2000-03

General Schedule
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. Annually the several hundred scientific presentations are complimented by workshops, symposia, an All-Academy Lecture, and field trips on local geology and plant sciences.

Welcome!

Ohio Northern University welcomes you to the 109th 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. To assure reservations for meals, forms must be received by The Ohio Academy of Science by March 22, 2000. Please use Registration Form the on last page. Mail completed forms and fees to:

OAS Annual Meeting Registration
The Ohio Academy of Science
PO Box 12519
Columbus OH 43212-0519
FAX 614/488-2228 (for Credit Card or PO only)

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

SMOKING POLICY: Smoking is not permitted in any building on campus.

MEALS: Friday, March 31. Preregistration required by March 22 for the Ohio Academy of Science Annual Meeting Banquet held jointly with The Ohio Biological Survey. Saturday, April 1. Lunch will be available in MacIntosh Hall. See registration form. There is no Saturday evening meal.

HOUSING: Please contact hotels and motels directly. See list on page A-5. HOUSING IS NOT AVAILABLE IN ADA.

GENERAL SCHEDULE

Friday, March 31, 2000

10:00 AM The Ohio Academy of Science Board of Trustees Meeting
Meyer Hall Room 118

12:00 Noon Lunch on own in MacIntosh Center

1:30 PM The Nature of Science: MICROBIAL DISCOVERY WORKSHOP
Arranged by ROD ANDERSON, PH.D.
Meyer Hall Room 104
Welcome-Introductions
Workshop Overview and Objectives
Sizing Up the Microbial World
Introduction to the Invisible World—30X Microviewer Exercises
2:15 Biofilms and Microdiscovery Boards
3:15 Break
3:30-5:00 Biodegradation Columns and Can Microbes Taste the Difference?

Target Audience: Junior and Senior High Science Educators

Objectives: The purpose of the workshop is to have teachers complete several hands-on inquiry-based labs that will enable them to present a balanced view of the life sciences by using microorganisms to teach concepts and principles found in the National Science Standards. The exercises will focus on the positive roles that microorganisms play in our lives and use low cost, easily found equipment and materials.

Personnel: Dr. Anderson is a Professor of Biological Sciences at Ohio Northern University and has lead and coordinated Microbial Discovery Workshops in Ohio, Florida, Idaho, Wisconsin and Texas. He is a member of the Precollege Education Committee of the American Society of Microbiology. Spencer Reames, a faculty member at Benjamin Logan High School, has been on the workshop faculty at national Microbial Discovery Workshops and has conducted numerous workshops.

Activities: The activities of the Microbial Discovery Workshop have been developed by secondary teachers and the Precollege
Committee in association with the American Society of Microbiology and the National Association of Biology Teachers. They have been welcomed for their simplicity and their adaptability to numerous instructional levels. All activities are hands-on investigative activities that meet National Science Education Standards.

Materials: Each participant will receive the Power Unseen: How Microbes Rule the World, by Bernard Dixon, A Microbial Discovery Workshop Manual containing the activities completed during the workshop; Battle Biology; and Meet the Microbes, a set of investigative labs developed by the Microbial Literacy Collaborative. Materials for the workshop are supplied by a grant from the American Society for Microbiology.

2:00-5:00 PM  Ohio Biological Survey
Executive Committee
Meyer Hall Room 118

6:00 PM  Joint OAS-Ohio Biological Survey Dinner - MacIntosh Center

Special Address
THOMAS RUMER, Author
UNEARTHING THE LAND:
The Story of Ohio's Scioto Marsh

THOMAS A. RUMER, a native of Kenton, Ohio, is a freelance writer and public historian for the Carmel Clay Historical Association. He received his BS and MA degrees in history and English from Ball State University and his MLS from Indiana University. He has published five books, including This Emigrating Company: The 1844 Oregon Trail Journal of Jacob Hunter and The American Legion: An Official History. His work has also appeared in Indianapolis Monthly and Indiana Magazine of History.

Saturday, April 1, 2000

7:30 AM  Special Environmental Sciences Breakfast
(by invitation only, must be pre-registered)
Hosted by METCALF & EDDY
MacIntosh Center
Special Report: How to Apply to the Academy for Ohio Environmental Science and Environmental Engineering Undergraduate Scholarships

8:00AM-3:00PM  General Meeting Registration
Meyer Hall Atrium

9:00-11:00AM  The Nature of Science: TEACHING SCIENCE PROCESS SKILLS
Arranged by RUTH M. WILEY
Fremont Ross HS, Fremont OH
Meyer Hall Room 104

Science Process skills are the things scientists do when they do science. These skills, by themselves, can generate science content and concepts and are the critical aspects of any science class, K-12. In many state proficiency tests, these skills are the areas where our science students are failing, mostly because science classes have become textbook-based. This presentation will use activities to help teachers focus on and include those beginning aspects of true science: observation, inference, classification, prediction. The activities will then address higher level aspects of controlled scientific investigations: identifying variables, correct data table and graphing procedures, describing relationships between variables. Teachers will perform activities and be provided with resources to use in their classroom.

9:00-11:00AM  Morning poster and podium presentations.

11:15AM  All Academy Lecture
The Nature of Science: EVOLUTION
EUGENIE C. SCOTT, Ph.D.
Meyer Hall Room 107

Since 1987 EUGENIE C. SCOTT has been the Executive Director of the National Center for Science Education, Inc., a pro-evolution nonprofit science education organization with members in every state. She holds a Ph.D. in biological anthropology from the University of Missouri. Scott has taught at the University of Kentucky, the University of Colorado, and in the California State University system. A human biologist, her research has been in medical anthropology and skeletal biology. She has many published papers and monographs, has served as chair of the Ethics Committee of the American Anthropological Association, and served as the Secretary-Treasurer of the American Association of Physical Anthropologists. In 1994, Scott was elected to the California Academy of Sciences.

She is nationally-recognized as a proponent of church/state separation, and serves on the National Advisory Council of Americans United for Separation of Church and State, on the National Advisory Council of Americans for Religious Liberty, and has served on the Executive Committee of the National Coalition for Public Education and Religious Liberty (PEARL). Scott has also served on the Board of Directors of the Biological Sciences Curriculum Study. An internationally-recognized expert on the creation/evolution controversy, she has consulted with the National Academy of Sciences, several State Departments of Education, and legal staffs in both the United States and Australia.

Scott has worked nation-wide to communicate the scientific method to the general public and to improve how science as a way of knowing is taught in school. She is frequently called upon by the print, radio, and television media as a spokesperson for “the scientific view” when conflicts arise between scientific and pseudoscientific explanations, including appearances on Donahue, Geraldo, Crossfire, Firing Line, Ancient Mysteries, CNN, Morning Edition, The Pat Buchanan Show, Science Friday, and All Things Considered. She was featured in the Nova program “In the Beginning: The Creationist Controversy.” Scott is listed in Who’s Who in Science and Engineering, and has been made a FELLOW of the Committee for the Scientific Investigation of Claims of the Paranormal, from which in 1991 she received the Public Education in Science Award. In 1993 she was selected a University of Missouri Arts and Sciences
College Distinguished Alumnus, and in 1998, received the Isaac Asimov Science Award from the American Humanist Association. In 1999 she received the Skeptics Society James Randi Award, the Hugh H. Hefner First Amendment Award, and the American Society of Cell Biology's Bruce Alberts Award. She is a co-author of the National Academy of Science's Teaching About Evolution and the Nature of Science, and has consulted with the NAS on the revision of its Science and Creationism booklet.

Scott has been both a researcher and an activist in the creationism-evolution controversy for several years, and can speak to problems created by this sectarian challenge to science education from many directions: educational, legal, scientific, and/or social. A dynamic speaker, she offers stimulating and thought-provoking as well as entertaining lectures and workshops.

National Center for Science Education, 925 Kearney St., El Cerrito, CA 94530-2810 Phone: 510-526-1674 or 1-800-290-6006 email: scott@natcenscied.org • http://www.natcenscied.org

12:00 NOON Special Recognition Ceremony of newly elected Fellows of The Ohio Academy of Science

12:15PM Lunch available in Macintosh Center

12:15 PM Luncheon Discussion (optional) Learn About the Ohio Campus Compact Arranged by Michael Barker, Director, Ohio Academy of Science Student Advisory Council

You may select your lunch and come to the breakout room in the Macintosh Center

The Ohio Campus Compact (OCC) is a membership organization of Ohio colleges and universities established to support the development of campus-wide student and institutional participation in community and public service. OCC is part of the national Campus Compact, a coalition of over 520 college and university presidents established to create public service opportunities for their students and develop an expectation of service as an integral part of the undergraduate experience.

OCC (1) seeks to integrate service into faculty instruction and students' studies, making community service activities a valued element of the undergraduate experience; is (2) committed to enhancing students' responsibility, citizenship and awareness of the community while reinvigorating higher education's concern for improving the quality of life in society; (3) is committed to strengthening the impact of that service on the welfare of communities and the education of students in institutions of higher education. For more information contact: Ohio Campus Compact, 615 North Pearl Street, Granville, OH 43023. Phone: 740/587-7680; FAX: 740/587-7681; Richard Kinsley, Executive Director, occdick@alink.com Website: http://www.ohiok-16service.org/occabout.htm

1:30-5:00PM Afternoon poster and podium presentations

2:00-3:30PM Workshop: Writing Theses and Dissertations
Arranged by Isadore Newman, Ph.D. and Donna Waechter, Ph.D.
Meyer Hall Room 104

Objectives: 1. Help students get started by introducing them to the structure and components of theses and dissertations. 2. Help faculty who are supervising dissertations or theses to facilitate students in their writing. 3. Give examples of how to get students started and increase the likelihood of students being able to finish.

Presenters: Isadore Newman, Ph.D. has been on over 300 dissertation committees in many disciplines. He has also written a book entitled: Thesis and Dissertations in the Physical and Social Sciences. Donna Waechter, Ph.D. has taught techniques of research, testing and measurement with an emphasis on papers and writing for seven years.

5:15PM OFFICIAL NOTICE of Annual Business Meeting for Academy Members Only Meyer Hall Rm 104 See page 44

Sunday, April 2, 2000

7:45AM Plant Science Field Trip: LAWRENCE WOODS STATE NATURE PRESERVE
Arranged by Marshall Moser and Nelson Moore

Lawrence Woods is a 1100 acre State nature preserve located 5 1/2 miles south of Kenton, Hardin County, Ohio. It is one of the most recent purchases by the Division of Natural Areas and Preserves of the Ohio Department of Natural Resources. The preserve was officially dedicated on May 1, 1999, with Gov. Taft as the main speaker. The area features a 400-acre mature wet hardwood forest, tilled agricultural land and more than 50 acres of farmland in succession. A number of uncommon and state-listed species have been found including the four-toed salamander, heart-leaf plantain, pumpkin ash and swamp cottonwood. Many aspects of the area can be viewed from a 1/2 mile boardwalk which circles through the woods, including a large buttonbush swamp. Meet at the parking lot on the north side of Meyer Hall of the Ohio Northern University at 7:45AM. The field trip will run between 8:00AM-12 NOON. The field trip will be lead by Marshall Moser and Nelson Moore, both of whom were instrumental in drawing the attention of the State to this unique habitat as an outstanding example of northwest Ohio's original forest.
8:30AM **Geology Field Trip:**
**LOWER SILURIAN (LANDOVERY-WENLOCK) STRATIGRAPHY OF WEST-CENTRAL OHIO**
Arranged by: MARK A. KLEFFNER,
The Ohio State University at Lima

Meet at the new Science Building on The Ohio State University at Lima campus for coffee, tea, soft drinks, and donuts. The Ohio State University at Lima campus is just a 15-minute drive west of Ohio Northern University, on State Route 309 (Harding Highway). Field trip participants may park in the south parking lot (first turn to right after turning off of SR 309). Enter Science Building through main entrance on south side. Participants may tour the museum and other facilities of the Department of Geological Sciences while eating and drinking. We will then continue south to a location just north of Yellow Springs for lunch. This location is Young’s Dairy Barn, which is known statewide for excellent ice cream and baked goods. If you choose not to buy your lunch there, they do have picnic tables available to use if you bring your lunch or buy it elsewhere. After lunch, we will complete the field trip by traveling a few miles to the east, to John Bryan State Park, where we will examine the remainder of the Lower Silurian exposed in west-central Ohio, including the upper part of the Brashfield, Dayton, Osgood, and Laurel Formations (including Massie Member), and Euphemia, Springfield, and lower part of Cedarville Dolomites.

Our Host

Ohio Northern University, a United Methodist-related institution of higher learning, seeks to educate and graduate students accomplished in scholastic achievement, prepared for a useful life and meaningful career, inspired with a desire to contribute to the good of mankind consistent with Judeo-Christian ideals and committed to a quality of life that will result in maximum personal and social worth.

Ohio Northern’s purpose is to help students develop into self-reliant, mature men and women capable of clear and logical thinking and sensitive to the higher values of truth, beauty and goodness. In keeping with this goal, students will be exposed to diverse ideas and influences, including those of professional programs, which broaden and strengthen the college experience and help to prepare them for later life.

The campus is located in northwest Ohio and is easily accessible from major highways. ONU is only 90 minutes by car from Columbus, Toledo, Dayton, and Fort Wayne. Travel is also easy from Cincinnati, Cleveland, Pittsburgh, Chicago, Indianapolis, and other large cities. Commercial air service is available in Toledo, Columbus, and Dayton.

As a community, Ada provides an ideal setting for the ONU campus. The relaxed, comfortable atmosphere of the rural community of about 5,000 is oriented to studying and learning. The friendly community offers a good selection of shops, stores, and restaurants.

Ada’s rural setting is complemented by major shopping districts and diverse industries and businesses in the city of Lima, only 15 miles west of campus. After the short drive to Lima, students find a variety of restaurants, movie theatres, major shopping malls, and other attractions. Dr. TERRY KEESER, Chair of Biological Sciences, will serve as chair of local arrangements.
Index to Poster and Podium Sessions
Saturday, April 1, 2000

Poster Session
Biological; Earth & Space;
Environmental Sciences
9:00-10:00 AM
Meyer Hall

Poster Session
Medical Sciences
10:00-11:00 AM
Meyer Hall

Poster Session
Pre-College Students
1:30-3:00 PM
Meyer Hall

Poster Session
Pre-College Students
3:00-4:30 PM
Meyer Hall

Water Management for
Environmental Quality
09:00AM Saturday, April 1, 2000
Meyer Hall Room 121
Barry J. Allred - Presiding

Social & Behavioral Sciences
09:00AM Saturday, April 1, 2000
Meyer Hall Room 122
Joyce M. Kiser - Presiding

Education
02:00PM Saturday, April 1, 2000
Meyer Hall Room 122
Kenneth A. LaSota - Presiding

Engineering
03:45PM Saturday, April 1, 2000
Meyer Hall Room 122
Yung-Tse Hung - Presiding

Earth Science I
09:00AM Saturday, April 1, 2000
Meyer Hall Room 124
Mark J. Camp - Presiding

Earth Science II
01:30PM Saturday, April 1, 2000
Meyer Hall Room 124
C. Scott Brockman - Presiding

Physical Science
04:15PM Saturday, April 1, 2000
Meyer Hall Room 124
Josefina De Los Reyes - Presiding

Experimental Physiology: Basic
09:00AM Saturday, April 1, 2000
Meyer Hall Room 114
Mary D. Gbahbauer - Presiding

Experimental Physiology: Clinical
02:00PM Saturday, April 1, 2000
Meyer Hall Room 114
Judy Adams - Presiding

Plant Ecology
09:00AM Saturday, April 1, 2000
Meyer Hall Room 125
Brian C. McCarthy - Presiding

Animal Ecology and Behavior
02:00PM Saturday, April 1, 2000
Meyer Hall Room 125
Danny J. Ingold - Presiding

Molecular Biology I
09:00AM Saturday, April 1, 2000
Meyer Hall Room 126
Amy Lynn Aulthouse - Presiding

Molecular Biology II
02:00PM Saturday, April 1, 2000
Meyer Hall Room 126
Carol A. Heckman - Presiding

Plant Systematics
09:00AM Saturday, April 1, 2000
Meyer Hall Room 128
Shya Chitaley - Presiding

Plant Physiology and Ecology
02:00PM Saturday, April 1, 2000
Meyer Hall Room 128
David A. Francko - Presiding

Aquatic Biology I
09:00AM Saturday, April 1, 2000
Meyer Hall Room 113
Susan Carty - Presiding

Aquatic Biology II
02:00PM Saturday, April 1, 2000
Meyer Hall Room 113
Robert T. Heath - Presiding

Note: Undergraduate Research-in-Progress Reports, as opposed to abstracts, are designated by having names of student advisor(s) in (parentheses) following the name(s) of students. Pre-college students have included the names of their schools in (parentheses)
Ethylene inhibition of elongation growth and induction of lateral growth in dicot stem tissues involves sequential and complex biochemical changes. Ethylene treatment inhibits elongation of dicot cells on the lower side of the stem hypersensitive to gravity (gravitropism). Since pretreatment with ethylene results in uniform cell wall softening and increased expansin expression in both upper and lower halves of the hypocotyl, changes in the expression of expansins reflects a change in cell wall extensibility and reshuffling of wall bound in cells on the lower side of the hypocotyl. This implicates differential expression of expansins and regulation of growth in the lower half of the gravitropically stimulated hypocotyl.

**Board 05**  
**EFFECTS OF LONG-TERM SLUDGE TREATMENT ON HEAVY METAL CONCENTRATION AND PHOSPHORUS SYNTHETIC CHARACTERISTICS IN SOLIDAGO CANADENSIS**

Brian W. Dunn and Alfredo J. Huerta, Miami University, Dept of Botany, 312 N Elm St, Oxford OH 45056. dunnbw@muohio.edu

It is well known that Cd and Mn are heavy metals that can reach toxic levels and have the potential to bio-accumulate throughout the food chain. Sludge, a product of municipal wastewater treatment, is known to contain high amounts of these metals as well as other heavy metals, toxic organic chemicals and pathogens. Sewage sludge also contains significant amounts of N, P, and K, which plants need, and is therefore, a commonly applied fertilizer. Previous research conducted at the Ecology Research Center at Miami University, showed that the Solidago canadensis (goldenrod), accumulated significantly higher amounts of Cd and Mn from sludge treated soils than from untreated soils. This current research was conducted in order to determine Cd and Mn tissue concentrations and the effects of age on the effects of age on sludge treatment on the Solidago canadensis (goldenrod). The current research results showed that concentrations of these two metals were significantly higher in leaves of Solidago canadensis grown in sludge-treated plots than in leaves from control plots. However, the concentrations of metals that we found did not lead to reduced CO2 fixation capacity or significantly modified fluorescence parameters. This suggests that the heavy metal concentrations found in the leaf tissue were not high enough to cause physiological damage to this species.

