa and 34kDa proteins in infection by E4 mutants leads to concatenation of viral DNA genomes by cellular DNA polymerase. We have investigated the effect of concatamer formation on expression of viral late genes. Human glioma cell lines that are either DNA dependent protein kinase (DNA PK) proficient (MO59K) or DNA PK deficient (MO59J) were used. DNA PK is one of the enzymes that viral DNA in concatenating the viral DNA during E4 mutant infections. We infected MO59J and MO59K cells with an E4 mutant and measured the late gene expression by western blotting. Preliminary studies have shown that an E4 mutant virus express late gene in the MO59K cells, with the hypothesis that it will turn on the gene's expression.
The metabolism of sugars is an important characteristic for differentiating between species of bacteria and is often used in clinical medicine to determine the species responsible for an infection. Fluorescent probes are molecules designed to localize with a biological specimen and respond spectroscopically to a specific stimulus. In this study, attempts were made to probe different maltose-labeled maltose molecules which will be introduced into the media of B. subtilis colonies. Maltose metabolism will be detected after exposure to ultraviolet light.

3:30 AN EXAMINATION OF ADJUVANT ADDITION AND ADMINISTRATION ROUTE ON VACCINE EFFECTIVENESS. LAUREN A. ASHWORTH, L-ASHWORTH@ONU.EDU, 415 E. UNIVERSITY AVE, ADA, OH 45810.

Humoral response to immunization can be maximized by antigen conjugation to an adjuvant and/or proper route of vaccine administration. Reduced mannan conjugated to the antigen of Salmonella typhimurium, was hypothesized to enhance immunoglobulin production in test mice. Additionally, intranasal and subcutaneous routes of administration were examined to determine optimal route of immunization in response. A antigen produced using heat-killed Salmonella typhimurium cells. A portion of the vaccine was reductively conjugated to a mannan adjuvant. Serum was collected from each mouse through intrabursal bleeds. Electrophoresis was performed on the serum samples and humoral immune response was indicated based on the relative total immunoglobulin portion of the sample. The antibody fraction was expressed as a percentage of the serum proteins and relative immunoglobulin percentages were compared. A greater antibody response would indicate a greater immune response. No significant difference was found between the control, the vaccine, and the vaccine with adjuvant for either administration route based on One-Way ANOVA tests. Additionally, differences were not observed between the two administration routes. The lack of significant differences between the control, vaccine, and vaccine with adjuvant may reflect experimental error due to small sample sizes (5-7 mice/group).

3:45 EFFECTS OF A MIXTURE OF A NON-ORTHO-SUBSTITUTED AND AN ORTHO-SUBSTITUTED PCB CONGENER ON BRAIN CHOLINE ACETYLTRANSFERASE (CHAT) ACTIVITY AND THYROID STIMULUS. DOUGLAS A. DOUGHERTY (DOUGHERTY@BOWLING GREEN.EDU), EDWARD J. DOUGHERTY (DEDWARD@BGSU.EDU), AND LEE A. MESERVE (LAMESERVE@BGSU.EDU), DEPT OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN, OH 43403-0212.

Polychlorinated biphenyls (PCB) are environmental contaminants that have been a problem since 1960s because they are very persistent, lipophilic, and bioaccumulate through food webs concentrating in adipose tissue. Placental and lactational PCB exposure of offspring causes metabolic and endocrine disruptions including hypothyroxinemia, spatial learning and memory deficits, neurochemical and neurobehavioral alterations, and reproductive problems. Previous studies in our lab using the individual congeners PCB 47 (2,2',4,4'-tetrachlorinated biphenyl, ortho-substituted) and PCB 77 (3,3',4,4'-tetrachlorinated biphenyl, non-ortho-substituted) have shown alterations in Chat activity, and alterations in thyroid hormone levels. In the present study pregnant Sprague-Dawley rats were fed a diet with or without a mixture of PCB 47/177 at 1.25, 12.5, or 25.0 ppm. Rat pups (n=32) were decapitated on postnatal day 30. Hippocampus and basal forebrain were rapidly removed for radiometrical measurement of Chat activity. Blood serum was collected for measurement of thyroid hormones. The present study found that Chat activity was depressed by PCB in the hippocampus regardless of dose, and in the basal forebrain except at 25 ppm. PCB also depressed both triiodothyronine (T3) and thyroxine (T4) levels. Thus, the depressed Chat activity caused by a mixture of two PCB congeners may be the result of depressed thyroid hormone levels. Reported learning and memory deficits in PCB-exposed animals (including humans) may result from neurological deficits (e.g., depressed Chat activity) that follow depressed thyroid status.

4:00 K+ CURRENT ACTIVATION BY THE ANTI-EPILEPTIC DRUG RETIGABINE. MARK D. WOMBLE, MDWOMBLE@YSU.EDU, REBECCA S. LIPTAK, YOUNGSTOWN STATE UNIVERSITY, DEPT OF BIOLOGICAL SCIENCE, YOUNGSTOWN OH 44555.

Traditional anti-epileptic drugs control seizures by dampening neuronal activity, either by enhancing inhibitory neurotransmission or reducing excitatory transmission. Retigabine, a new drug currently in clinical trials, has been identified as having a different mode of action. It appears to directly activate the K-current (I_K), a voltage-gated K-current present in the regulation of neuronal resting potential, excitability, and firing patterns. We have examined the actions of retigabine on I_K using whole-cell patch-clamp recordings obtained from acutely isolated bullfrog (Rana catesbeiana) sympathetic neurons. Retigabine (10 μM) was applied directly to the cell via single cell superfusion. Immediately following the onset of retigabine application, the resting potential was seen to de-activate by approx. 5-6 mV. This was accompanied by a reduction in action potential firing during direct injection of depolarizing current, indicating a dampening of neuronal excitability. The M-current was identified by voltage-clamping neurons to a holding potential of ~30 mV, a level at which I_M is persistently active. Application of retigabine produced a large and rapid elevation in holding current amplitude, indicating a substantial increase in I_M. A continuous ramp voltage-clamp protocol (~100 to 0 mV) was used to identify the I_M activation threshold. Retigabine shifted this threshold approximately 20 mV more negative, from the normal threshold of ~60 mV. This shift resulted in a substantial increase in I_M activation at the normal rest potential, producing neuronal hyperpolarization and greatly dampened neuronal excitability.

Plant Ecology/Wetlands
2:00 PM Saturday April 17” 2004
DeBartolo Hall Room 356
Mr Traye Engle – Presiding

2:00 VEGETATIVE PATTERNS ALONG AN ELEVATION GRADIENT IN THE WHITE MOUNTAIN NATIONAL FOREST, NEW HAMPSHIRE. JESSICA M. WILSON (JWILSON@ONU.EDU) 402 W. COLLEGE AVE. UNIT 1941 ADA OH 45810.

In 1956, Whittaker concluded that his study in the Great Smoky Mountains supported the individualistic distribution of species and communities. That is, each species grows where it can, under the influence of biotic and abiotic factors and does not depend upon the presence of other species as Clements’ organismic hypothesis of community structure suggests. To test this idea in the White Mountain National Forest (New Hampshire), we conducted a series of transects along the Pine Link Trail from the base of the trail to treeline on Mount Madison. Trees were identified and their diameter at breast height measured in 23 evenly spaced sample units along the elevation gradient. The number of individuals of each species counted in these sample units was graphed against elevation with one line representing each species. The graph gave no indication of species groups along the gradient. The sum of each species’ diameter at breast height was regressed against elevation with no apparent grouping. Two species in particular, Betula papyrifera and Picea mariana exemplify the individualistic nature of the communities along this transect. B. papyrifera grew consistently along the elevation gradient despite disturbance in the middle elevations. P. mariana was present within the hardwoods in mixed forest, in coniferous forests with other evergreens, and in single-species stands. Thus, neither of these species was dependent upon a particular group of other species. Individualistic distribution of species and communities appears to be the organization of this New England transect as well as Whittaker’s Great Smoky Mountain transects.