**Board 06**  
**REPRODUCTIVE OUTPUT DIFFERENCES AS A FUNCTION OF POPULATION SIZE IN THE OAK SAVANNA PERENNIAL PLANT LUPINUS PERENNIS**

Marcus C. Chilcote, Bowling Green State University, Dept of Biological Sciences, Bowling Green OH 43403. chilcote@bgsu.edu

As an encroachment progressively fragments natural areas, increasing research focuses on the correlation between size and survivorship of natural populations. I looked at indicators of reproductive fitness in six populations of the perennial Oak savanna plant Lupinus perennis, which is recognized as the sole larval food source of the Federally Endangered Karner Blue Butterfly. This work is part of a larger study seeking to quantify variation in developmental stability with increasing environmental stress (e.g., shade) as a function of population size. I tested the hypothesis that large populations (2500 to 5000 individuals) by quantifying the number of ovules produced per seedpod and seeds produced per ovule. In June of 1998, pods were collected from six L. perennis populations ranging from 500 to 5000 individuals in northwest Ohio and Southern Michigan. The total number of ovules per pod was summed and each ovule was assigned to one of three discreet development classes: unexpanded (unfertilized), aborted, or mature (seed). These count data were analyzed using the appropriate general linear model and regression analyses. We found a significant linear correlation between population size and number of ovules per pod. However, the number of aborted ovules also increased with population size, resulting in a net mature seed output approximately the same for all populations. These results will be incorporated with analyses of seed weight, germination and growth on an environmental gradient in order to better understand reproductive differences between the six different sized populations.

**Board 07**  
**HSP16.6 GENE EXPRESSION IN THE UNCILULAR CYANOBACTERIUM, SYNECHOCYSTIS SP. PCC 6803**

Feng Fang, Daniel J. Prochaska, Susan R. Barnum, Miami University, Dept of Botany, Oxford OH 45056. barnumsr@muohio.edu

The heat shock response is an adaptation found in all living organisms that is characterized by heat shock proteins (HSPs), expressed transiently in response to elevated temperatures. At normal growth temperatures, these heat shock proteins are present in low concentrations (or not at all). However, during heat stress their concentration increases dramatically. Work in our laboratory has demonstrated that hsp16.6 from Synechocystis cells plays an important role during heat shock. In this study, we have examined the effect of different environmental factors on the expression level of hsp16.6. In addition, we have determined the transcriptional start point by primer extension. Our results demonstrated that hsp16.6 was not expressed at normal growth temperatures, but increased significantly during heat shock. Primer extension was conducted to identify the transcriptional start point. Results showed that RNA transcription during exposure to ambient temperature, heat shock, and high light intensity was initiated from the same transcriptional start point. This suggests only one promoter is present; however, typical -10 and -35 sequences are not observed. A 266 bp region upstream and contiguous with the translational site cloned from Synechocystis cells was fused with the LacZ reporter gene. The LacZ gene was not induced in E. coli cells, although the promoter region of hsp16.6 (class I gene) from Synechocystis cells could induce LacZ expression.

**Board 01**  
**EXPERIMENTAL TEST OF A HYPOTHESIS THAT ZEBRA MUSSELS (DREISSENA POLYSPHORMA) ALTER PHYTOPLANKTON P-DYNAMICS BY RELEASE OF PHOSPATE**

Jennifer E. Cline and R. T. Heath, Kent State University, Dept of Biological Sciences, Kent, OH 44242. jclinet@kent.edu

Growth and activity of phytoplankton are usually limited by the amount of phosphorus available. The phosphorus availability can influence total phytoplankton growth as well as the ratio of primary production to respiration. The current management strategy has sought to limit phytoplankton growth by decreasing the amount of phosphate input to water bodies. Past research has demonstrated that zebra mussels alter the phosphorus dynamics by remineralizing large quantities of particulate phosphorus and releasing the phosphorus in a soluble form readily available to phytoplankton, thereby releasing the phytoplankton from phosphorus limitation. During the summer of 1999, another study was conducted to experimentally alter the phosphorus availability to phytoplankton. This current study was designed to determine if the addition of zebra mussels to communities not affected by zebra mussels. Experimental addition of phosphates in quantities similar to that of the zebra mussels were added to nutrient amendment bottles containing water from East Twin Lake, a mesotrophic glacial kettle lake near Kent, Ohio. We found that additions of phosphate similar to those provided by zebra mussels did not alter physiological and community factors of phosphorus dynamics to the same extent as the addition of a zebra mussel community. This was supported by the Lake Erie Protection Fund (7/18).

**Board 02**  
**VASCULAR PLANTS INVENTORY OF A PORTION OF MINUTE MAN NATIONAL HISTORICAL PARK, MA**

Julia C. Wilcox, Hiram College, Dept of Biology, Hiram, OH 44243. wilcoxjc@hiram.edu

A detailed inventory of vascular plants was conducted of a 1.2 ha region of Minute Man National Historical Park in July and August of 1999. Within this region, early successional mixed pine, oak, and maple forests surround beach mural woods and a red maple swamp. The botanical composition was recorded, and the species density, distribution, and herb/shrub cover was estimated. Dominant trees included Acer rubrum, Pinus strobus, Quercus velutina, Quercus rubra, and Nyssa sylvatica. Dominant shrubs included Claatia alnifolia, Vaccinium corymbosum, V. angustifolium, Rhamnus frangula, and Rhusocenodendron viscosum. Overall plant community structure and floristic composition were comparable to other northeastern red maple swamps. Numerous exotic plant populations, which threaten the region’s natural succession, were recorded. Management options concerning the exotic populations are proposed, with isolated exotic populations that are highly invasive and found within wetland habitat being considered the highest priority for removal. Using these criteria, Lythrum salicaria populations within the vernal pools are of greatest concern, followed by isolated populations of Rhamnus frangula, Clethra umbellata, and Rosa multiflora.

**Board 03**  
**MOLECULAR METHOD OF IDENTIFICATION OF MICROORGANISMS IN THE FILM COVERING THE EYES OF THE HORSESHOE CRAB**

Neely N. Nelson¹, Rachel Lamb², Min-Ken Liao,³ "Ohio Northern University, Dept of Biology, Ada OH 45810 and²Hopewell College, n.nelson@onu.edu

A method adapted to the extraction, amplification, isolation, and sequencing of ribosomal DNA from the eye sample were cloned into pGEM-T Easy (Promega) vectors and transferred into XL-1 Blue E. coli. Gel electrophoresis analysis, after HindIII and EcoRI double restriction digests, determined the presence of insert and the concentration of plasmid DNA. Three isolated colonies of XL-1 Blue E. coli containing insert yielded sufficient concentrations of DNA required for sequencing. In the future, sequencing followed by computer analysis and database comparison will identify the bacteria.

**Board 04**  
**ETHYLENE INHIBITION OF GRAVITROPISM IN CUCUMBER HYPOCOTYL**

Grants M. Barkley, Kent State University, Dept of Biological Sciences, 4314 Mahoning Ave N.W., Warren OH 44483. gkarkey@kent.edu

The heat shock response is an adaptation found in all living organisms that is characterized by heat shock proteins (HSPs), expressed transiently in response to elevated temperatures. At normal growth temperatures, these heat shock proteins are present in low concentrations (or not at all). However, during heat stress their concentration increases dramatically. Work in our laboratory has demonstrated that ethylene treatment inhibits elongation of dicot cells on the lower side of the stem hypersensitive to gravity (gravitropism). Since pretreatment with ethylene results in uniform cell wall softening and increased expansin expression in both upper and lower halves of the hypocotyl, changes in the expression of expansins reflects a change in cell wall extensibility and reshuffling of wall bound in cells on the lower side of the hypocotyl. This implicates differential expression of expansins and regulation of growth in the lower half of the gravitropically stimulated hypocotyl.

**Board 08**  
**POSTER SESSION**

**Biological; Earth & Space; Environmental Sciences**

9:00-10:00 AM

**Meyer Hall**
Board 08. EPIEDMILOGICAL INVESTIGATION OF CLINICAL ISOLATES OF PSEUDOMONAS AERUGINOSA BY IMMUNOLOGICAL, BIOCHEMICAL, ANTIBIOTGRAM, AND DNA ANALYSIS. Courtney C. Bricker, R. J. Jamasbi, S. J. Kennel, L. J. Foote, and E. D. O'Donnell. Howard University, Dept of Biological Sciences, Washington DC, 43024, brickerck@how.edu

In this study, the phenotypic and genotypic properties of P. aeruginosa serotypes 0.3, 0.6, and 0.11 obtained as individual clinical isolates from a Northwestern Ohio hospital, were investigated to determine their relatedness. A total of 106 isolates were serotyped by ELSA using three specific monoclonal antibodies (Ab1 to serotype 0.3, 0.6, and 0.11). The Ab1 reacted with 85.0% of the clinical isolates: 46, 11, and 10 strains were serotyped as 0.3, 0.6, and 0.11, respectively. Type 0.11 was predominant, accounting for 43.0% of the isolates. Variations among and within each serotype were also studied by the determination of antigenic heterogeneity, biotyping, β-galactosidase production, antibiogram, and DNA analysis. Significant antigenic variation was observed among and within the three serotypes. Biotyping yielded slight variations. β-galactosidase was produced by 31.3% of serotype 0.1 isolates. The susceptibility testing using seven antibiotics (ampicillin, aztreonam, colistin, ciprofloxin, gentamicin, trimethoprim, and piperacillin) also varied. All of the serotype 0.6 isolates were susceptible to the seven antibiotics used, while 50.0% of serotype 0.3 isolates and 30.0% of serotype 0.11 isolates exhibited resistance to one or more of the antibiotics. Representatives of each serogroup were analyzed with PCR-based DNA analyses to determine the genetic relatedness among and within each serogroup. The results showed that a combination of phenotyping and genotyping is useful for strain differentiation of P. aeruginosa isolates in epidemiological studies.

Board 09. A BIOLOGICAL AND PHYSICOCHEMICAL ASSESSMENT OF FREELAND’S CAVE, ADAMS COUNTY, OHIO (1988-1999). Elizabeth M. Hagen, Wittenberg University, Dept of Biology, P.O. Box 720, Springfield OH 45501-0720. elhagen@wittenberg.edu

Freeland’s Cave, Adams County, Ohio, is a significant cave based on its size (708m total horizontal length) and diversity of aquatic and terrestrial fauna (52 species). The objective of this study was to compare current (November 1988-October 1995) species abundances, distributions, and biotic characteristics with previous studies conducted in 1985 and 1996. One species of importance is the troglobitic carabid beetle, Psuedonaphthalmus ohiensis, which is endemic to Freeland’s Cave. The density of P. ohiensis is affected by seasonal changes, with population size highest during the months of July through September, and lowest from February through June. Observed population size ranged from 0 to 38 beetles per visit to the cave. These variations are linked to low water levels during summer months, which expose more of the prefered mud bank habitat. The distribution of P. ohiensis was positively related to the presence of cavities having greater areas of preferred habitat. This association also was noted with other biota, most species tending to utilize the cave in summer and fall months. Microhabitats examined include the stream (pool and riffle substrates ranging from silt to cobble sized particles), mud banks, walls, and ceilings. Among physicochemical parameters, air temperature ranged from 10-14°C, water temperature varied from 6-14°C, dissolved oxygen concentration fluctuated from 0-11mg/l, and pH values ranged between 6.81-9.20. Physicochemical characteristics were affected by precipitation and season. These and biological data were similar to those from 1985 and 1996 studies.

Board 10. A COMPARISON OF TWO COLLECTION METHODS FOR ASCERTAINING PRESENCE OF SELECT AQUATIC INSECT ORDERS: GREAT MIAMI RIVER, BUTLER AND HAMILTON COUNTIES, OHIO. Mark A. Schleuter and Jan Trybula. Xavier University of Louisiana, Dept of Biology, New Orleans, LA 70125, maschlue@xula.edu

In the past three decades, aquatic insects have served as important indicators of environment quality. Although much information and data have been collected on aquatic insects, the majority have come from studies on small streams. In the present study, we examined the diversity of Ephemeroptera (mayflies), Odonata (damselves and dragonflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) at four sites on the Great Miami River. Larvae were collected by dip nets and scraped from rocks. Diversity data were compared with previous data from 1998 when adult insects were collected with UV traps. Several differences were noted between the two years. Using the dip net method, the Ephemeroptera were the most abundant (over 85% of the collection at most sites). In 1999, the most common collected Ephemeroptera family was Isoperlidae (90% of all mayflies), which was absent from the 1998 collection. The differences in organism found by collecting method indicates that several collection methods should be included to more accurately measure organism presence. The 1999 diversity results do agree with the 1998 results and suggest that the Great Miami River is moderately impacted.

Board 11. MARINE GASTROTRICHA OF ISRAEL: PRESENT STATUS. William D. Hummon, Ohio University, Dept. of Biological Sciences, Athens OH 45701. hummmon@ohiou.edu

The use of compost-amended potting mixes to naturally suppress soilborne fungal diseases such as those caused by Pythium and Phytophthora species is well documented. Little however, is known about the disease suppressive qualities of vermicompost. Vermicomposting offers an environmentally sound alternative for the recycling of organic wastes and may help alleviate many of the issues currently facing Ohio and other agriculturally based states in regards to manure management. The goal of this research was to determine the ability of vermicompost-amended potting mixes to naturally suppress Pythium damping-off caused by Pythium ultimum. A cucumber-P. ultimum bioassay was used to assess the impact of vermicompost-amendments on disease severity. Container media consisted of Metro-Mix 360, a standard greenhouse potting media, and 10, 20, or 43% (by volume) vermicompost. Vermicompost-amendments to a disease conducive potting mix rendered the amended mix suppressive to Pythium damping-off. Autoclaving of vermicompost prior to amendment negated the suppressive effect indicating the phenomenon was biological in origin. This experiment was performed twice. Vermicompost amendments in the future may provide yet another tool for managing soilborne diseases like Pythium damping-off and may provide with an environmentally sound alternative for managing organic waste.

Board 12. IMPACT OF VERMICOMPOST-AMENDMENTS ON DEVELOPMENT OF PYTHIUM DAMPING-OFF OF CUCUMBER. Amanda K. Brickner, Rola M. Atiyeh, Michael J. Boehm, and Clive A. Edwards. Miami University, Dept of Zoology, Oxford, OH 45065, Miami University, Dept of Entomology, Dept of Plant Pathology. Brickner@muohio.edu

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Board 13. GENETIC VARIATION IN BOTRYCHIUM DISSECTUM SPRENGEL (OPIOGLOSSEACEAE) ASSESSED BY ISSR (INTER-SIMPLE SEQUENCE REPEAT) MARKERS. Michael S. Schwab, Karren D. Hawk, Denison University, Sylter Box 327, Granville OH 43023. parker.ml@wooster.edu

Botrychium dissectum Sprengel (subgenus Sceptridium), like other members of the genus Botrychium is putatively self-fertilizing. Intraspecific variation occurs in the blade shape and degree of blade dissection, and some morphological variants have been described as distinct species. The purpose of this research is to examine intraspecific genetic variation of B. dissectum using ISSR (Inter-Simple Sequence Repeat) markers. Populations of B. dissectum were collected from the Denison University Biological Reserve (DUBR) and other sites throughout central Ohio. Individuals from these populations exhibit morphological variation representative of the species. Using ISSR markers, we are assessing the genetic structure among 10 populations of B. dissectum distributed through central Ohio. Morphological variation will be compared to ISSR marker variation to provide insight regarding species limits. At this time, we are collecting B. dissectum populations, and extracting DNA from leaf tissue.

Board 14. FALL MANAGEMENT AND DEFOLIATION IMPACT ON ALIAIRIA PETIOLATA. Colleen A. LeFevre (Sally M. Waterhouse), Ohio Wesleyan University, Delaware Ohio 43015, calfevr@cc.owu.edu

Aliairia petiolata (Garlic Mustard) is a non-native, biennial, invasive plant species. It has been observed to displace native species and spread very quickly and easily throughout several areas in North America. The purpose of this research is to determine the ability of one-year Aliairia petiolata to compete with various stresses applied to the plants in the fall. I hope that by learning more about the m/t of tolerance of over-wintering plants that I will discover an effective, non-damaging fall management technique. My hypothesis is that since photosynthesis is reduced in winter and there is reliability primarily on storage, the plant is more susceptible to stresses in the fall, and damage to the taproot and foliage will result in the destruction of the plant. There are two experimental setups. Each consists of 3 groups of plants that received a different stress (leaves cut at 2 cm above the taproot, taproot cut at the very top, and the taproot cut at the point at which it enters the ground) and one control group in which the plants were not damaged. One experiment was performed entirely in a Conviron 1-E15 growth chamber. The other was left in situ (Ohio Wesleyan University Kraus Preserve). Preliminary growth chamber results show that Aliairia petiolata is able to recover from all the experimental stresses. The in situ results are not yet available.


Methane emissions from rice agriculture have been shown to be dependent on cultivar and plant age. Young plants have higher CH4 emissions than older plants. In this study, we investigated the effect of cultivar on CH4 emissions. Growth chambers were constructed with a control and two treatments. One group of rice plants was left on the control growth chamber, and the other was grown in an elevated CO2 chamber. The results of this study showed that the effect of CO2 concentration on CH4 emissions was dependent on cultivar. Young plants had higher CH4 emissions than older plants, regardless of CO2 concentration.
random regions of the DNA, was performed to compare the relatedness of individual crayfish. These techniques were developed over the summer and fall of 1999 and will be used to compare cave crayfish and crayfish from surrounding streams.

Board 19  POPULATION DYNAMICS OF SIX OF OHIO'S BREEDING GRASSLAND BIRDS. Claudia R. Steele1, James S. McCormac2, Michael A. Hogarth1, Otterbein College, Department of Life and Earth Sciences, Westerville OH 43081 and Ohio Department of Natural Resources, Division of Natural Areas and Preserves. ClaudiaRS@email.mscom

Historically, grassland birds nested in farm fields in the flatter areas of glaciated Ohio. In the last several decades, however, many of these agricultural habitats have been developed into residential and commercial areas. Agricultural areas that have not been developed have been plowed and harvested several times a year, thus disrupting the nesting habitats of grassland birds. Reclaimed strip-mines in eastern, unglaciated Ohio currently provide the largest contiguous grassland habitat for this avifauna. This study documents the population dynamics of six grassland birds in a total of eight counties in the state of Ohio over the past one hundred years. The grassland birds used in this study were the bobolink (Dolichonyx oryzivorus), dickcissel (Spiza americana), heron’s sparrow (Ammodramus inornatus), grasshopper sparrow (Ammodramus savannarum), northern harrier (Circus cyaneus), and short-eared owl (Aio flammeus). The four glaciated Ohio counties examined were Ashtabula, Clinton, Lucas, and Paulding, while the unglaciated counties surveyed for those species were Belmont, Coshocton, Lawrence, and Muskingum. Current population data were collected during a survey of four wildlife areas, which contain reclaimed strip-mines, in the above mentioned unglaciated Ohio counties. Historic population data for the same areas were published in an abridged life history review of many Ohio ornithologists. It was found that during the first half of the century, the populations of grassland avifauna were highest in the glaciated Ohio counties where agricultural grasslands provided abundant nesting habitat. In contrast, the reclaimed strip-mines of unglaciated Ohio have provided the necessary habitat for these large populations of grassland birds over the last several decades. These findings suggest possible management options for reclaimed strip-mine grassland habitats.

Board 20  CHANGES IN FOREST DYNAMICS OF A SOUTHWEST OHIO STAND OVER A 21-YEAR PERIOD. Melanie A. Baker, Kristin M. Bolzman, Timothy L. Lewis, Wittenberg University, Dept of Biology, Springfield OH 45561. Small, isolated woodlots cover much of the Midwest. Long-term studies of forest dynamics are useful for management of these areas in Ohio. We measured dominance (as evidenced by basal area), density, and frequency of such a typical beach-maple forest at Aullwood Audobon Center and Farm in Montgomery County, Ohio. All trees greater than 10 centimeters DBH in 65-five-meter radius plots were measured in 1978 and then again in 1999. We measured each tree’s diameter at breast height, distance from the center of the plot, and recorded the species of the tree. Results showed that maples (Acer spp.) remain the most dominant over a 21-year period occupying 32% of the forest basal area. The relative dominance of the maple (Acer spp.) declined from 37% to 32%. The relative dominance of American beeches (Fagus grandifolia) increased from 16.8% to 19.3%. Analyzing frequency data showed that black cherry (Prunus serotina) and ash (Fraxinus spp.) were the most frequent in 1978 but maples were the most frequent in 1999. Possible explanations for these changes include interspecific competition, the presence of pollution, and the influence of the woodlot surroundings.

Board 21  THE EFFECT OF FLOWERING PHENOLOGY ON REPRODUCTION IN LUPINUS PERENNIS. Constance E. Hausman1, Helen J. Michael1, and Randall J. Mitchell2. Bowling Green State University, Dept of Biological Sciences, Bowling Green OH 43403, romantc@snet.bgsu.edu, and 2University of Akron, Dept of Biology, Akron OH. Variation in flowering time may influence reproduction through effects on plant-pollinator interactions and/or resource availability. We examined the effect of within-plant variation in flowering time on components of offspring reproduction in Lupinus perennis, a threatened herbaceous perennial of Midwestern oak savannas. We classified all inflorescences on 15 individuals into discrete phenological classes. To prevent seed dispersal, we bagged the inflorescences after senescence of all flowers. Fruit production per flower varied among, but was not affected by inflorescence phenology. However, early flowering inflorescences produced significantly fewer seeds per fruit, and had significantly heavier seeds. In a greenhouse experiment seedlings from early inflorescences developed significantly smaller flowers, smaller leaves, and smaller flower buds than those from late inflorescences. These results are consistent with the notion that pollinator limitation may be more important than resources early in the flowering season.

Board 22  COLD TOLERANCE IN SEMI-AQUATIC AND TERRESTRIAL SPRINGTAILS (INSECTA: COLLEMBOLA). Richard L. Stewart Jr. and Joseph D. Varner, Malone College, Dept of Science and Mathematics. 515 25th Street N. W. Canton OH 44705. stewart@malone.edu

Insects within the order Collembola are among the most abundant and widespread terrestrial arthropods. They can be found on every continent, including Antarctica, making it the arthropod group with the most southerly location. While many Collembola species reside within the leaf litter layer, others may live their entire lives on the surface of water. Besides their use as aforalla for movement, both semi-aquatic and terrestrial Collembola share a great tolerance to endure sub-freezing temperatures. To measure cold tolerance fifty individuals were collected from a local source near the edges of a stream during production and oxidation processes contribute to observed differences in CH4 emissions between cultivars under identical growing conditions. In order to more accurately interpret δ13C data for this purpose, it is necessary to quantify the degree to which carbon isotope fractionation resulting from plant mediated transport is dependent on cultivar type and plant age. A laboratory experiment, in which rice roots were immersed in an aqueous CH4 solution while the remainder of the plant was contained in a chamber, allowed the differential fractionation due to transport to be determined without interference from other fractionating processes. Samples taken by this method from Mars and Lemont cultivars, grown hydroponically in a greenhouse, showed δ13CCH4 fractionation to be independent of cultivar type. However, the degree of fractionation was found to increase with plant age. At approximately 70 days after germination, Lemont plant cultivar exhibited a δ13C of emitted methane to values which are 12.6 ± 1.1‰ (n=6) lighter than the initial methane pool. At the same age, the shift observed for the Mars cultivar was 12.2 ± 1.7‰ (n=5). At 103 days after germination, the degree of isotope fractionation had increased to 14.1 ± 0.8‰ (n=6) for Lemont and to 14.5 ± 0.7‰ (n=5) for the Mars cultivar.

Board 17  A REVIEW OF THE STYGOTIC CRAYFISHES OF NORTH AMERICA WITH NOTES ON A NEW SPECIES FROM MISSOURI. Horton R. Hobbs III, Wittenberg University, Dept of Biology, P.O. Box 720, Springfield OH 45501-0720, hhobbs@wittenberg.edu

Currently, 58 species and subspecies of stygotic (obligate cave species) crayfishes are described from North America (inclusive of Mexico and Cuba) and are assigned to one of four genera: Cambarus, Orconectes, Procambarus, and Troglocambarus. Within the contiguous United States these cave-adapted crustaceans occur primarily in the karst regions of the Appalachians, Interior Lowlands, Florida Lime Sink, and the Ozarks. Eleven species of Cambarus (4 subgenera) are known from the Ozarks, the Interior Lowlands, and the Appalachians; seven species and subspecies of Orconectes are found in ground waters, 19 species and subspecies of Procambarus are known from Florida and Alabama; and the monotypic Troglocambarus is limited to ground waters in north-central Florida. The genus Procambarus also is represented in subtropical waters in Cuba (one species) and Mexico (four species assigned to two subgenus). During August 1999 two adult (female and Form I male) individuals of an undescribed, blind, albinistic species of Orconectes (INSECTA: COLLEMBOLA). Richard L. Stewart Jr. and Joseph D. Varner, Malone University, P.O. Box 720, Springfield OH 45501-0720. stewart@malone.edu

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Board 18  GENETIC ANALYSIS OF CAVE AND SURFACE CRAYFISH. Jason D. Moon (Margaret A. Goodman), Wittenberg University, P.O. Box 720, Springfield OH 45501-0720. smoon@wittenberg.edu

Cave crayfish are generally thought to belong to isolated populations, that is, they make only with crayfish in the cave system itself and not with crayfish on the surface or in other caves. Recently cave crayfish have been found in well water, suggesting that populations may not be entirely isolated by competing geographic barriers from crayfish populations in surface systems and streams in Indiana. We will develop a measure of the relatedness of cave crayfish, and hence, determine whether cave populations are completely isolated. This summer, pleopods and chelicerae from Orconectes rusticus, a crayfish in the same genus as the cave-dwelling species O. pelucius, were collected from Buck creek, located downstream of the C.J. Brown reservoir north of Springfield, OH, and DNA was isolated. RAPD-PCR (Randomly Amplified Polymorphic DNA – PCR), a process used to amplify random regions of the DNA, was performed to compare the relatedness of individual crayfish. These techniques were developed over the summer and fall of 1999 and will be used to compare cave crayfish and crayfish from surrounding streams.
alcohol consumption and drug usage (p > 0.21 for all indices) to eliminate outside variables were carefully matched with subjects from other groups having similar age, general health, subject was screened using the Edition to test both short and long term memory. Using the MANCOVA while covarying for interview, and given the Personnel Test and Million Clinical Multiaxial Inventory: Third Edition and clinically interviewed to confirm group assignment. Subjects were demographically matched between groups and received a magnetic resonance imaging (MRI) scan of the brain. To control for the MRI and other procedures, patients were interviewed two years after removal indicated that diversity and density increased in the disturbed plots while the control plot remained unchanged. It appears that the experimental plots are slowly recovering from the disturbance associated with the cutting/removal activities.

The DROSOPHILA GENOME PROJECT: ANALYSIS OF THE 36B LOCUS. Leokadia K. Okress (Dr. Charles E. Rozek, Case Western Reserve University; Cathleen M. Jenkins), Cuyahoga Community College, Western Campus, 11000 W. Pleasant Valley Rd, Parma OH 44196, cathyjenkins@cc.ohio.edu

The Drosophila Genome Project originating out of Berkeley, California was started to sequence the genome of Drosophila melanogaster, commonly known as the fruit fly. As a component of this project the goal is to create a restriction map of fragments of the Drosophila genome. These restriction fragments are smaller pieces of the 120 mb genome and comprise chromosomal locus 36B. This area is vital to understanding gene function and regulation within the muscular and circular respiration systems of the fruit fly. These fragments are formed by restriction digestions into a much more manageable size. The resulting 3 kb fragments are then subcloned into a vector plasmid to create a recombinant plasmid. This recombinant plasmid is formed through plasmid DNA isolation, restriction enzyme digests, alkaline phosphatase and ligation reactions, and a final enzyme digest while the control remained unchanged. It appears that the experimental plots are slowly recovering from the disturbance associated with the cutting/removal activities.

Board 24 THE DROSOPHILA GENOME PROJECT: ANALYSIS OF THE 36B LOCUS. Leokadia K. Okress (Dr. Charles E. Rozek, Case Western Reserve University; Cathleen M. Jenkins), Cuyahoga Community College, Western Campus, 11000 W. Pleasant Valley Rd, Parma OH 44196, cathyjenkins@cc.ohio.edu

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Board 25 MEMORY DEFICITS IN WOMEN SUFFERING FROM POSTTRAUMATIC STRESS DISORDER RESULTING FROM CHILD ABUSE. Kelly A. Zander, Scott H. Maurer, Cathy L. Pederson, Patricia L. Pederson, Cathleen L. Kaminiski, Robin Osborn, Wittenberg University, P.O. Box 720, Springfield OH 45501. s00.smaurer@wittenberg.edu

Posttraumatic Stress Disorder (PTSD) is a mental affliction that is prevalent in victims of childhood abuse. PTSD patients present a myriad of problems including intense fear, avoidance of stimuli related to the trauma, and recurrent nightmares. Recently, deficits in free verbal recall and short-term memory have been associated with PTSD (Bremner et al. 1995). Our goal is to further explore memory deficits found in PTSD subjects. We are examining female adult victims of childhood abuse who exhibit PTSD (Group 1, n=3). These subjects will be compared to women who have a similar abuse history but not present PTSD (Group 2, n=3) and controls with no abuse history (Group 3, n=3). All subjects are right-handed women between 20 and 40 years old. Each potential subject was screened using the Childhood Trauma Questionnaire, Trauma Symptoms Inventory, and Million Clinical Multiaxial Inventory: Third Edition. Subjects from each group were carefully matched with subjects from other groups having similar age, general health, alcohol consumption and drug usage (p > 0.21 for all indices) to eliminate outside variables that may alter subject performance. On separate occasions, subjects were clinically interviewed, and given the Wonderlic Personnel Test and Wechsler Memory Scale: Third Edition to test both short and long term memory. Using the MANCOVA while covarying for IQ, a significant difference was shown between groups in auditory memory (p = 0.010) with a significant deficit for Group 1. No significant differences were found between groups for visual memory (p = 0.147) or working memory (p = 0.849).

Board 26 USING MAGNETIC RESONANCE IMAGING TO IDENTIFY ALTERATIONS IN BRAIN MORPHOLOGY IN FEMALE SURVIVORS OF CHILDHOOD ABUSE WITH POST-TRAUMATIC STRESS DISORDER. Scott H. Maurer, Kelly A. Zander (Cathy L. Pederson, Cathleen L. Kaminiski, Robin Osborn), Wittenberg University, P.O. Box 720, Springfield OH 45501. s00.smaurer@wittenberg.edu

Childhood abuse is increasingly linked to Posttraumatic Stress Disorder (PTSD), a mental affliction which follows abuse survivors into adulthood. PTSD symptomology, which includes intense fear, difficulty sleeping, amnesia related to the trauma, avoidance of stimuli related to the traumatic event, and recurrent nightmares implicates abnormalities in several different brain areas. Currently, MRI based studies are important in the study of PTSD and have shown significant decreases in the volume of the hippocampus, an area of the brain responsible for memory (Bremner et al. 1997). The increasing need for PTSD research focusing on both child abuse and women is apparent. Thus far, we have examined 12 women who will fit into one of three groups: 1. History of childhood abuse resulting in PTSD (n=4), 2. History of childhood abuse not resulting in PTSD (n=4), and 3. No history of abuse (n=4). Each subject was screened using Childhood Trauma Questionnaire, Trauma Symptoms Inventory, and Million Clinical Multiaxial Inventory: Third Edition and clinically interviewed to confirm group assignment. Subjects were demographically matched between groups and received a magnetic resonance imaging (MRI) scan of the brain. To control for the MRI and other procedures, patients were interviewed two years after removal indicated that diversity and density increased in the disturbed plots while the control plot remained unchanged. It appears that the experimental plots are slowly recovering from the disturbance associated with the cutting/removal activities.

Board 27 NITROGEN MINERALIZATION UNDER DIFFERING AMOUNTS AND TYPES OF LITTER FALL Thomas G. Bauer, Dr. Charles McClagherty, Mount Union College, 1912 Clark Ave, Alliance OH 44601, baugthrg@muohio.edu

The objective of this research is to determine how the quality and quantity of litter fall affect rates of Nitrogen (N) mineralization. I hypothesized that N mineralization values would be higher in a successional forest than in an old growth forest due to difference in litter quality. I also hypothesized that N mineralization would be proportional to quantity of litter input. Two forests were studied, an old growth Beech-Maple Forest (Fagus grandifolia-Acer saccharum) and a nearby successional forest dominated by red maple (Acer rubrum). Both forests were located in eastern Stark County, Ohio. Litter input has been manipulated in both forests annually for the past five years by removing all litter from a circular plot (5m radius) and transferring it to an adjacent plot. A third adjacent plot served as a control. The average annual litter fall for the old forest are 507 g/m² and, for the successional forest, 560 g/m². Soil cores (9 cm per plot) were collected during June and August of 1993 resulting in a total of 54 initial and 54 incubated samples per month. Cores were collected from randomly located points within each plot and samples were incubated for 30 days in the laboratory. N was extracted from initial and incubated samples using 2N KCl per 50g of sample for 48 hours. N mineralization was determined as the net change in extractable ammonia and nitrate during the incubation. I anticipate higher values for N mineralization as litter fall amount and forest age increases.

Board 28 DEVELOPING FIELD MAPPING TECHNIQUES FOR FRACTURE IDENTIFICATION AND SPACING IN NATURALLY OCCURRING OUTCROPS—AN EDUCATIONAL EXPERIENCE. Julie Weatherington-Rice, Ann D. Christy, Garry McKenzie, Bennett & Williams Environmental Consultants, Columbus OH 43231 and The Ohio State University, Columbus OH 43210. Weatherington-rice,1@osu.edu

While the Fracture Flow Working Group has developed methodologies for discovering and mapping fractures in freshly dug pits, the Group is still struggling with suitable techniques for uncovering and mapping fractures in natural outcrops. Natural faces present different challenges; they are usually weathered, covered with slumped materials, and steeply angled. This provides poor footing and vertical faces higher than the 1 meter bench limit. Fractures for significant vertical distances. They also present the opportunity to map across angled trenching shovels, and long-handled hoes. Since the field team was comprised of a disciplined team in solving the fracture question. Fracture trips were also cross-disciplinary learning experiences, reemphasizing the need for a multi-angled trenching shovels, and long-handled hoes. Since the field team was comprised of a disciplined team in solving the fracture question. Fracture trips were also cross-disciplinary learning experiences, reemphasizing the need for a multi-disciplinary team in solving the fracture question.
hampered either by a paucity of conodonts, scarce representation of diagnostic conodonts, or a lack of a high-resolution Silurian conodont biostratigraphy for that part of the Silurian to correlate with. Restudy of hundreds of conodont samples processed from cores drilled through the Silurian Dolomite and Salina Group in northern Indiana in the 1960’s and early 1970’s indicates that although diagnostic conodonts are scarce, they are present in enough samples from some of the cores to provide the data required to determine a quantitative biostratigraphy and correlation for those units with high-resolution Silurian conodont biostratigraphies recently developed. Ten conodont zonations and five subchronozones are provisionally recognized for the Silurian Dolomite and Salina Group in northern Indiana, ranging from the uppermost Llandovery Pteraspathodus amorphognathoides Chronzone to the lowermost Pragian Lower Czokadina remachseidelensis Subchronzone of the O. remachseidelensis eostii-novemcheloniensis Chronzone. The Llandovery/Wenlock boundary is recognized near the top of the Louisville Limestone Member of the Plains Mills Formation or in the lower part of the Wasbash Formation, just slightly above the first-appearance datum of Kockelaria variabilis. The Ludlow/Pridoli boundary is recognized near the top of the Wasbash Formation (Kenneth Member, when possible to identify), but the top of the Wasbash has apparently been eroded below that boundary in many cores.

Board 31 IMPULATIONS OF FLOW AND WATER SOURCE ON NITRATE CONCENTRATIONS IN A FEN. Sky Schiebe, (Dr. John Ritter), Wittenberg University, Dept of Geology, P.O. Box 720, Springfield, OH 45501. S.Sachelles@wittenberg.edu

Located near central Ohio, the Wenlock/Wendover Fen is a fen located on the boundary between glacial till and outwash along the lower Mad River system and functions to filter chemicals out of that system. Wenlock is presently surrounded by farmland. The purpose of this study is to evaluate wetland function as it relates to changes in water source and flow direction. The objectives are threefold: to investigate the relation of flow stage to water source, the influence of different water sources on water quality, and changes in water quality along a flow path that intersects areas of water from different sources. Data collection included a continuously recording rainfall gauge, a manual sampling and automated sampling of water using a field spectrophotometer for water analysis. Nitrate analysis uses the cadmium reduction method. Stage data are collected during each visit so that the relation between nitrate’s concentration, water source, and flow stage can be understood. Initial observations have shown that flow through the fenland is dominated by groundwater but may also be influenced by flow stage in an adjacent drainage ditch. The wetland is a fenscape wetland during baseflow and a fenland wetland during flood inundation. Flow direction is influenced by groundwater during base flow and overland flood during flood stage. Depending on flow stage, water sources may include combinations of groundwater flow and/or overland flow. The potential for multiple sources of water that are stage-related leads to the hypothesis that nitrate concentrations and water quality in general are dependent on source of water and different flow patterns.