2:15 RECENTLY DOCUMENTED OLD-GROWTH RIPARIAN FOREST IN ZOAR VALLEY, NEW YORK. THOMAS P. DUGGINS, TDUGGINS@YSU.EDU, ADAM DRAA, KENT LURLTON, ERIN PEEL, GREG SHOOK, DEPT OF BIOLOGICAL SCIENCES, YOUNGSTOWN STATE UNIVERSITY, ONE UNIVERSITY PLAZA, YOUNGSTOWN OH 44555.

Previous qualitative surveys have suggested the Zoar Valley Canyon of western New York State contains a diverse tract of old-growth riparian forest. In this first quantitative study of the site, canopy trees >20 cm diameter at breast height (DBH) were surveyed within twenty-five 30-m quadrats on five prominent streamside terraces. Understory trees 1 – 20 cm DBH were catalogued in 10-m quadrats located within the 30-m plots. Nineteen broadleaf and two coniferous species exceed 20 cm DBH, and form a multi-layered canopy. Four more broadleaf species...
(striped maple – Acer pensylvanicum L., flowering dogwood – Cornus florida L., witch hazel – Hamamelis virginiana L., and American hоrnbeam – Carpinus caroliniana Walt.) occur only in the understory. Thirteen species reach 80 – 126 cm DBH. Sugar maple (Acer saccharum Marsh.) accounts for 38.8% of the canopy numerically (27.3% of basal area) and also dominates the understory. Size distributions of all trees together, and of shade-tolerant species individually, are uneven and negatively lognormal. Of these, shi-doe, oak, and maple dominate the 140-cm DBH class and are rare in the understory. Fourteen species reach 35 – 47 m in height in this tallest broadenforest yet described in the northeastern United States. Increment cores from seven canopy species reveal ages of 170 to 305 years. The diverse woodlands within the study area meet all criteria for eastern old growth. 2:30 THE COMMUNITY STRUCTURE OF ECTOMYCORRHIZA FUNGI IN OAK-HICKORY FORESTS OF SOUTHEASTERN OHIO. DAWN R. BLACK db642701@ohio.edu, KIM J. BROWN brownk4@ohio.edu, DEPT OF ENVIRONMENTAL & PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

Oaks (Quercus) depend on an obligate symbiosis with ectomycorrhizal fungi for survival. However, management strategies that are being evaluated for their ability to facilitate oak regeneration in eastern deciduous forests have largely ignored the effect of thinning and burning on the diversity and abundance of ectomycorrhizal fungi. Consequently, we are addressing the following questions in oak-hickory forests of Vinton County, Ohio: (i) what is the species richness and abundance of ectomycorrhizal fungi in disturbed and undisturbed oaks, and (ii) how do thinning and burning practices affect the ectomycorrhizal fungal (EMF) community structure within a given landscape position? Our hypotheses include (a) species diversity will be greatest in control plots; (b) thinning will increase spatial heterogeneity of EMF species composition; (c) thinning will result in a species shift, depending upon life-history traits of EMF; and (d) burning will decrease species abundance and diversity of EMF found predominantly in litter and organic layers. Methods used to address EMF diversity include collection and identification of fruiting bodies and morphological typing and molecular analysis of ectomycorrhizal root tips. EMF abundance was measured by percent root tip colonization and soil hyphal biomass. To date, fruiting bodies of 34 EMF species have been identified in the wild, 20 of which are mainly associated with oaks. Amanita and Russula are the best represented fungal genera aboveground, with six and nine species, respectively. 2:45 EFFECT OF WEEPING WILLOW (SALIX ALBA) ON MICROBIAL POPULATIONS IN CONTAMINATED SOILS. ROBERT J. STUCK, stucker1@wvu.edu, CAROLYN H. KERR, kerrohio@ohio.edu, DEPT OF BOTANY, MUNI UNIVERSITY, OXOF, OH 45056.