Board 32 AN EFFECTIVE METHOD OF AMENDMENT DISTRIBUTION FOR IN-SITU BIOREMEDIATION OF CIS-1,2-DICHLOROETHENE AND VINYLL CHLORIDE. Joseph M. Warburton and James A. Peeples, Metcalf & Eddy, Inc., 2860 Corporate Exchange Dr Suite 250, Columbus OH 43221. Joe.warburton@aecuailliance.com

A shallow glacial outwash aquifer at an industrial site in central Ohio was contaminated with cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride (VC), soluble petroleum compounds, and residual light non-aqueous phase liquids (LNAPLs). The impacted aquifer had a thickness of 80 feet. During the early stages of remediation, anaerobic biodegradation was chosen as the remedial alternative. A non-recirculating pilot cell was constructed using two amendment injection wells located six feet apart, on an axis parallel to groundwater flow. 150 pounds of carbon dioxide efflux is thought to change with the amount of leaf litter supplied to the system. In this experiment, the amount of CO₂ efflux from the ground was measured for six sites in a fen/slope wetland during base flow and a riverine wetland during flood. Flow direction is influenced by groundwater during baseflow stage and overland flow during flood stage. Depending on flow stage, water sources may include combinations of groundwater flow and/or overland flow. The potential for multiple sources of water that are stage-related leads to the hypothesis that nitrate concentrations and water quality in general are dependent on source of water and different flow patterns. Soil cores were taken in June and August to determine the influence of different water sources on water quality, and change in water quality resulted in total sales of $70.26 and rates ranging from $3.90 to $8.00 per hour. Decorative items resulted in a rate of $3.53 per hour while useful items had a rate of $2.09 per hour but the difference was not significant. The overall average rate of $2.81 was not significantly different from a minimum wage of $5.60 per hour. The results, though interesting, are not significant, so the study is worth repeating over a longer time period during which more items can be made and sold.

Board 33 LIMITING FEATURES FOR A SMALL HEADWATER STREAM TO SUPPORT FISH LIFE. Nathan A. Moyer, (Dr. Lin Wu), Mount Union College, Box 1448, 1972 Clark Ave, Alliance OH 44601. Whitetol@muc.edu

The economics of sustainability was investigated by turning tree trimmings into craft items that were then offered for sale at the local ‘Kent farmers market’. The sustainable aspect was emphasized by using only hand tools and no glue or finish of any kind. Because many different objects were produced the study took the form of a market survey to determine which products could be most profitably produced. For each object the time to produce it and the sale price were recorded, and from these the ‘hourly rate’ was calculated. The hypothesis was that these costs could be compared to the minimum wage and that there would be differences that could indicate a direction for profitability. Two categories of items were produced, decorative and useful. Within each category, there were several types of products, for a total of 73 individual items in 28 types. A total of 140.75 manufacturing hours resulted in total sales of $70.26 and rates ranging from $3.90 to $8.00 per hour. A significant difference between the 2x and Ox plots, while the efflux of the 1x plot and residual light non-aqueous phase liquids (LNAPLs). The impacted aquifer had a thickness of 80 feet. During the early stages of remediation, anaerobic biodegradation was chosen as the remedial alternative. A non-recirculating pilot cell was constructed using two amendment injection wells located six feet apart, on an axis parallel to groundwater flow. 150 pounds of carbon dioxide efflux is thought to change with the amount of leaf litter supplied to the system. In this experiment, the amount of CO₂ efflux from the ground was measured for six sites in a fen/slope wetland during base flow and a riverine wetland during flood. Flow direction is influenced by groundwater during baseflow stage and overland flow during flood stage. Depending on flow stage, water sources may include combinations of groundwater flow and/or overland flow. The potential for multiple sources of water that are stage-related leads to the hypothesis that nitrate concentrations and water quality in general are dependent on source of water and different flow patterns. Soil cores were taken in June and August to determine the influence of different water sources on water quality, and change in water quality resulted in total sales of $70.26 and rates ranging from $3.90 to $8.00 per hour. Decorative items resulted in a rate of $3.53 per hour while useful items had a rate of $2.09 per hour but the difference was not significant. The overall average rate of $2.81 was not significantly different from a minimum wage of $5.00 per hour. The results, though interesting, are not significant, so the study is worth repeating over a longer time period during which more items can be made and sold.
study because it is good fish habitat. The study was carried out between August and November 1999. Flags were placed at ten-meter stream intervals marking the research area. Using a compass and the flags, a detailed map was drawn showing the stream shape and mapping all of the pools present in the stream. The pools were then numbered and the perimeter shape was drawn. The length, width, and depth at all of these points were recorded for each pool with a meter stick. On October 19 or 23 the number of fish seen in each pool were recorded and using a dip net for ten minutes as many fish as possible were captured. The number captured and length of the fish were also recorded. The percent gradient was recorded at every twenty-meter stream interval and the actual distance between the marks was measured with a 50-meter tape measure. A longitudinal profile of the stream marking pools with and without fish will be made.

Board 38 SOIL CHARACTERISTICS AND VASCULAR PLANT DIVERSITY OF DISTURBED LANDS; PPGE LAKES IN BARBERTON OH, AND ABANDONED COAL MINES IN STARK COUNTY OH. Annabelle M. Foss, Smith, L. R. Baird, B. A. Clark-Thomas, D. W. Conner, T. E. Conte, J. N. Dennison, C. M. Indriolo, W. K. Laine, A. W. Landaw, F. G. Larkin, K. J. Lobur, J. D. Naus, C. J. Ulo, University of Akron, Center for Environmental Studies, Akron OH 44325-4101. afoosk@uakron.edu
Two contrasting areas of disturbed lands were investigated by the analysis of soil characteristics (pH, conductivity, nitrate, and phosphates) and determination of a vascular plant diversity index. Two sites in the Bear Creek watershed of southern Stark County, Ohio, were investigated. The Bear Creek watershed contains a large acreage of abandoned surface coal mine spoil areas that have produced acid mine drainage. The first site was overgrown and showed evidence of artificial reclamation. Scott’s pines were planted in the second area in an effort to reclaim the site. The vascular plant diversity index of site 1 was higher than site 2. An increase in diversity was noted with an increase of pH, a decrease in conductivity, as well as a decrease in phosphorus levels. The lime pools of PPGE contain waste from soda ash production which consists of fine-grained lime spoil that was alkaline, lacked nutrients, and was unable to support vegetation. Reclamation efforts included mixing the waste with sewage sludge, regrading, and planting of mixed herbaceous and woody vegetation. Test sites included undisturbed as well as younger and older reclaimed sites. Higher vascular plant diversity indices were noted in the undisturbed land as well as the older reclaimed site. Conductivity was highest in the area of recent reclamation and lowest in the undisturbed area. Phosphorus was lowest in the undisturbed and highest in the older reclamation areas. Nitrate showed no significant trend. This study indicates that the reclamation efforts at the PPGE lime lakes site were more successful than the reclamation efforts at the Stark County abandoned coal mine site.

Board 39 ASSESSMENT OF VEGETATION CHANGES AFTER 13 YEARS OF RESTORATION AT THE MOUNT ST. JOHNBERGAMO PRAIRIE. Amanda L. Wischmeyer (Leanne M. Jablonski), Denis R. Conover, Donald R. Geiger, Marianist Environmental Educational Center, University of Dayton, Dayton, OH 45469-2320. wischmhall@flyernet.udayton.edu
Evaluation of prairie species establishment is being used to determine if management intervention is necessary on the Mount St. John/Bergamo Prairie (Greene County, OH). Restoration began on the 1-acre sand and gravel borrow pit from 1986-88 with 52 species, 82% of these being native. Burning has occurred every 3 years, and more than 120 species present are native. For each interval between surveys, native species additions and losses were recorded and using a dip net for ten minutes as many fish as possible were captured. The number captured and length of the fish were also recorded. The percent gradient was recorded at every twenty-meter stream interval and the actual distance between the marks was measured with a 50-meter tape measure. A longitudinal profile of the stream marking pools with and without fish will be made.

Poster Session Medical Sciences 10:00-11:00 AM MEYER HALL

Board 01 EFFECTS OF THE CANNABINOID AGONIST WIN 55212-2 ON NEURONAL DIFFERENTIATION OF PC-12 CELLS. Kristyn L. Strasser, Heather N. Smith, Talnishia R.J. Williams and Karl J. Romstedt. Capital University, Biology Dept, 2199 E Main St, Columbus OH 43209. kstrasse@capital.edu
Marijuana and other cannabinoids exert influences via cannabinoid receptors which are known to exist on neurons within the central nervous system. Activation of these receptors has been shown to result in the phosphorylation of a neuronal focal adhesion kinase which could have neurotrophic effects (Finkbeiner et al., Science 273: 1719, 1996). The present study was undertaken to determine if the cannabinoid agonist, WIN 55212-2 (WIN) could regulate the differentiation of a neuronal chromaffin cell line (PC-12) in vitro. PC-12 cells were observed with no treatment or in the presence of 50 ng/ml nerve growth factor (NGF), WIN or both. Concentrations of WIN ranged from 0.1 to 30 µM. After 4 days, neurite development with NGF reached a value of 186 ± 18 SEM nm per cell [n = 12 cultures]. This was significantly greater (t-test, p<0.0009) than growth in controls (110 ± 7). WIN inhibited neurite outgrowth in a dose-dependent manner with 50% inhibitory concentrations of 6.53 and 3.37 µM for NGF-treated cells and controls, respectively. WIN concentrations of 10 µM or greater also reduced the number of viable cells as determined by trypan blue exclusion. However, 3 µM WIN had no significant effect on cell viability. Although WIN inhibited differentiation of these cells, the concentrations required are higher than would be expected for effects mediated via cannabinoid receptors and therefore the observed inhibition could be of a non-specific or toxic nature.

Board 02 LACTATE DEHYDROGENASE ISOZYME ACTIVITIES IN TWO SPECIES OF BATS. John J. Leskovar (Dr. Sheafor) Mount Union College, 1972 Clark Ave, Alliance OH 44601. leskoyj@muohio.edu
Lactate dehydrogenase (LDH) is an enzyme that catalyzes the reversible reaction between pyruvate and lactate. In vivo, LDH occurs in two forms, LDHm as the major isozyme in heart, and LDHα, termed for the large chains found in skeletal muscle. LDH, facilitates the conversion of pyruvate to lactate and lactate to pyruvate. Two species containing high levels of this isozyme favor the use of oxidative metabolic pathways. Tissues containing elevated levels of LDHα facilitate the reverse reaction and enhance glycolytic ATP synthesis. It has been shown that pikas and hummingbirds (oxidatively stressed endotherms) maintain elevated levels of LDH, in skeletal muscle. Due to extremely high energetic demands placed on bats during flight, we hypothesize that high levels of LDHα would be found in their flight muscles. High LDHα would help to rapidly synthesize ATP without a reliance on anaerobic pathways. This would decrease the buildup of lactate in muscle tissues and limit consequent acid-base imbalances. In this experiment, the composition of LDH isozymes in six major muscles from two common species of bats (Myotis lucifugus and Eptesicus fuscus) was examined. Native gel electrophoresis will be performed on the extracted tissues and the percentage of each isozyme will be quantified. In addition, spectrophotometric assays will be performed to determine total lactate activity in all tissues. We hope that this study will increase our understanding of general muscle physiology as well as the specific adaptations that have evolved in conjuction with volent locomotion in mammals.

Board 03 SIGNAL TRANSDUCTION PATHWAYS INVOLVED IN THE CATECHOLAMINERIC DIFFERENTIATION OF AVIAN NEURAL CREST-DERIVED CELLS IN VITRO. Xiaodong Wu, Marine J. Howard, Medical College of Ohio, Dept of Anatomy and Physiology, Toledo OH 43614. xwu@mco.edu
Growth factors have a pivotal role in the differentiation of neural crest-derived cells into catecholaminergic (CA) neurons. Molecules derived from the neural tube and found in chick embryo extract (CEE), transforming growth factor-β, ciliary neurotrophic factor and bone morphogenetic proteins (BMP) all support the differentiation of CA neurons in vitro under growth conditions which alone will not support expression of this phenotype. Each of these identified growth factors bind to a cognate receptor whose signal transduction pathway is partially understood. Two broad groups of growth factor receptors, those which have an intrinsic receptor tyrosine kinase or activate soluble tyrosine kinases and those identified growth factors binds a cognate receptor whose signal transduction pathways are partially understood. Two broad groups of growth factor receptors, those which have an intrinsic receptor tyrosine kinase or activate soluble tyrosine kinases and those which are serine/threonine kinases and activate the transcription factor SMAD (vertebrate homologue for mothers against decapentaplegic), can influence differentiation of neural crest-derived cells into CA neurons. In the present study, we tested whether nitogen activated protein (MAP) kinase or SMAD, both of which can influence transcription, mediate the differentiation of neural crest-derived CA neurons in response to CEE or BMP-4. In the presence of Herbimycin A, a pan-specific tyrosine kinase inhibitor, there was a dose-dependent loss of neural crest-derived CA neurons differentiating in 10% CEE. Inhibition of MAP Kinase using PD98059 (a MAP kinase kinase inhibitor) resulted in a dose-dependent inhibition of neurite outgrowth in a dose-dependent manner with 50% inhibitory concentrations of 6.53 and 3.37 µM for NGF-treated cells and controls, respectively. WIN concentrations of 10 µM or greater also reduced the number of viable cells as determined by trypan blue exclusion. However, 3 µM WIN had no significant effect on cell viability. Although WIN inhibited differentiation of these cells, the concentrations required are higher than would be expected for effects mediated via cannabinoid receptors and therefore the observed inhibition could be of a non-specific or toxic nature.
osmolyte, Of interest to this study, the molecular mass of GPDH is 35 kDa. While the determined by incorporation of S-labeled methionine/cysteine into protein during tissue incubation, synthesis of a 35 kDa protein increased in response to osmotic stress. These seen within one hour of onset of osmotic stress and increases over three hours. Although to the incubation buffer, producing a hyperosmotic environment. Hyperosmotic stress of were determined. Osmotic stress was produced in brain slices by the addition of sorbitol measured by immunoblotting with a phospho-specific antibody, and on protein synthesis proinflammatory response. In this study, the effects of osmotic stress on activation of p38, function has been linked to apoptosis and neurodegeneration, as well as facilitating a (MAPK) family acts to transduce stress-related signals in eukaryotic cells. In the brain, p38 Ruppert Health Ctr, 3120 Glendale Ave, Toledo OH 43614-5809. julniswander@mco.edu

The animals actively responded to hypoxia by increasing buccal activity as oxygen levels between 8 and 6.5% oxygen was reached. Carbon dioxide output pumping observed increased significantly during 5 and 6.5% oxygen exposure, not at other increased significantly, but only during 5% oxygen exposure. The amount of buccal pumping observed increased significantly during 5 and 6.5% oxygen exposure, not at other oxygen levels. Heart rate increased at all levels tested except 2% oxygen. The buccal activity and heart rate of lungless salamanders were responsive to environmental hypoxia, with a slight stimulatory response to 10% and 6% oxygen, a significant stimulant during 6.5% and 5% oxygen exposure and no response, or an inhibitory response, to 2% oxygen. During exposure to hypoxia, heart rate and heart rate variability to control levels were regained after all hypoxic exposures. Length of the period of apnea increased during recovery, which may suggest a down-regulation or inhibition of buccal activity following hypoxic exposure. The animals actively responded to hypoxia by increasing buccal activity as oxygen levels decreased. This may facilitate oxygen uptake and aid in maintaining metabolic rate during hypoxia. (Research supported by NIH grant HL40357)

Activation by phosphorylation of p38, a member of the mitogen-activated protein kinase (MAPK) family acts to transduce stress-related signals in eukaryotic cells. In the brain, p38 function has been linked to apoptosis and neurodegeneration, as well as facilitating a proinflammatory response. This study, the effects of osmotic stress on activation of p38, measured by immunoblotting with a phospho-specific antibody, and on protein synthesis were determined. Osmotic stress was produced in brain slices by the addition of sorbitol to the incubation buffer, producing a hyperosmotic environment. Hyperosmotic stress of brain slices activated p38, most prominently in the hippocampus and cortex. This effect is seen within one hour of onset of osmotic stress and increases over three hours. Although hyperosmotic stress diminishes total protein synthesis in the brain regions studied, as determined by [35S]methionine incorporation into tissue homogenates during control incubation, synthesis of a 35 kDa protein increased in response to osmotic stress. These results are analogous to the situation in yeast, where activation of the p38 homolog under similar osmotic conditions mediates a survival response by inducing glycerol phosphate dehydrogenase (GPDH), the enzyme that generates glycerol, a biologically compatible osmolyte. Of interest to this study, the molecular mass of GPDH is 35 kDa. While the multiple roles of p38 activity in the brain remain under investigation, we offer the suggestion that p38 activation may be an adaptive response to osmotic stress.

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have a fusion of lacZ (the gene for beta-galactosidase) with the sflA promoter. This construct allows the amount of DNA damage, which is modulated by the cell's ability for DNA repair, to be measured by assaying for beta-galactosidase. E. coli strains PG30 (wildtype), PG35 ( Col) and PG37 ( uvrA) were grown in M9 media containing IPTG, isopropyl thiogalactoside (IPTG), NADPH, and glucose. NADPH and glucose were added to prevent auxotrophic deficiencies. Cells from the overnight cultures were resuspended in fresh media containing IPTG, isopropyl thiogalactoside (IPTG), NADPH, and glucose.

By assaying for beta-galactosidase activity, we can determine the amount of DNA damage that occurs in each strain. In order to analyze the data, we performed a two-tailed Student's t-test to determine if there were statistically significant differences between the strains. The results of these experiments indicated that the E. coli strain PG30 (wildtype) had significantly higher beta-galactosidase activity than the E. coli strain PG35 ( Col) and PG37 ( uvrA). This suggests that the sflA promoter is important for DNA repair in E. coli.

In order to further investigate the role of the sflA promoter in DNA repair, we performed a series of experiments in which we introduced the sflA promoter into E. coli strain PG30 (wildtype), PG35 ( Col) and PG37 ( uvrA). The results of these experiments indicated that the E. coli strain PG30 (wildtype) had significantly higher beta-galactosidase activity than the E. coli strain PG35 ( Col) and PG37 ( uvrA). This suggests that the sflA promoter is important for DNA repair in E. coli.

In conclusion, our results indicate that the sflA promoter is important for DNA repair in E. coli. This suggests that the sflA promoter is important for DNA repair in E. coli. This suggests that the sflA promoter is important for DNA repair in E. coli.

Board 13 POSSIBLE MECHANISMS OF ETHANOL-INDUCED INCREASES IN BLOOD GLUCOSE IN YOUNG WHITE MICE. Stephanie A. Zank, Kathryn T. Knecht. Ohio Northern University, 525 S. Main St, Ada OH 45810. s-zank@onu.edu

Over a one-year period, 261 clinical isolates were collected from Northwest Ohio teaching hospital by standard microbiological techniques. The strains were serotyped by ELISA and / or slide agglutination techniques using specific monoclonal or polyclonal antibodies produced against the 17 out of 20 International Antigenic Typing System (IATS) of P. aeruginosa. From the 261 isolates, approximately 5% were typed by these antibodies. The O:11 serotype predominated in frequency (33%) followed by serotypes O:2 (8%), O:1 (5%), and O:23 (4%). O:11 was found to possess beta-galactosidase enzyme capable of cleaving ortho-nitrophenyl beta-galactoside (ONPG) substrate. It was noted that O:11 serotype was also ONPG positive, a finding that has not been previously reported. No obvious connection between the site of infection and specific serotype has been detected. We concluded that the combination of several phenotypic characteristics is useful for the initial strain differentiation of P. aeruginosa in epidemiological study. Statistical analysis and genotyping studies are currently underway to further differentiate the strains with similar phenotypic characteristics. 

Board 14 PROGRESS TOWARD THE SYNTHESIS OF 6-SUBSTITUTED IMIDAZO[2,1-b]TETRAZOLLES RELATED TO LEVAMISOLE. Jomuara Aouad and Jeffrey J. Christoff, Ohio Northern University, College of Pharmacy, Ada OH 45810. j-aouad@onu.edu 

Levamisole (Ergamisol®), a weak immunostimulant agent currently recommended as adjunct therapy with 5-fluorouracil as standard treatment for patients with stage III colon cancer. Levamisole is considered to have negligible immunomodulatory effects in individuals with properly functioning immune systems and immunorepressor effects in immunocompromised patients. Several plausible hypotheses for Levamisole’s mechanism of action have been proposed, however, studies that critically evaluate these hypotheses are unable to substantiate these claims. The goal of this project is to identify substitutions at position 6 of the imidazo[2,1-b]tetrazole nucleus that influence immunorepressor activity. The preparation of highly potent 6-substituted derivatives is necessary for the elucidation of Levamisole’s mechanism of action. Levamisole facilitates the response of an inadequate immune system. Such activities are modulated by cytokines, and Levamisole’s action may mimic an endogenous protein. Our target compounds are based on naturally occurring amino acids. We are replacing the phenyl substitution of Levamisole with a 3- indole group and expect increased potency. The synthetic pathways are initiated with conversion of the amino acid methyl ester to their amide analogues. Reduction to the corresponding diamines followed by sequential cyclization with carbon disulfide and 6N hydrochloric acid produces the heterocyclic ring system. In vitro screening will be performed with mitogen-induced lymphoproliferative assays utilizing donated human blood. Funding was provided by the American Foundation for Pharmaceutical Education and The Baroudies Welcoming Fund.
Board 17  EQUAL OPPORTUNITY TO ACQUIRE NEW KNOWLEDGE. Dionna Stewart, Debbi Broughton, (Joseph F. Fagan, Ph.D., Case Western Reserve University and Cynthia R. Holland, Cuyahoga Community College, Cuyahoga Community College, 11000 Pleasant Valley Rd, Parma OH 44130. Cindy.Holland@trc.cc.oh"

Conventional IQ tests are based on how much a person knows. But how much a person knows depends on how well a person thinks as well as on personal experiences. Thus, experience always plays a role in estimates of IQ. For example, children born before or after a particular date to enter school, vary in IQ. People of different birth orders vary in IQ. All of these differences in IQ have to do with differences in experience not to actual differences in thinking or intelligence. Different racial groups vary in IQ. They also vary in experience. In the present study, 100 students, whites and blacks, were tested for their knowledge of vocabulary, on a standard IQ test. Prior to testing, all participants received training on the meaning of 50 words of the words of equal opportunity to learn half the words. For words that were not learned, the whites knew more than the blacks, a standard finding. But, for equally trained words, blacks and whites were equal in knowledge. Results indicate that IQ differences between blacks and whites have to do with experience. Blacks and whites have had different experiences, as have people of different birth orders or people whose birth dates put them in one grade or another in school. Results of the present study dispel any notion of genetic differences in intelligence between races. They indicate that standard IQ tests are culturally biased and, in many cases, are an inappropriate measure of a person's capability.

Board 19  WHAT GOES INTO MUSICAL ABILITY? Rhea McKinley (Douglas Dottrman, Ph.D., Joanne Ruthsatz, Case Western Reserve University and Cynthia R. Holland, Ph.D., Cuyahoga Community College, Cuyahoga Community College, 11000 Pleasant Valley Rd, Parma OH 44130. Cindy.Holland@trc.cc.oh"

440 participants were recruited from two Cleveland area high schools, the Cleveland Institute of Music, and from Case Western Reserve University. Participants were administered three measures, a standard IQ test, a test of innate musical ability, and an assessment of practice time. The outcome variable was the participant's rank in the orchestra or band that they performed in. A regression analysis was performed and results indicate that all three of the measured variables were predictive of the participants musical ability as indicated by their rank in the band or orchestra. Each variable showed significant contribution to musical ability and the order of importance was IQ, innate musical ability and then practice.

Board 20  TO FORGIVE OR NOT TO FORGIVE. Trinidad Morales (Roy Baumesteir, Ph.D., Julie Estline, Ph.D., Case Western Reserve University and Cynthia R. Holland, Ph.D., Cuyahoga Community College, Cuyahoga Community College, 11000 Pleasant Valley Rd, Parma OH 44130. Cindy.Holland@trc.cc.oh"

The focus projects on the topics of forgiveness and repentance, particularly on their facilitators and barriers. The purpose of the project is to determine what factors impact on a victim's willingness to forgive. A few of the factors under consideration are the closeness of the relationship between the victim and the perpetrator, whether or not the perpetrator admits guilt and asks for forgiveness. The work involves carefully reading narratives and open-ended questions of approximately 50 undergraduate participants. The investigators will be seeking out patterns and categories of factors which impact upon a victim's willingness to forgive their transgressor. There will be qualitative coding of responses into those categories. A series of analyses will then be run on these data. Graphs will then be made to show comparisons among the categories and the possible effects of the categories on forgiveness.

Board 21  EXPLORING DIFFERENCES BETWEEN TRADITIONAL AND ALTERNATIVE WORK ARRANGEMENTS. Heather N. Odle (Dr. Jeff Stanton, Bowling Green State University, Psychology Dept., 530 Manville Ave., Bowling Green OH 43402. hnlode@bgnet.bgsu.edu"

Recent reports show the growing increase in temporary help and part-time positions. Prior research has compiled a mass of contradictory findings. The present research is an attempt to understand the issues surrounding full-time versus part-time employees as well as permanent versus temporary employees in terms of job satisfaction, commitment, and stress. Data was utilized from three general samples of workers. Sample 1 (N=120) was obtained through direct canvassing of businesses, and had a response rate of nearly 100%. Sample 2 (N=13) had a response rate varying by organizations from 22% to 100%. Sample 3 (N=632) had a response rate of 54%. Both sample 2 and sample 3 were obtained through mail in surveys. In sample 1, temporary workers were found to have significantly lower job commitment than permanent. We found significantly higher satisfaction with supervision, based on the Supervision scale of the Job Descriptive Index, in part-time than full-time in sample 2. Sample 3 also found higher satisfaction with supervision among part-time than full-time, as well as significant differences in stress. The Pressure and Threat sub-scales of the Stress-in-General scale showed full-time were more stressed than part-time using a t-test for equal variances. Although expected differences were found, only a few were statistically significant. Consistent was the effect on participant's stress. As it generally co-localizes in serotonergic neurons an involvement in the neurochemistry of aggression is thus a distinct possibility. In this study we infused small amounts of this neuropeptide into the hemolymph of freely-moving crayfish using fine-bore fused silica capillaries and characterized the resulting behavioral effects. Within minutes of the start of the infusion, proctolin treated animals began to behave differently. They were less likely to participate in an interaction, very likely to retreat from advancing opponents, often

Program Abstracts

Board 22  THE EFFECTS OF LIGHT EXPOSURE ON THE EXPRESSIVITY OF THE GENE FOR PIEBALD COLOR IN HOUSE MICE. Emilie M Carson, Advisor, Dr. Rema Suniga, Ohio Northern University, Dept of Biological Sciences, Ada OH 45810. e-carson1@onu.edu"

When a phenotype of a specific genotype varies from individual to individual, it is said to exhibit expressivity variation. An example of this phenomenon is the piebald spotting pattern observable in the coat color of Mus musculus. The spotting pattern is caused by the recessive s allele on Chromosome 14 of the mouse. The exact cause of variance in the degree of expression is unknown, it is known that environmental and genetic factors affect the spotting pattern. This experiment was designed to determine whether variations to light exposure during gestation had an effect on the coat color of the offspring. Ten pregnant female mice of the same genotype were divided into five five-light exposure groups and exposed to different times and wavelengths of light as follows: 12/12 hours, 23/1 hour, 23/1 hour ultraviolet, and 23/1 hour infrared. Twenty-eight days postpartum, the spotting patterns of the offspring were recorded according to location and size. These patterns were then recorded as a percentage of white fur to total fur: 12/12 hours – 17%, 23/12 hours – 13%, 23/1 hour UV – 15%, and 23/1 hour IR – 15%. Statistical analysis using ANOVA and the Post-hoc Scheffes f-test (a=0.05) indicated that only the 23/12 hour and 23/1 hour groups were significantly different from each other. This indicates that pigmentation differences result from variations in exposure to regular light.

Board 24  NEUROMODULATORS AND AGGRESSION IN CRAYFISH, ORCONECTES RUSTICUS: DEPLETION OF SEROTONIN BY 5, 7 DIHYDROXYTRYPTAMINE. Jules B. Parkskepp and Robert Huber. Bowling Green State University, Dept of Biological Sciences and J.P. Scott Center for Neuroscience, Mind and Behavior, Bowling Green OH 43403. julesp@caspar.bgsu.edu"

Crayfish offer behavioral neuroscientists a model system for studying how specific physiological axises affect different components of behavior. Short-term infusions of serotonin (5-HT) reverse the likelihood of a previously subordinate crayfish to retreat from agonistic encounters. The present study examined the particular behavioral effects resulting from long-term serotonin depletions in the crayfish nervous system. We hypothesized that such a depletion should decrease levels of aggression. The neurotransmitter 5,7 dihydroxytryptamine (5,7-DHT) was loaded into sciaticus taming and implanted into the thoracic tissue of socially isolated crayfish. After a recovery period, components of aggressive behavior (intensity, duration, escalation, who initiates/retreats) were compared between treatment and control animals when fighting size-matched opponents. Following the behavioral experiments, effective depletion of central 5-HT stores was confirmed using HPLC with electrochemical detection. Surprisingly, no behavioral deficits were detected as a result of such depletions. As depicted serotoninergic neurons retain functional membrane properties, it is possible that targeted 5-HT cells may be using 5,7-DHT as an agonist in place of 5-HT. New avenues of interpretation may need to be considered by researchers using 5,7-DHT in invertebrate systems.

Board 25  HUNGER AND PRESENCE OF FOOD ITEMS INFLUENCE FIGHTING STRATEGIES IN CRAYFISH, ORCONECTES RUSTICUS. Adam M. Stocker and Robert Huber, J.P. Scott Center for Neuroscience, Mind and Behavior, and Bowling Green State University, Dept of Biological Sciences, Bowling Green OH 43403. amstock@bgnet.bgsu.edu"

Crayfish chelae are formidable weapons employed in fights among conspecifics. Individually reduce the risks associated with extensive caw use by slowly increasing the intensity of a contest with an escalating sequence of stereotyped behavior patterns. Resorting to the rapid use of claws and unrestrained combat without prior assessment of the opponent's fighting potential thus carries great perils. We believe that hungry animals should take greater risks to feed. Similarity, individuals should be more careful when a desired resource is at stake. The goal of this study was to test these hypotheses by examining the differences in fighting strategies between hungry and satiated individuals in the presence or absence of a chemical food cue. Individual decisions for initiating encounters, escalating to higher intensities, retreating, or finally retreating from an interaction, were compared within a 2x2 factorial design. In agreement with our hypotheses, hungry crayfish escalated more rapidly than satiated individuals. Our discussion focuses on the complex trade-offs between increased risks of injury, appeitive states, and increased opportunities for resource access.

Board 26  THE NEUROPEPTIDE PROCTOLIN INFLUENCES AGONISTIC BEHAVIOR IN CRAYFISH, ORCONECTES RUSTICUS—Sarah Tuttle and Robert Huber, J.P. Scott Center for Neuroscience, Mind & Behavior, and Bowling Green State University, Dept of Biological Sciences, Bowling Green OH 43403. tutts@bgnet.bgsu.edu"

Aggressive interactions in crayfish feature escalating sequences of stereotyped displays and fighting acts, allowing us to characterize this behavior in quantitative terms. In previous work our lab has demonstrated that the neuropeptidulatory monoamine serotonin greatly enhances aggressive tendencies in crayfish and lobsters. Proctolin, a putative neurohor-"
performed a series of unprovoked tailflips, and eventually assumed a subordinate status. In conclusion, our data are most consistent with proctolin fostering the expression of an underlying, non-specific fear component.

Board 27 QUANTITATIVE ANALYSIS OF CNS AMINE LEVELS IN CRAYFISH, ORCONECTES RUSTICUS. Xiaoxia Yue, Yues Panksepp and Robert Huber. J.P. Scott Center for Neuroscience, Mind & Behavior, and Bowling Green State University, Dept of Biological Sciences, Bowling Green OH 43403. xuyue@bgsu.edu.

Neuroendocrine analyses, such as serotonin and dopamine, play important roles in the behavior of most animals. In crayfish, the infusion of serotonin greatly enhances aggressive tendencies. Much less is known, however, about the extent to which amine neurochemistry is altered by behavioral contexts, such as dominance. Although amine distributions have been documented in the nervous system of crayfish using immunocytochemical methods, the exploration of such links requires a quantitative determination of amine levels. As a first step, we have adapted and optimized methods for HPLC with electrochemical detection for crustacean tissues. In the present paper, we use this system to explore the scaling of amineergic neurochemistry during the growth of crayfish. With a detection limit of < 2 pg of substance, we are able to measure the amine content of individual ganglia. In this study, male crayfish (5 - 25 g bodyweight) were dissected and the central nervous system was analyzed in 4 sections, namely the brain, the combined sub- and circum-esophageal ganglia, thoracic ganglia, and abdominal ganglia. Our preliminary results show that CNS amine levels are similar over a large range of sizes.

Board 28 DIFFERENCES IN FIGHT STRATEGIES BETWEEN SMALL AND LARGE CRAYFISH, ORCONECTES RUSTICUS Lisa Schroeder and Robert Huber. J.P. Scott, Bowling Green State University, Center for Neuroscience, Mind & Behavior and Dept of Biological Sciences, Bowling Green OH 43403. schoed@cspgr.bgsu.edu.

Size-matched pairs of crayfish readily engage in agonistic encounters. Interactions increase in intensity until one individual withdraws. In such escalating fights the risk of injury rises as individuals begin to make unrestrained use of their potentially lethal weaponry. The growth of the claws greatly outweighs that of the rest of the body during normal development, and weapons should thus play a disproportionately greater role in fights between larger individuals compared to smaller ones. To examine this hypothesis, we analyzed the fight characteristics and fighting strategies in either small or large size-matched pairs of crayfish. Specifically, this study compared the number of interactions, their duration, maximum intensity, and rate of escalation in pairs either weighting 1.26-14.24 grams in an experimental arena scaled to the size of the animals. Fighting in small pairs was characterized by more interactions of shorter duration than between larger individuals. In agreement with our model, small crayfish were less hesitant to escalate quickly than larger individuals.

Board 29 MILLIMETER-WAVE ROTATIONAL SPECTRA OF SMALL ASYMMETRIC MOLECULES. Douglas T. Petkie, Jennifer L. Gottfried, Jennifer L. Powell. Ohio Northern University, Dept of Physics, Ada OH 45810. d-petkie@onu.edu.

The rotational spectra of many small molecules found in the atmosphere have peak absorption in the millimeter-wave region. Based on these spectra, remote-sensing techniques can retrieve such information as molecular abundance, temperature and pressure. These techniques rely on accurate laboratory measurements and predictions, which is the focus of this research. The spectra of several molecules were recorded with the Fast-Scan Submillimeter Spectroscopy Technique (FASSST) that allows large spectral scans (10-40 GHz) to be recorded in seconds. This research involved assigning and fitting the rotational spectra of several chemical species. In addition to rotational states of deuterated nitric acid (DNO), hydrogen peroxide (HO2), and nitric acid (HNO3) to distorted asymmetric rotor models.

For DNO, the rotational spectra for the ground state, v1, v2, and 2v2 vibrations in the 120-180 GHz region was assigned and fitted, involving approximately 600 transitions. A unique set of spectroscopic parameters, rotational and centrifugal distortion constants, was determined for each vibrational state. These fitted parameters reproduced the measured spectra to the experimental accuracy of 100 kHz, producing a reduced root-mean-square deviation near one. This demonstrates the effectiveness of the model. Parameters, approximately 10 for each vibrational state, accurately predict the roatational spectrum from the microwave to the far-infrared, totaling thousands of transitions. Only tentative assignments have been made for the v1, v2, and 2v2 vibrations of HO2H and the v1, v2 interactions of HNO3. The analysis of these vibrational states is complicated due to significant interactions with other vibrational states that must be taken into account.

Board 30 BOUND TO BE DIFFICULT: MAPPING STRUCTURAL CHANGES IN HEMOCYANIN SUBUNIT II DUE TO OXYGEN BINDING. Ian W. Straffin (Lisa Unico PhD), Edinboro University, Dept of Physics, Ada OH 45810. straffin@toolcity.net.

Hemocyanin, the oxygen-transport protein found in horseshoe crabs, is similar to hemeoglobin, but as an octa-hexamer, it is more complex and less well understood. Hemocyanin, like hemoglobin, is a multi-subunit molecule in which each subunit binds oxygen. Both hemocyanin and hemoglobin display positive cooperativity and allosterics in oxygen binding. We are studying the 628 amino acid subunit II. Allosteric effectors are small molecules, or ions that can also bind specifically to the transport protein. Binding of an allosteric effector changes the ability of the transport protein to bind oxygen by altering the structure of the protein. In the case of subunit II, chloride ion is an allosteric effector. We are in the process of mapping the structure of this protein in the "bound" state with chloride ion. Mapping is performed after first isolating and purifying the protein by ion exchange chromatography and centrifugation. Chemical modification and specific proteolysis are part of this mapping process. In specific proteolysis, the purified protein is digested with specific proteases. In this case trypsin, which cleaves only on the epsilon-terminal side of lysine and arginine residues, was used. Peptides of protein are then separated on an HPLC column, and identified. A chemical modifier, p-hydroxyphenylglycolal will be used to modify arginines in the folded protein. This renders these sites immune to trypsin digestion. Thus, changes in the peptide map can be used to identify which arginine residues have been modified, and thereby are accessible to the solvent.

Board 31 STRUCTURAL CHANGES IN HEMOCYANIN SUBUNIT II DUE TO OXYGEN BINDING. Ian W. Straffin (Lisa Unico PhD), Edinboro University, Dept of Physics, Ada OH 45810. straffin@toolcity.net.

Hemocyanin, the oxygen-transport protein found in horseshoe crabs, is similar to hemeoglobin, but as an octa-hexamer, it is more complex and less well understood. Hemocyanin, like hemoglobin, is a multi-subunit molecule in which each subunit binds oxygen. Both hemocyanin and hemoglobin display positive cooperativity and allosterics in oxygen binding. We are studying the 628 amino acid subunit II. Allosteric effectors are small molecules, or ions that can also bind specifically to the transport protein. Binding of an allosteric effector changes the ability of the transport protein to bind oxygen by altering the structure of the protein. In the case of subunit II, chloride ion is an allosteric effector. We are in the process of mapping the structure of this protein in the "bound" state with chloride ion. Mapping is performed after first isolating and purifying the protein by ion exchange chromatography and centrifugation. Chemical modification and specific proteolysis are part of this mapping process. In specific proteolysis, the purified protein is digested with specific proteases. In this case trypsin, which cleaves only on the epsilon-terminal side of lysine and arginine residues, was used. Peptides of protein are then separated on an HPLC column, and identified.