Phytoremediation is the use of plants and their associated microorganisms to decrease richness and concentration of acute pollutants in the soil. We assessed the effects of willow (Salix alba) on indigenous soil microorganisms in the study of the effects of willows on microbial diversity and the potential impacts on soil contamination. We examined the diversity and activity of indigenous soil microorganisms by measuring their numbers and activity in soil samples taken before and after willow planting. We also measured the activity of soil microorganisms in the presence and absence of willow leaves. Our results indicate that willow roots can affect the activity of indigenous soil microorganisms, but the effect is not significant.
gyrina and the prevalence of cercariae. There was a significant (p<0.05) difference in length between uninfected and infected snails in the June 19th collection. This may be due to a condition of gigantism in snails caused by the cercarial infections. Although there has been little research on cercarial prevalence and patterns from snails in man-made reservoirs, the results of this research suggests many similarities with studies on naturally occurring bodies of water.

3:45 FROG AND TOAD CALLS AS CORRELATED TO TEMPERATURE FOR A GEOUGA COUNTY, OHIO WETLAND COMPLEX. Tracy L. Engle,
tlenagle@transystems.com, TransSystems Corporation, 55 Public Square, Ste 1650, Cleveland, OH 44113.

The calls of frogs and toads were surveyed at a small pond/wetland complex in Geauga County, Ohio over a period of seventy-seven nights from 15 April 2003 to 03 July 2003. This survey was conducted to test the hypothesis that amphibian vocalization can be influenced by temperature. Air temperature readings were collected from an indoor/outdoor Radio Shack® thermometer and also a cross comparison of the National Weather Service air temperature records for the Cleveland International Airport was recorded for verification purposes. The amphibian call survey was completed between 11:00 p.m. and 12:00 a.m. when species were most active. For this project the sample size analyzed occurred as 76 survey nights. Five species of frogs and toads occurred within this complex; American toad (Bufo americanus), bullfrog (Rana catesbeiana), gray treefrog (Hyla versicolor), green frog (Rana clamitans melanota), and spring peeper (Pseudacris crucifer). During the sampling period a negative correlation between lower than average temperature and the frequency of amphibian calling seems to exist, while, a positive correlation between the air temperature and species type vocalization seems to exist.

4:00 VEGETATION DEVELOPMENT IN CREATED, RESTORED, AND ENHANCED WETLAND MITIGATION BANKS OF THE UNITED STATES. Douglas J. Spieles, spieles@denison.edu, McPhail Center for Environmental Studies, Denison University, Granville, OH 43023.

Wetland mitigation banking is the practice of creating, restoring, enhancing, or preserving large, off-site wetlands to compensate for authorized construction impacts to natural wetlands. By 2002 there were 219 active mitigation banks in the United States, encompassing 50,000 hectares in 29 states. This study is the first systematic analysis of the ecological quality of these ecosystems. The objective is to determine if mitigation banks are successfully supporting native wetland vegetation and if success differs by age, area, or mitigation method (creating or restoring wetlands versus enhancing existing wetlands). Monitoring reports were obtained from 45 randomly selected mitigation bank wetlands in 21 states to evaluate three measures of ecological status: the prevalence of wetland vegetation, the pervasiveness of nonnative species, and plant species richness. Prevalence Index scores (PI; 1.0 for obligate wetland vegetation to 5.0 for upland vegetation) do not differ by wetland area but are lower in created wetlands (PI=2.0±0.16; mean±SE) than in restored (2.49±0.09) or enhanced (2.26±0.13; p<0.01, F=4.7, n=45). Created and restored wetlands support 12.4 and 12.2 species per 10 m² respectively, nearly four times more than the 3.2 species in 10 m² of enhanced wetland. This is largely attributable to a greater incidence of nonnative species in created and restored wetlands. The vegetative cover in created mitigation banks is 18.9±3.2 percent nonnative—statistically similar to that of restored (16.3±3.2) but significantly greater than that of enhanced systems (4.2±1.0; p<0.02, F=4.3, n=45). In created and restored mitigation banks both the prevalence of wetland vegetation and the representation of native species increase with age, indicating a trend toward functional equivalency with natural wetlands.