Board 32 INCREASING EFFICIENT PRODUCTION OF THIN FILM SOLAR CELLS WITH CIS AS AN ABSORBER LAYER BY ELECTRODEPOSITION. Jonathan E. Cowen (Alyusus Hepp, NASA Glenn Research Center, Stan Durz, Cleveland State University and Cathleen M. Jenkins) Cuyahoga Community College, 11600 W. Pleasant Valley Rd, Parma OH 44130.

Currently, we are investigating a more efficient means of producing thin film photovoltaic devices via electrodeposition. Conversion efficiencies of 17.8% have been achieved for chemically vapor deposited copper indium diselenide (CIS) based solar cells. However, electrodeposition is a less toxic and less expensive means of producing CIS based solar cells. We are currently producing junctions using a p-type layer of CIS deposited electrodeposition followed by a layer of cadmium sulfide by chemical bath deposition. It has been previously demonstrated that changing the deposition voltage can vary the copper to indium ratio. These alterations allow us to change the CIS semiconducting material from N-type to P-type. A series of thin films were produced with deposition potentials ranging from -1.21V to -1.25V (vs. a saturated calomel electrode) in 0.02 increments. Copper-indium-selenide films are deposited on a molybdenum substrate for 600 seconds using a solution consisting of 1M CuSO4, 10mM In (SO4)2, 5mM SeO2, and 25mM NaCl. After electrodeposition, films are rinsed with deionized water and annealed at 600°C for 2 hours. Film compositions have been characterized using Energy Dispersive Spectroscopy. A cadmium sulfide film is deposited on top of the CIS layer from chemical bath consisting of 1mM Cd(CH3CO2)2, 10mM thiourea, and 1M NH4OH. The temperature of the bath is maintained at 60°C, films are deposited for ten minutes. An evaporated aluminum grid will serve as the top contact for the cells. The resulting solar cells were characterized by current vs. voltage measurements.

Board 33 A STUDY OF GALAXY COLLISIONS. Jennifer J. Bohland, (Michael L. Fishier). Ohio Northern University, Dept of Physics, Ada OH 45810. m-fishier@onu.edu.

The morphology of elliptical, irregular and spiral galaxies has long been a source of discussion in the field of astronomy. Toomee and Toomee (1975) have shown that several interesting features can result from the interaction or collision of spiral galaxies. Other authors have also studied galaxy collisions using different methods for modeling the gravitational interactions. We have taken an existing galaxy interaction code, GALAXY, and created our own version to operate under Microsoft Windows using Microsoft Visual Basic. The original code used a single mass point to simulate the intruder galaxy and several mass points to simulate the target galaxy. Our new code adds several mass points to the intruder galaxy as well as simplifying the input of initial conditions. This improves the capability of the code as well as allowing a more detailed analysis of the initial conditions once an interesting effect is seen. Several tests of the new code and validation runs of our code with that of Toomee and Toomee are presented here.

Board 34 ACYLATION OF AROMATIC COMPOUNDS USING NITRILES AND ESTERS. Joseph G. Lisko and Colleen A. Fried, Hiram College, Dept of Chemistry, P.O. Box 67, Hiram OH 44234. liskoj@hiram.edu.

Acylation of aromatic compounds is commonly achieved using acyl chlorides, which are both expensive and corrosive. Esters and nitriles would provide safer and cheaper alternatives as acylating agents. Nitriles have previously been found to be effective acylating agents (Adachi et al., J. Am. Chem. Soc., 1978, 100(5), 4842-4852. and Heinirn and Toussaint, J. Am. Chem. Soc., 1940, 62, 1145-1147.). However, esters, while less expensive have proven to be less effective. We sought to adapt the procedure developed by Hopsa and company (Terahiron 2004. 3(37), 631-6314) to esters as acylating agents, and extend the reaction to amines other than aniline. The
same general procedure was followed for all reactions. In an ice-cooled, 25-mL round-
bottom flask, the anhydride was dissolved in 1.2-dichloroethane. After cooling, trifluoroacetic anhydride was added
slowly followed by the dropwise-addition of the ester or nitrile. Finally, aluminum chloride was added, and the mixture was stirred while slowly heating to 130°C. Products were analyzed by TLC, GC-MS, and IR. The developed synthetic method has proven to be
versatile, producing aromatic ketones from a variety of diones using esters and nitriles as
acylating agents. Once further optimized, this procedure would be applicable to the
synthesis of quinoline alkaloids, many of which have shown anti-HIV activity.

Board 36 A STUDY OF CHAOTIC PLASMA BURSTS. William L. Thesene, Hanna L. Wagner, Ohio Northern University, Dept of Physics, Ada OH 45810. w.t@thesene@ou.edu
Large amplitude plasma bursts have been detected in many types of plasmas including the
northern lights, laboratory plasmas, and the solar wind around the various planets. Plasma
bursts generally occur in the regions where two different plasmas come into contact. The
nonlinear process of plasma burst formation involves a stream of fast moving electrons that
has been accelerated by the differences in the two plasmas. This electron stream interacts
with the plasma giving rise to plasma bursts, plasma waves, and other nonlinear processes.
Several argon plasmas were created in an aluminum chamber and used to produce the
plasma bursts in the laboratory. A chaos data analyzer program using time-series analysis
methods was used to determine if the bursts occurred randomly in time. It was found that
the time-series probability distribution is not random and that a large number of bursts are
separated by a short time interval. Further investigation reveals that a long time interval is
typically followed by several shorter time intervals. The first burst is thought to serve as a
‘nucleation’ site for the bursts which rapidly follow. This is consistent with the concept of
cavitation formation in plasmas. The time-series of plasma bursts have also been plotted in the
phase-plane. Structure in these plots has been observed linking quasi-periodic to
chaotic data. These observations give strong evidence that these laboratory plasma bursts are
not formed randomly in time and that the use of chaotic methods for the study of these
plasmas leads to a better understanding of plasma bursts in general.

Board 37 BEAD PILE SYSTEM AS A MODEL FOR SELF-ORGANIZED CRITICALITY. Hanna L. Wagner and Donald T. Jacobs, Ohio Northern University, Physics Dept, Ada OH 45810. h.wagner@onu.edu
In 1987, Bak, Tang, and Wiesenfeld introduced a new paradigm in the physics of large,
complex, dynamical systems called Self-Organized Criticality. Common to many systems
is the natural tendency to organize itself at a critical state resulting in characteristic
fluctuations, which are observed in everything from earthquakes to the stock market. The
fluctuations are expected to follow a power-law distribution where there is no simple
causality. One system that has previously been used as a model for SOC is a sandpile. We
experimentally investigated smooth glass beads forming a conical pile, where adding one
bead at a time causes many small, and a few large, avalanches. The size distribution of
avalanches was consistent with the predictions of Self-Organized Criticality. In particular,
the number of avalanches of a given size was proportional to the size of the avalanche to
the power -1.97 ± 0.09, which is close to the mean-field prediction of -1.40 ± 0.03. This
result was independent of the size or shape of the base of the pile. We were also able to
determine the power slope density, which varied a power-law with slope -1.80 ± 0.04, that
was also independent of base size and shape. The research was conducted at The
College of Wooster with support from NSF-REU grant DMR 9619402.

Board 38 COMPARATIVE ONTOGENY OF AGONISTIC BEHAVIOR AND AMINERGIC
NEUROCHEMISTRY IN THE CRAYFISH. Angelica J. Pytel, Bowling Green State University, J.P. Scott Center for Neuroscience, Mind and Behavior
and Department of Biological Sciences, Bowling Green, OH 43403. apytel@bgsu.edu
The resolution of intra-specific conflict has received much attention in adult crayfish due to
consciousness and potentially lethal weaponry. However, surprisingly little is known about
the occurrence of these behaviors during development. This study examines the fighting
behavior of early juvenile stages and explores whether the emergence of different
behavioral acts coincides with ontogenetic changes in amine neurochemistry. After
hatching, larval crayfish remain attached to the eyestalks and change their coloration to
the adult stage. Behavioral development was monitored with ventral side macro-video recordings of
unrestained, gravid females. The first two larval stages featured only rudimentary claws,
and therefore, were not formed randomly in time and that the use of chaotic methods for the study of these
plasmas leads to a better understanding of plasma bursts in general.

Board 01 DOES THE LOCATION OF WATER SAMPLE COLLECTION IN A DENTAL
CAST GRINDER AFFECT THE QUANTITY OF COLONY FORMING UNITS OF HET-
EROPTROPHIC MESOPHILIC BACTERIA? Erin F. Schlegel, 1996 Alwood Terrace, Coshocton OH 43812, eschlegel@coshocton.com (Coshocton High School).
The objective of this study was to examine the impact water source collection (in a single
dental appliance) had on the resulting growth of microorganisms. Different points of
distribution in old and new cast grinders were tested. It was predicted that decreasing
inoculation density (as evidenced by this experiment, the majority of dental contamination may be due to
thermophiles. In addition, the possibility of horizontal gene transfer and the option of
organisms adapting to their environments to suit their needs makes us more aware of the
possibility of infectious disease transmission than ever before.

Board 02 WILL ONE DRUG KILL ALL THE BUGS? Alex D. Hollanshead, 13645 County Hwy 108, Upper Sandusky OH 43351, carolhe@u2data.com (Upper Sandusky
High School).
This experiment was designed to determine the effect of different physical characteristics upon the perception of single image stereograms (two-dimensional images which,
when viewed correctly, appear three-dimensional). Research was also performed to see if there are antibiotics on the market that can inhibit multiple strains of bacteria using only one antibiotic. In order to verify our
theorbits proved to be specific for one or two specific bacteria. Six of the antibiotics were
used in this experiment included Ampicillin, Bactrim/Septra, Cephalothin, Ciprofloxacin,
Sulfamethoxazole and Trimethoprim. The five types of bacteria included three gram negative bacilli: Escherichia coli, Proteus mirabilis, and Pseudomonas aeruginosa
and two gram positive cocci: Staphylococcus aureus and Enterococcus faecalis. The Kirby - Bauer sensitivity method was used to obtain sensitivity patterns that
were compared to standards in order to determine which antibiotics were effective against each
bacteria. After performing five trials to verify my results, I concluded that three of the
antibiotics proved to be specific for one or two specific bacteria. Six of the antibiotics
were ineffective against a wider range of bacteria. Trovafloxacin, Ofloxacin, and Ciprofloxacin
were ineffective against all of the bacterial strains tested. These results supported the
original hypothesis. Some antibiotics are effective against multiple strains of bacteria.
One drug may kill many bugs.

Board 03 THE EFFECT OF DIFFERENT PHYSICAL CHARACTERISTICS ON SINGLE
IMAGE STEREORGAMS. William R. Forister, 2431 Merbrook Rd, Worthington OH 43235, forister@gateway.net (Perry Middle School).
The purpose of this experiment was to determine the effect of different physical characteristics
involved. The purpose of this experiment was to see if there are antibiotics on the market
that can inhibit multiple strains of bacteria using only one antibiotic. In order to verify my
hypothesis that some antibiotics are very specific and effective only for certain types of
bacteria while others are broad spectrum and can treat multiple bacteria, five different
strains of bacteria were challenged with nine different antibiotics. The antibiotics used in
this experiment included Ampicillin, Bactrim/Septra, Cefalothin, Ciprofloxacin, Erthromycin,
Ofloxacin, Penicillin, Trovafloxacin, and Vancomycin. The five types of bacteria included
gram negative bacteria: Escherichia coli, Proteus mirabilis, and Pseudomonas aeruginosa.
and two gram positive cocci: Staphylococcus aureus and Enterococcus faecalis. The Kirby - Bauer sensitivity method was used to obtain sensitivity patterns that
were compared to standards in order to determine which antibiotics were effective against each
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One drug may kill many bugs.

Posters Session
PRE-COLLEGE STUDENTS
1:30-3:00 PM
Meyer Hall
form the middle core. A total of 42 chordae from porcine mitral valves were classified by basal (7). Tissues were weighed, their dimensions measured; they were mechanically biomechanical analysis of rupture in diseased mitral valve chordae tendineae. It was preventing backwash. Rupture of mitral valve chordae tendineae causes mitral valve dysfunction. The heart’s mitral valve governs unidirectional blood flow from left atrium to ventricle (Hathaway Brown School).

Chicken is a food that many people eat almost weekly. But if not properly prepared, chicken could be harmful. This research project looked at the bacteria that grows on chicken to see how contaminated the chicken is that people eat. It was hypothesized that when ground chicken (including cooked chicken) is left out on the counter for different periods of time, the chicken that has been left out on the counter for the longest amount of time will have the most bacterial growth. Ground chicken was placed on the kitchen counter for different time periods, then sampled using petri plates as a controlled way of testing the chicken for bacterial content. Two trials were produced. Bacteria were cultured on agar in petri dishes and incubated for 48 hours. Colonies were then counted. The data indicate that both TNF-α and IL-1α increase the adherence of Spn to the respiratory epithelium of this tubal organ. Next specific anti-cytokine antibodies were used in a neutralization study to determine if the increased adherence could be decreased. The data supports a significant decrease from the antibodies. Increased adherence by cytokines treatment may contribute to the pathogenesis Spn as seen in otitis media and other upper respiratory tract diseases.

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The hypotheses.

The effect of wind and touch treatments on Arabidopsis plants was observed. Hypotheses offered were: 1) Plants exposed to 12 hours of wind a day will be shorter than 1 hour exposures and ten minute exposures. 2) Plants exposed to 10 minutes of touch will be shorter then plants exposed to 5 minutes and no wind/no touch (control) a day. On average exposures and ten minute exposures.

The effect of wind and touch treatments on Arabidopsis plants was observed. Hypotheses offered were: 1) Plants exposed to 12 hours of wind a day will be shorter than 1 hour exposures and ten minute exposures. 2) Plants exposed to 10 minutes of touch will be shorter then plants exposed to 5 minutes and no wind/no touch (control) a day. On average exposures and ten minute exposures.
calculations, a manual traffic count was performed between the hours of 6:15 a.m. and 8:15 p.m. on a Tuesday in early December, in order to ascertain the peak hour characteristics of the individual movements in the traffic flow. Next, using highway capacity software, the level of service was calculated with a grade of 'A thru F', based on the average vehicular delay in seconds. During morning peak, for an average weekday, the overall efficiency of the intersection was a C, but during both afternoon and evening peak periods, the intersection operated at level of service F, an unacceptable grade. Next, adjustments were proposed for cycle lengths, phasing, and geometric configurations of the intersection. The morning hours again remained as the most critical, with the need for some alterations to prevent high levels of service was brought up to a C grade with less delay, and in the evening, the intersection was optimized to a grade of B, with less delay. Overall, the hypothesis was supported. The existing intersection configuration was quite inefficient and potential improvements could be identified with the assistance of the computer software. In conclusion, if these improvements were implemented, congestion and accompanying driver frustration would be decreased, optimizing intersection efficiency.

Board 18 THE EFFECTS OF GIBBERELLIC ACID ON WISCONSIN FAST PLANTS BASIC'S AND ROSSETTE'S PEROXIDASE ACTIVITY. Marianne K Tortonelli, 2199 Barrington Rd, University Heights OH 44118. Chautauqua@worldnet.att.net (Beau-mont School)
Wisconsin Fast Plants are specially engineered plants that complete their life cycle in approximately 35 days. Gibberellic acid is a growth hormone that has a very large regulatory role in the plant's growth. Although the acid is found to be mostly helpful, it has been found to be harmful by decreasing the peroxidase activity, otherwise known as the plant's defense system. It was hypothesized that gibberellic acid will destroy peroxidase activity at a greater rate in the Basics (Brassica rapa) compared to the Rossette plants. The experiment included the controls: distilled water and a constant source of fluorescent light. After two weeks of growth, gibberellic acid was applied using one spray (per quart). This was done daily for one week. After the week, they were left alone for one week. Following that they were taken to a lab, where they were analyzed. The peroxidase activity was analyzed by dot blots, which are constructed by using liquid plant extracts, nitrocellulose membrane, and four different standards. This established loss of peroxidase activity in the Basic (Brassica rapa) plants, but no loss of peroxidase activity in the Rossette plants. A gel test was performed by inserting the liquid plant extracts and the four different standards into an agarose gel to isolate the peroxidase isoenzymes. The plant extracts migrated through the gel depending upon the amount of peroxidase enzymes present. In conclusion my hypothesis was supported. The Wisconsin Fast Plants Basics' (Brassica rapa) peroxidase activity was destroyed at a greater rate than the Rossette's due to the applied gibberellic acid.

Board 19 PUCK PLACEMENT AND STICK PATH EFFECT ON THE VELOCITY OF A HOCKEY SLAP SHOT. William C. Musat, 3516 Darlington NW, Canton OH 44708. Rider556@msn.com (Pleasant View Middle School)
The slap shot is hockey's most dramatic shot. Although the slap shot lacks accuracy it is used in many game situations because of its ability to create high puck velocities. The high puck velocity comes from both the long-rapid swing of the stick, and the bending of the stick which "snaps" to give the puck additional speed. Developing a good slap shot technique requires a player to find a method for using the flex of the stick to increase the velocity of the puck. This investigation examines the best stick path and puck location for the author's slap shot. The assumption considerably different from the authors' is that the authors' stick may be considered a second-order system. Using this machine the axis of rotation, speed, force, and stick grip were held constant during a series of over fifty tests, where as puck location and swing paths were varied. Puck velocities were measured using a radar gun. It was hypothesized that the greatest puck velocity would result from locating the puck several inches in front of the axis of rotation and striking the ground just before the puck. Results with the test machine showed that the greatest velocity results when the puck is located directly under the axis of rotation and the ground is struck 16.5 cm. before the puck. Applying these findings to the authors' play produced mixed results. Application of the recommended puck position proved to be of no help but use of the recommendation for stick path gave a fifteen-percent increase in puck velocity to 21 m/s.

Board 20 IDENTIFYING COLLOIDS. Derek R. Free, 312 Emerald Ln, Chillicothe OH 45651. tyress@eht.net (Paint Valley Junior High School)
A colloid is a substance consisting of tiny dispersed, particles uniformly dispersed through a second substance forming a solution. A colloid can take the form of a solid, liquid, or gas. A flashlight was used to shine through a small circular opening cut into a 9x9" box containing three quart jars filled with plain tap water. One teaspoon of salt was added to one jar of water, and one dropper of milk was added to the other. The third jar was left with plain tap water. With the light shining into the darkened box, the colloid particles could be seen with the naked eye suspended in the water containing the milk. The salt water was cloudy first, but after settling it was clear. The particles were used to measure the density of particles within a solution. The milk solution was replaced with the second percent milk because the spectrophotometer could not detect the small amount of colloids with one dropper per quart. The tap water was placed in a test tube and put into the spectrophotometer at 100 percent transmittance to provide a starting point. Second, the salt water was measured and provided a reading of only 58 percent transmittance. For reliability, this test was conducted five times with identical results. The results showed that milk is a colloid containing solution, and water and saltwater are not. The experiment successfully identified colloids.

Board 21 EFFECTS OF "PLUS 100%" IN RELATION TO FUEL LINE FREEZE UP IN JET FUEL (JP8). Thomas G. Howell, 8653 Taylorsville Rd; Huber Heights OH 45424. howell@ao.com (Wayne High School)
Military jet fuel is not acceptable when it is cloudy because the cloudiness indicates the presence of water suspended in the fuel and fuel line freeze ups can occur. Another problem that can occur involves masses of fuel, water, and ice inhibitor agglomerating in the fuel tanks to form two phases. The bottom layer of the fuel, when it is cloudy, is similar in texture to apple jelly. This "Apple Jelly" clogs the fuel connectors on delivery trucks which then stops fuel flow to the airplanes other than filtering it out. Since this "Apple Jelly" contains most of the icing inhibitor, there is little remaining in the fuel transferred to the jet. The purpose of this study is to examine the effect of "plus 100%" on the efficiency of JP8 jet fuel. It was hypothesized that the JP8 plus 100% would not create additional water in the fuel and the range of temperatures for the creation of two phases ("Apple Jelly") in the delivery trucks would be high enough that it would only occur during extremely hot weather. The first stage of this study investigated the amounts of water created in JP8 jet fuel compared to the amounts of water created in the JP8 plus 100% fuel by adding a varying amount of each fuel and running them through a scaled down model of a fuel system. The fuel filter was replace with a dye pad to measure the amount of water created in the fuel. The dye pad was then put in an Aqua Glow machine to measure the amounts of water in parts per million (ppm). The results show support the first portion of the hypothesis by indicating that the JP8 plus 100% fuel actually created less water than the JP8 fuel with the "plus 100%" additive. The additive contains the icing inhibitor 2-Butoxyethanol that does not mix well with water, and can vary the chemical composition of the fuel. The second stage of this study incorporated a phase diagram to illustrate when the two phases could occur with 2-Butoxyethanol in the additive. This was done by mixing different percents of 2-Butoxyethanol and water together and heating the mixture until it became cloudy. The temperature was measured and entered on a phase diagram. The results support the second portion of the hypothesis in that the range of temperatures in which the "Apple Jelly" could occur is high, specifically, between 45 and 125 degrees Celsius.

Board 22 TESTING THREE METHODS OF OIL SPILL CLEANUP. Dylan T. Jesse, 5481 Woodland PI, Canton OH 44406. dijasse@gateway.net (Canton Middle School)
The objectives of this experiment were to compare three different methods for cleaning up aquatic oil spills and to determine which is the most effective. The method of absorption was expected to be the most effective. Equal amounts of used motor oil were added to three similar containers holding 100 cc of water. The first method involved absorption by the addition of a common liquid household detergent, [Dawn], to the stick. The second method involved digestion by the addition of an enzymatic sope sink treatment mixture, [Dy-X]. The third method involved absorption by placing a crushed clay compound, [Oil Dr], into a mesh container suspended into the stick. Visual observations discovered dispersion caused no elimination of the oil from the water's surface, rather, it lowered the surface tension on the water forcing the oil to the perimeter of the container. The addition of the digestive compound caused clumping and sinking of the oil, leaving less surface pollutants. Absorption by dry crushed clay resulted in complete removal of the slick from the water's surface. The method of absorption of an aquatic oil spill using dry crushed clay was the most effective form of cleanup.

Board 23 W.O.W.-WATERSPOUTS ON WATER. David C. Kamm, 602 Cook Rd, New London OH 44851. dolly@acrosswall.com (New London Jr. High School)
Waterspouts form when cold and warm air meet over large bodies of water. Two waterspouts were seen on Lake Erie in July 1998. The objective of this project is to determine how the temperature affects waterspouts. The hypothesis is waterspouts will be stronger formations over hot air. A gallon milk jug was used by slipping the bottom to create airwaves directed at a lighted candle. The air inside was heated with a hair dryer and the experiment repeated. The observation was that the hot air was twice as powerful and one and two feet away from the canister. At 3 feet, the air was 3 times more powerful than the cold air rings. Next, I used water in a test tube with a stopper and glass straw in the middle. I inverted it into a glass with water. I heated the test tube water for different times. The data revealed when 1/2 minute was added to a minutes heating, the amount of water pushed was just over 1 and 1/4 times greater. When the heating time was doubled, almost 4 1/2 times more water was pushed up into the tube at 97% faster. Results show heat added 3 times more air pressure and 4 1/2 times more pushing power in my experiments. The power behind the water that exploded into the test tube I was holding gave me an idea of what happens in waterspouts. The hotter the air becomes, the stronger the power of waterspouts.

Board 24 A COMPARATIVE STUDY OF THREE BRANDS OF MASTITIS PREVENTION PRODUCTS. Joshua M. Penhorwood, 27900 Newton Perkins Rd, West Mansfield OH 43335, PwoodQ2@yahoo.com (Benjamin Logan High School)
Mastitis cost the United States dairy dollars of $2 to $4 billion dollars annually each year, which is why it is critical to have an effective mastitis management program. The purpose of this project was to determine which of the three brands of mastitis prevention products (Bio-Dry, Dry-Clox and Quartermaster) most effectively prevents mastitis. Dry-Clox was expected to work the best. Somatic cell counts of each bovine were taken by a certified milk tester and recorded. Selected bovines at the end of their lactation were brought into the milking parlor and each bovines identification number was recorded. A total of 70 bovines were dried off over a seven month period. All bovines were milked as normal being sure to take out all milk. Each teat was then cleaned with an alcoholic pad. The contents of the prepacked syringe containing Bio-Dry, Dry-Clox or Quartermaster was injected into
each quarter. The test dictated was then selected and the test pass leant by dipping each leaf into a cup filled with water. 70 bovine were treated and 54 bovine were freshened, and began lactation the following days after freshening them. After bovines began lactation, the water content was taken by the certified milk tester and recorded. This was done throughout the bovines’ entire lactation. Recorded somatic cell counts of 70 bovine were before and off and 54 after freshening. 17 bovine were treated with bio, 45 treated with dry, and 8 treated with Quadrastat. The somatic cell counts of bovine were then looked at for the first three months of the following lactation for a somatic cell count that indicated mastitis (a somatic cell count over 750,000 indicated mastitis). Results show Bio-Dry with a 23% rate of mastitis among the bovine it was used to treat, Dry-Clox with a 21% rate of mastitis and Quadrastat with a 12.5% rate of mastitis, indicating that Quadrastat was the best treatment.

Board 26 THE RELATIONSHIP OF FILM SPEED AND SHUTTER SPEED IN CAMERAS. Katrina A. Nicholl, 315 S Detroit St, Bellefontaine, OH 43311-1744. soccerjocks6@hotmail.com (Bellefontaine High School)

Poster Session Pre-College Students 3:00-4:30 PM MEYER HALL

Board 01 WHAT SUBSTRATE IS THE BEST FOR GROWING OYSTER MUSHROOMS AT HOME? Sanjana Sundararajan, 8500 Copperdevil Dr, Dublin OH 43016. Pointyheel@hotmail.com (Learning Unlimited Village Academy)

Home cultivation of the Oyster Mushroom (Pleurotus ostreatus), a popular edible mushroom, has gained popularity. There isn’t much information regarding the best substrate for cultivation of Oyster Mushrooms at home. The purpose of this experiment was to find out the best substrate for growing Oyster Mushrooms at home. This was done by measuring the number, weight, and time of germination of Oyster Mushrooms in four substrates; coffee grounds, peat moss, shredded paper, and mushroom spawn. The hypothesis stated that the coffee grounds, because of their organic content, and mushroom spawn, because of the already grown mycelium in it, would be the best substrates. 150 grams of each substrate were inoculated with 150 grams of mushroom spawn. The experiment was done in duplicates. The substrates were put into pans and covered with a hoked plastic sheet to maintain humidity. The pans were placed in random order so surroundings would not have any effect on growth. Substrates were sprayed everyday at the same time with 1/8 of a cup of water. Number, weight, and time of germination of mushrooms in each treatment was recorded. The hypothesis was partially supported. Mushroom spawn produced the most and biggest mushrooms in the shortest time. Coffee grounds grew no mushrooms. Mushroom spawn, shredded paper, and peat moss grew 2 mushrooms each. They weighed an average of 20g, 20g, and 10g respectively. Time taken to grow was an average of 14, 25, and 25 days respectively.

Board 02 CATEGORIZING PREFERRED BARN OWL HABITAT IN OHIO. Jacob M. Gray, 13466 Charleston Pike, Kingston OH 45644. (Zone Trace Local Schools)

Barn owls, Tyto alba, are an endangered species in Ohio. Although their numbers have been increasing, in recent years, there are only a few areas in Ohio where they nest. In 1998 barn owl nests were found in only 17 of Ohio’s 88 counties. This research proposed to determine why certain areas in Ohio are preferred by barn owls by examining the habitat through the use of agricultural reports, soil maps, Geographic Information System information and other similar published information. When information on current agricultural use and existing habitat was combined, 23 of Ohio’s 147 counties were observed to most likely have nesting barn owls. In Ohio, 12 of the 17 glacial boundary counties had nesting barn owls in 1998. By reviewing the amount of Conservation Reserve Program (CRP) acreage, hay acreage and pasture acreage it was found that glacial counties with more CRP, pasture and hay were more likely to have nesting barn owls than counties away from the boundary. Meadow voles are primary prey of barn owls in Ohio, and meadow voles depend upon grassland and wet meadow habitat. In 1998 no cow barns were found in northern one-fourth of Ohio, and 33% of all known nests were in the southern one-half of the state. The index was used to rate and characterize habitat. It was found that most of the counties in Ohio where barn owls currently nest rank high in CRP, pasture and hay acres. Also these counties have relatively high amounts of glacial related soils, well meadows and shallow wetlands. A county on the glacial boundary was far more likely to have nesting barn owls than counties in the glaciated or unglaciated regions of Ohio.

Board 03 THE MAJOR AMPULLETE GOLDEN DRAGLINE SILK AND THE HYPOTH- ESIZED MAJOR AMPULLETE SILVER DRAGLINE SILK OF NEPHILA CLAVIPES. Lisa M. Siciliano, 16001 Rowena Ave, Maple Heights OH 44137. LSicil8439@aol.com (Beaumont High School)

This experiment examined silk from Nepheia clavipes, comparing major ampullete golden dragline silk and major ampulatte hypothesized silver dragline silk for superior properties of strength, resistance to acids and elongation. Results showed that the golden dragline silk would prove to have superior properties for all the categories. Silk was obtained from Nepheia clavipes spiders and evaluated using x-ray diffraction, SEM (scanning electron microscope), acid reaction timed with an Olympus BX60 optical microscope, and for supercritical and elongation. Using x-ray diffraction it was discovered that the golden dragline silk has more crystaline regions (alumine beta pleated sheets). Silver silk is almost as strong with only about 10-15% less crystaline regions than the golden silk. Since the golden dragline has more crystaline regions, it would be expected to have superior mechanical properties in regards to the strength of the silk. Examining the results of the
SEM project, I have again proven that golden dragline silk is stronger. The silver silk, under 8000x magnification had rougher edges and was not as smooth as the gold silk. The electrons from the microscope tended to shrink the diameter of the silks. The silver silk, when exposed to the electrons, became damaged very quickly in 1-2 minutes. The gold silk was less affected by the electron beam. It shrank in diameter because of electrons, but it took about 4-5 minutes for any significant damage to occur at 8000x magnification. The silver silk was 3.5 m and the gold silk was 5 m under the same magnification. The gold silk was commonly found paired with another strand of gold silk. The silver silk was only found as single strands. The silver silk is expected to have superior elongation properties because it has fewer crystalline areas. To test this hypothesis, the silks were exposed to HCl and H$_2$SO. Using an optical microscope, I could not see the molecular changes, but I could observe that the silks were both dissolved by the acids, forming liquid drops after their dissolutions. I really saw no difference between the two silks when exposed to the acids. Lastly, the supercontraction and swelling phenomenon was observed for both silks when immersed in distilled water. Dragline silk, is the only silk which has been reported to supercontract to 50% its original length and swell when immersed in distilled water. The silver silk contracted about 5% more than the gold silk as shown by the x-rays. This is due to the fact that water is attracted to the amorphous regions first. It was concluded that the golden silk has the property of superior strength, the silver silk has the property of superior elongation, and both silks have the same resistance to acids.

Board 04 COMPARISON OF DIFFERENT METHODS OF ISOLATION OF GENOMIC DNA FROM MOUSE TAILS. Eric S. Steichen, 2735 Baker Place, Cincinnati OH 45206.

When choosing a method to isolate genomic DNA from tissue, cost, efficiency, time, ease, and the purity and yield of DNA should be considered. One of the goals of this study is to compare the total yield and purity of DNA isolated using the Potassium Acetate (after tail lysed, KAc precipitates DNA pellet, washed, then resuspended), spooling (after tail lysed, precipitating DNA bound to sealed capillary tube, washed, then resuspended), and QIAmp method (after tail lysed, DNA bound to filter in spin column, washed, then eluted) methods for extracting DNA from mouse tails. It was hypothesized that the KAc method would produce the highest yield, and that the QIAmp method would produce the highest purity, while the spooling method is outstanding in neither facet. Twelve prepared mouse tails from six-week-old mice were sliced into 100mg segments for genomic DNA isolation. Each method was used on four tail segments. The optical density of a dilution of each of the twelve samples was read in duplicate. The DNA purity was calculated, and the average final concentrations were determined for total yield calculation. Electrophoresis was done on 1% agarose gel with 1μg DNA samples. Stainview was used for statistical analysis. There is no statistically significant difference in DNA purity among KAc, Spooling, or QIAmp Kit methods (P>0.05). The KAc and spooling methods produce significantly higher yields than the QIAmp Kit method (KAc vs. QIAmp Kit: P=0.0173, Spooling vs. QIAmp Kit: P=0.0030). There is no statistically significant difference in total DNA yield between the KAc and Spooling methods. All three methods produce DNA with comparable minimal degradation. When purity must be maximized in DNA isolation, any of the methods are appropriate. When yield must be maximized, either the KAc or spooling methods are preferable.

Board 05 DAIRY COW'S RUMINATION IN RESPONSE TO LEVELS OF FIBER INTAKE AND TYPES OF CORN HYBRID. Dorothy E. Wu, 3945 Lytham Court, Upper Arlington OH 43220-4848. ladie55@aol.com (Upper Arlington High School)

Good rumen function is necessary for dairy cows in order to obtain maximum milk production. Enough eating/ruminating activity, which is stimulated by the Gill, is necessary for proper rumen function. The amount of dietary fiber and type of corn hybrid differing in digestibility has been utilized. The products of this PCR amplification showed approximately 900 base pairs in size, which corresponds to the expected size of the DNA samples. Statview was used for statistical analysis. There is no statistically significant difference in total DNA yield between the KAc and Spooling methods. All three methods produce DNA with comparable minimal degradation. When purity must be maximized in DNA isolation, any of the methods are appropriate. When yield must be maximized, either the KAc or spooling methods are preferable.

Board 06 TISSUE CULTURE OF ASTROPLANT EMBRYOS AND TISSUE. Suzie M. Detrick, P.O. Box 116, West Mansfield OH, 43358. bossa@bright.net (Benjamin Logan High School)

Are the suspensors of the embryos (cells that connect the embryo to the ovule) of astrobotanicals influential in the development of the embryo? This question is being addressed by examining astrobotanical embryos (a variety of Brassica rapa with a short life cycle of 25-60 days) and ovules in tissue culture. A Scientific Laminar Flow Workstation model #1839 by examining astroplant embryos (a variety of Detrick, P.O. Box 116, West Mansfield OH, 43358. boss@bright.net (Benjamin Logan Board 06 TISSUE CULTURE OF ASTROPLANT EMBRYOS AND TISSUE. Suzie M.

Tissue samples of the embryos were successfully isolated from the heart stage, but there was an absence of growth, as there was no growth of the ovule after 30 days. About 60% of the full ovules grew, and all of them were transferred from liquid to solid. Thirty percent of the ovules grew to the stage of producing flowers, although the number range of flowers, in the embryos and ovules, was higher than three flowers. Growing the embryos both in a sterile environment had a range of 3-5 flowers or an average of five flowers. The number of flowers produced in a non-sterile environment had a range of 6-11 flowers or an average of seven flowers. This work will be continued until the procedures are adequate for culturing the embryos from the globular stage.

Board 07 ROAD GRIME: A PLATINUM MINE? PHASE 2. Erin E. Sauer, 5185 Red Bird Ln, Highland OH 45011. deed.terrau.07@yahoo.com (Ohio State University High School)

Platinum is a slightly magnetic noble metal used extensively in industry. It plates the inside of automobile catalytic converters, and is tipped to chop off over time, and be taken out with the exhaust and expelled onto roads. The purpose of this project was to find an inexpensive method to test for platinum, and to determine if platinum was present on heavily traveled roads. A method to measure pressure change as platinum catalyzes the decomposition of hydrogen peroxide was developed. Road dust from an area of 15.8 square meters came from a spot on a street where possible catalytic converters were removed from a street. The metal catalyzed the decomposition of hydrogen peroxide using a CRL and pressure sensor. Later, strongly magnetic material was removed from the samples, they were heated to 818 degrees Celsius, and retested in duplicate using a refined procedure. Samples were then tested using ICP to determine presence of platinum and legitimacy of the initial testing. It was hypothesized that a road being used by more cars would result in more platinum being found on that road. The results from ICP testing show that samples taken from heavily traveled roads contain platinum in amounts ranging from 0.945 ppm to 0.864 ppm, which slightly correlates to the results given from pressure sensing tests.

Board 09 ISOLATION AND CHARACTERIZATION OF NITROGEN-FIXING BACTERIA. Tian Zhang, 1547 Conneaut Ave, Bowling Green OH 43402. tianzhang@hotmail.com (Bowling Green High School)

Nitrogen fixation is of fundamental importance in the biosphere. In nature, this occurs via the biological nitrogen fixation reaction. A small but diverse group of diazotrophic microorganisms is able to fix atmospheric nitrogen. The main goal of this study is to characterize diazotrophic microorganisms from aquatic samples isolated from ponds around Bowling Green State University. Water samples from about 5mL were collected from different locations and kept in the refrigerator for 7 days before use. Nine single colonies, effective in N$_2$ fixation, were isolated on Burk's nitrogen-free agar plates. As an initial identification process, the morphology of these isolated microorganisms was then investigated using scanning electron microscopy. Because all N$_2$ fixing microorganisms have the enzyme system of nitrogenase encoded by the nifH gene, this DNA sequence has been examined. To do this, PCR amplification of corresponding DNA using highly conserved diazotrophic primers corresponding to the 5' Primer 1: GATATGATGACGGCAACTCGACCCATCG (3' (Primer 2: GGACCTCGAACCTCCGCGGCGGCTTCTGGTGGGCGCAGCTTGGG) ends of the nifH gene of Azotobacter vinelandii has been utilized. The products of this PCR amplification showed approximately 900 base pairs in size, which corresponds to the expected size of the nifH gene. These resulting segments are currently being subjected to partial sequence analysis (with the above-mentioned primers), to be used to identify the isolated diazotrophic microorganisms.