4:15 GERMINATION SUCCESS IN LONICERA MAACKII SEEDS FROM CONTRASTING DEVELOPMENTAL LIGHT ENVIRONMENTS. Jasmine Bascom, ja3348703@ohio.edu, Dean Liewance, lierance@ascol.com, Kim J. Brown, kim.brown@ohio.edu, Dept of Environmental & Plant Biology, Ohio University, Athens OH 45701.

Lonicera maackii is an aggressive, invasive woody shrub. It is mainly propagated by seed, and is a prolific seed producer. We need to understand factors controlling seed production in order to control this plant. The purpose of this research is to investigate the germination success of L. maackii seeds produced by open-grown, edge, and forest interior shrubs. We are also investigating the interaction between seed origin and light levels present during germination, to explore the relationship between the environment in which the seeds develop and germination success in a given light environment. This research will add to the understanding of the population dynamics of L. maackii, and is part of a larger study investigating biomass allocation and fecundity of L. maackii. Results from both projects will determine the quality and quantity of fruits produced in contrasting light environments. Evaluating differences in fruit production will be useful for managers to target the removal of this invasive shrub from the landscape. It is predicted that germination success will be greatest in seeds from open-grown shrubs, followed by edge shrubs, with interior shrubs showing the least success. Seeds were collected from East Fork State Park in Clermont County, Ohio. Samples were stratified at 5°C for ten weeks. Seeds were placed in sterile Petri dishes on 20g of autoclaved sand moistened with 5ml of distilled water. After 12 days, percent germination at incubation thermoperiod of 20/10°C was determined at 100%, 20%, and 0% light in seeds from open, edge, and interior environments.
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FOR MEMBERS ONLY:

A. A Call to Order by the President.
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C. Presentation of the report of the tellers of the election of officers and other positions.
D. Voting on any proposed amendments to the Constitution or By-Laws.
E. Business from the floor.
F. Adjournment.

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The Ohio Academy of Science
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113th Annual Meeting
April 16-17, 2004
Hosted by Youngstown State University
Advance registration must be received by April 7, 2004

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1-4 from same institution $20 $25
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Plan NOW to Attend Stone Laboratory in 2004

F.T. Stone Laboratory, The Ohio State University’s Island Campus, offers over 30 college credit courses to undergraduate and graduate students, educators, and outstanding high school students every summer. From Lake Erie geology to aquatic biology courses, students receive a hands-on science experience in one-day, one-week, or term courses. This facility is located on the 6.5-acre Gibraltar Island and is the nation’s oldest freshwater biological field station and research laboratory. Stone Laboratory is the Lake Erie research and teaching laboratory for the Ohio Sea Grant College Program.

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Open to college and select high school students.*

**Week Courses: June 6 - August 25**
3 credits; classes meet Sunday through Saturday
- Aquatic Biology (offered four times)
- Field-Based Oceanography
- Insect Biology
- Local Flora
- Study of Birds

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3 credits; classes meet Sunday through Saturday
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- Aquatic Environmental Science for Teachers
- Field Ecology
- Fisheries Science for Teachers
- Geologic Setting of Lake Erie (Sat. through Fri.)
- Insect Biology for Teachers
- Local Flora for Teachers
- Marine & Aquatic Education
- Ornithology for Teachers
- Principles of Oceanography for Science Teachers
- Stream Ecology for Teachers

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For undergraduate and graduate students in biological sciences, education, and natural resources; professional biologists, and ecologists; and biology and general science teachers.

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5 credits; classes meet three days a week
- Field Zoology
- Ichthyology
- Limnology

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5 credits; classes meet five days a week
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- Fish Ecology
- Aquatic and Wetlands Flora

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3 credits; classes meet Sunday through Saturday
- Ecology and Management of Wetland Birds
- Field Ecology
- Herpetology
- Structuring Environmental Decisions for the Great Lakes Region

1-10 Days
- Current Topics in Environment & Engineering – 1 credit; 3 evening seminars (6 lectures)
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