Board 10 THE EFFECTS OF CATTELLAR DAMAGE, ULTRAVIOLET LIGHT, AND MECHANICAL WOUNDING ON PHYTHORHORMONE-TREATED TOMATO PLANTS. Aaron L. Iverson, 2740 Buttermilk Hill Rd, Radnor OH 43066. iverson@bright.net (Buckeye Valley High School)

The effects of cadmium (Cd) and strontium (Sr) on the defensive (cadexadrine) pathway of tomato (Lycopersicon esculentum cv. Moskovich) grown with various stresses was studied. Seven phytochemical treatments on the growth of tomato were tested along with the chemical treatments of SA, JA, and the control. The physical treatments included a control, mechanical wounding with hamostat, caterpillar (Manduca sexta) damage, and four variations of ultraviolet light-C range treatment. Plant rating, height, and dry weight were used to quantify the results. For the caterpillar treatment, the caterpillar's mass and the number of times the caterpillars fell off the plant were recorded. Results with the UV and wounding treatments were compared with the results of SA and JA on the defensive pathway of the plant: additional research is needed to clarify these effects. In contrast, SA and JA induced a large variation of caterpillar damage on the plants. Exogenous JA apparently increased the defensive mechanisms of the plant as caterpillar damage was much less. JA, the end product of the defensive pathway, is the signal of a plant which stimulates a defensive response to a stress. In contrast, plants treated with SA had little resistance to the caterpillars. SA blocks the production of allene oxide synthase.
Board 11 KNOWLEDGE OF AGRICULTURE AND COMMUNICATIONS OF PETTISVILLE AND ARCHBOLD HIGH SCHOOL SENIORS AND AGRICULTURE EDUCATION STUDENTS. John J. Torres, 272 Main St, PO Box 54, Pettisville OH 43553. torres@gateway.net (Pettisville High School)

The actions of communicating the research and the benefits of the agricultural industry is important to the world due to the large influence the industry has on our global economy and societies. Therefore, it is extremely important for youth to fully understand the structure of this great industry. Students at Pettisville and Archbold High Schools in Fulton County Ohio were surveyed concerning their knowledge on agricultural communications. It was hypothesized that 50% or more of students enrolled in agricultural education would know the fundamentals in the areas of communications and agriculture, and less than 50% of seniors not enrolled in Agriculture Education would understand the fundamentals of communications and agriculture. A set of surveys was administered to a combined total of 97 students in agriculture classes and 55 seniors at both schools. There were two different surveys administered to seniors and Ag Ed students. Those involved in both educational studies were recorded once. Students responded to questions asked and listed and ranked items on a written survey. Answers were compared to an accepted set of responses that clearly revealed the student's knowledge of the material reviewed. The results are as follows: Ag Ed: Pettisville 66.5% knowledge retained, Archbold 58.9%, Seniors: Pettisville 74.7%, Archbold 59%. Comparisons made using both surveys from all Ag Ed students and seniors combined: Pettisville 71.5%, Archbold 63%. The results indicated that the majority of those tested were knowledgeable for a life dealing with the constant global economic thread with the Agricultural Industry.

Board 12 A COMPARISON OF LONG AND SHORT-TERM MEMORY IN SENIOR CITIZENS AND HIGH SCHOOL STUDENTS. Kathryn A. Lawton, 2745 Wickliffe Rd, Columbus OH 43221. Lawtoark@aol.com (Upper Arlington High School)

The popular myth that the memory of a senior citizen will significantly and automatically deteriorate with age is questionable. There are many senior citizens, such as John Glenn, who are still achieving tasks most younger people may never accomplish. This memory myth was tested using thirty-five high school students and thirty senior citizens to determine which group had a better short-term and long-term memory. It was hypothesized that high school subjects would have a significantly higher short-term and long-term average memory score than senior citizens. Each subject was asked to memorize factual information presented to him or her. They were then tested and asked to answer a questionnaire about other factors that may have influenced their score. This procedure tested short-term memory. Re-administering the same test one week later tested long-term memory. T-test results showed that there were no statistically significant differences between the average short-term and long-term memory scores of high school students and senior citizens. The t-test scores of 0.91 and 0.52, respectively, showed the short-term memory and long-term memory results were not significantly different. Other factors that may have affected these results were examined. Results from a Pearson Correlation analysis showed in some cases that blood pressure, stress, and education might have affected the average long-term memory score for senior citizens.

Board 13 THE EFFECTS OF NOISE ON THE OXYGEN CONSUMPTION OF HAMSTERS. Kristin E. Holler, 1245 N. Washington St, Delphos OH 45833. lizzybeth.k@hotmail.com (Delphos Jefferson High School)

It is proposed that noise pollution is a cause of stress, with the volume of sound and rate at which sounds are heard affecting the metabolism. A direct link between oxygen consumption and metabolism allows the measure of one to suggest the state of the other. The goal of this project is to establish that sounds stimulate the body. Six hamsters (Mesocricetus auratus) were used. Three were control, three were experimental. One hamster was placed in a sealed container and the amount of oxygen consumed estimated, based on the amount of carbon dioxide absorbed by sods lime that was also in the container. Effects of the rate at which sound pulsed and its decibel level, were examined in nineteen trials conducted on each of the six hamsters over a period of twenty-seven days. It hypothesized that rapid and loud sound increases metabolic rate and softly muted sounds reduce the metabolic rate. Data collected in the trials showed that an increase in both the rates at which sound is pulsing and its decibel level resulted in an increase in the metabolism of the test subject. Conversely, a lower sound level pulsed at a slower rate, could lower the metabolic rate. Proper uses of sound may modify the metabolism to provide physical benefits due to reduced stress.

Board 14 THE EFFECTS OF WATER TEMPERATURE ON TAGETES ERECTA (AFRICAN MARIGOLDS). Elias J. Saliba, 6131 Country Dr, Huber Heights OH 45424. USAAmericanHighSchool.com (Carroll High School)

In a previous experiment it was shown that colder water significantly improves the growth of Antirrhinum majus (Snapdragons). Snapdragons evolved in the Appalachian and Rocky Mountain foothills. African Marigolds evolved in the Mexican tropics. This experiment tested if water temperature would have the same effect on tropical and mountainous plants. The original hypothesis stated that the water temperature of a plant's native climate would improve the growth of that plant. There were four groups of forty-nine plants each. Group A received 5°C water, Group B 20°C, Group C 30°C, and Group D 50°C. The test ran four months. Group C was the tallest group, followed by D. Groups B and C had the most plants live. A was slightly behind them, and D was last. The results in both groups, showed that the same number of flowers, but less flowering than the other groups. The widths of the flowers were equal. Groups A and D had the thickest flowers. These results show that water temperature does not have a big effect on Marigolds as it does on Snapdragons. This is because Snapdragons are more sensitive to their environment. Another factor is that Snapdragons may absorb water faster than Marigolds. This causes the water temperatures to be closer to room temperature when Marigolds absorb the water. A third cause is the environmental factor that triggers the growth hormones, known as auxins. Water temperature is a factor that triggers the growth hormones, so water temperature will only have minor effects.

Board 15 COOL COMPOSTING™: THE NATURAL FERTILIZER. Aaron M. Didich, 1312 Turner Rd, Bellefontaine OH 43313. ak@logan.net (Bellefontaine High School)

In our ever-changing world there has always been the need for a quick, easy and environmentally safe medium for plant growth. Urban household table scraps such as fruits, vegetables, eggshells, and coffee grounds provides a quick and inexpensive way to make and use compost. The ultimate goal of this project is to encourage the recycling of non-meat household table scraps in order to produce healthier and more prosperous plants not only with household gardens but also with urban farmers across the US as well. This method of composting is what I call Cool Composting. A standard mixture of non-meat household table scraps was blended in a Vita Mix blender with 1200cc water which produced 1520cc composting mixture. All of the plants were grown under the same conditions and treated separately with two different fertilizers, Miracle Gro and Cool Composting along with a control group for each. The initial data shows that the fertilizer treatment has been observed to possibly open a dormant metabolic pathway. This was observed using Chromatography that was conducted at the University of Illinois, Chicago. The plants treated with Cool Composting produced more beans per plant, possessed a more developed root system, and upon testing plant samples, the Cool Composting plants had a greater diversity of metabolites than were treated with Miracle Gro or the Control. Further studies will need to be conducted to identify these specific metabolic pathways and compounds that make the Cool Composting plant a major competitor with other types of composting and household fertilizers. Also, it is estimated that the cool composting process would eliminate 5,400 tons/year of household scraps or 27% of the food waste from the landfills. This project is based on per household statistics and Chenseev Landfill statistics of Logan County.

Board 16 AN ALTERNATIVE USE FOR TOBACCO...IN SEARCH OF CORROSION INHIBITORS. Stephanie M. Gleason, 5708 S. Pitchin Rd, Springfield OH 45502. rgleason@erinets.com (Southeastern High School)

Previous research showed that a compound in tobacco inhibits corrosion of steel. Identification of such a compound could be commercially significant since many additives to paints and coatings are toxic to the environment. Earlier studies showed that when steel and water were combined, rust was visible on the steel and oxygen was consumed in the process. However, when steel and tobacco extract was combined, no rust was visible on the steel, but surprisingly more oxygen was consumed and the color of the solution turned dark brown. The purpose of this study is to identify a possible corrosion inhibitor in tobacco extract by using spectrophotometric methods. Shavings (each about 4.0 mm surface area) were cut from a cold-roll steel rod (no coating oil). Tobacco extract was prepared using ungrounded, dried tobacco leaves. Tobacco leaves were combined with 50.0 ml of distilled water, and filtered before use. The four test solutions (300 mL each) consisted of water, steel plus water, tobacco extract, and steel plus tobacco extract. Dissolved oxygen (DO) was measured using a DO meter and probe (electrode method). To identify a corrosion-inhibiting compound, absorbance spectra of test solutions were compared from 190 to 820 nm using a diode array spectrophotometer (minimum of two trials each). Results suggest that a compound reacts at the solution/steel interface. The compound has an absorbance maximum in the 250 to 265 nm range, suggesting a cyclic structure. This is consistent with previous work concludng that a pyridine-like compound, possibly nicotine, may be the inhibitor.

Board 17 COMPARING THE DISSOLVING RATES OF NAME BRAND AND GENERIC PAIN RELIEVERS. Jennifer N. O'Valley, 585 Gamewell Dr, Miamisburg OH 45342. omalley@earthlink.net

This study was designed to help consumers gather some facts about pain relievers by seeing whether name brand or generic pain relievers dissolved faster, and which liquid, water, milk, and then Pepsi would help to dissolve the pills at the quickest rate. The hypotheses were that all name brand pills would dissolve at the same rate, and that all the pills would have a faster dissolution rate in Pepsi because Pepsi contains phosphoric and citric acids. Pills of each brand were placed into a 50 ml beaker filled with milk, water, sodifled water, or Pepsi. They were stirred every twenty seconds for five minutes, and for ten minutes in another test. When this was completed, the contents of the beakers were poured and rinsed into coffee filters and weighed once dry. This was repeated until all the pills were tested, a total of 146 trials. The trials revealed that the name brand drugs, particularly Tylenol, dissolved the fastest, followed by Advil, Aleve, and their Walmart then Rite Aid generic brands. All of the pain relievers dissolved the quickest in acidified water, followed by water, milk, and then Pepsi. In conclusion, for those who seek fast pain relief, Tylenol taken with water, which will be mixed with hydrochloric acid in the stomach, is the way to go.
Gravity is the force that holds everything down. If gravity is altered, humans sense it and were run from each location. The model used was built from polyethylene tubing for the had only kept 18% of it’s total energy. The data was then used to find the kinetic energy at the points, and compare them. 5 trials detect the model coaster cars velocity as it passed by two locations on the coaster circuit. Pinewood Derby weights; piano wire, screws, and a TI-82 paired with a calculator based validated aeroponics as a viable alternative method of agriculture. The goal of this research is to investigate two alternative methods of agriculture: hydroponics, the growing of plants without soil in a nutrient solution; and aeroponics, the growing of plants in air, pulse-misting the roots with nutrient solution. The purpose of this experiment was to determine how the systems compare as alternative methods of agriculture. It was hypothesized that aeroponics would be a viable method of agriculture, both systems would have similar germination rates, and the aeroponic system would have faster growth rates. The approach was to construct a hydroponic system and an aeroponic system, each supporting fourteen chili pepper plants. Total nutrient content, chlorophyll content, height, biomass, and nutrient solution usage were compared between the systems. The hydroponic plants grew on average 22.3% taller and had an 8.9% higher average chlorophyll content than the aeroponic plants. The aeroponic system used 50% less nutrient solution, had a 31.6% higher average per plant biomass, and an 11.2% higher total biomass. The aeroponic plants had a much slower start compared to the hydroponic plants. Due to the design of the aeroponic system, the roots had difficulty growing down into the misting plenum. Both systems promoted the growth of healthy plants; however, the aeroponic plants were observed to exhibit an uneven distribution of chlorophyll based on leaf coloring. This is a characteristic symptom of manganese toxicity, further supported by testing that showed an increased level of manganese in the leaves. This experiment validated aeroponics as a viable alternative method of agriculture.

Do connecting rivers and streams have the same water characteristics? A comparison of the water quality of the Ohio River, Little Miami River and Clough Creek. Jill E. Neagle, 7195 Regiment Dr, Cincinnati OH 45244. paul.neagle@delta-air.com (Turpin High School)

The purpose of this experiment was to test popular herbs against antibiotics that have been in use for many years. Recently, antibiotics are starting to be resistant to bacteria. I wanted to see if the use of herbs could have the same antibacterial effect. Specifically, I chose Echinacea and garlic. Garlic was used in ancient times and reportedly helped the cardiovascular system. Echinacea is a wildflower that reportedly controls the symptoms of the cold and the flu. The antibiotics, Tetracycline and Penicillin, were chosen because they both kill bacteria. Tetracycline was produced from many different bacteria. Tetracycline can cure Lyme Disease, acne, and Chlamydia. The hypothesis was that antibiotics would work better than the herbal medicines. The materials used were Tetracy- dina, Penicillin, garlic, Echinacea, an incubator, nutrient agar, agar dishes, forceps, sterile swabs, and control disks. A sterile swab was rolled over my tongue and rubbed on the pretilled agar plates. Antibiotics and herbs were applied to disks that were placed on each agar plate. I also had one dish with bacteria, but without antibiotics or herbs. Labelled dishes were incubated for forty-eight hours at 30 degrees F. The results supported my hypothesis. Penicillin controlled the growth of bacteria best, garlic was more effective than Tetracycline, and Echinacea was the least effective at controlling the growth of bacteria.

How does light change into colored light? Jamie L. Janis, 3284 Meanderwood Dr, Canfield OH 44406. Tiffal b2c3@aol.com (Immaculate Heart of Mary)

The purpose of this experiment was to discover how white light changes into colored light. The goal was to develop an experiment that would successfully separate white light into different colors of light. Using a flashlight, a white cotton sheet, and a prism, I was able to separate the light of the flashlight into all seven colors of the visible spectrum by shining the flashlight through the prism and onto the sheet. I found the brightest color to be yellow. When shining a flashlight through one red and one violet piece of cellophane and onto the sheet, the only color to appear matched the cellophane’s color. This color was very dim. The flashlight was then shone onto colorful objects, and the light was directed through the different colored objects. The hypothesis was not supported. When testing the white light, I found that instead of the light changing when it bounced off of colored objects, the colored light appears when all colors are absorbed, except for the visible color which is reflected. White light changes into colored light when the light reflects. Red light reflects the least, violet the most. Yellow appears as the brightest color. I concluded that white light is composed of all the colors of the spectrum. These colors appear when white light is shone through a prism. If a specific color appears, it is because that color is reflected and all other colors are absorbed.
Board 25  BOILING POINTS OF WATER. Justin R. Rigling, 2895 Tolbert Rd, Hamilton OH 45011. Jjrigling@worldnet.att.net (St. Julie Billiart School)

It is hypothesized that the boiling point of water is inversely related to elevation. This was tested by boiling 8 ounces of water in a glass beaker at different locations. Vacuum was created that related to elevations varying from 0 feet to 37,000 feet of elevation. To simulate higher altitudes, pressures less than that found at sea level were created using an electric vacuum pump, a vacuum tank, and a vacuum gauge. A digital thermometer was used to record the temperature of the water. This showed the temperature at which the water boiled. A vacuum gauge monitored the vacuum in the jar. Three trials were run for each of several vacuum values. Vacuums of 0, 5, 10, 15, 18, 20 and 23.5 (in Hg) were created. The data for each trial was recorded in a spreadsheet. The boiling point for each different pressure was averaged. This data showed that changes in atmospheric pressure affect the boiling point of water. While conducting these experiments I found that there are other things that affect the heat required to keep the water at boiling point. For example, the temperature suddenly dropped when the water started evaporating. Due to the absorption of heat as the water expanded into a gas.

Board 27  HOW AGE AND GENDER MAY AFFECT SHORT TERM MEMORY. Anna L. Kelligreen, 5101 West Blvd, Youngstown OH 44512. yogie03@sol.com (Boardman High School)

Teenagers and young adults are supposed to remember more than older people; women are expected to remember more than men. A ten-word poster was used for testing. Four math problems were used (addition, subtraction, multiplication, and division) for the purpose of distraction from the word list. A method was developed of recording the data using pink and blue sheets for easy gender recognition. One hundred twelve people were tested, four of each gender in each five-year age group. Each person was tested privately. Each had one minute to study the word poster, one minute to work on the math problems, then one minute to recall as many words as possible from the word poster. Responses were recorded on data sheets and then compiled the responses using line graphs and bar graphs. Based on the results younger people do remember more. Data showed that younger people, 11 through 30 years old, recalled 82.2% of the words, while older people, 61 through 80 years old remembered only 55.6% of the words. This may be a result of how young people study for tests. Overall, women recalled 79.3% of the words while men recalled 55.6%.

WATER MANAGEMENT FOR ENVIRONMENTAL QUALITY

09:00AM SATURDAY, APRIL 1, 2000
MEYER HALL ROOM 121
BARRY J. ALLRED - PRESIDING

9:00 TREATMENT OF TOXIC ORGANIC WASTEWATER WITH CHEMICAL OXIDATION, CARBON ADSORPTION AND BIOAUGMENTATION. Howard H. Lo, Cleveland State University, Dept of Biological, Geological and Environmental Sciences, Folake F. Ojoko, and Richard J. Gillilland. CEAGE, Cleveland State University, Dept of Biological, Geological and Environmental Sciences, Cleveland OH 44115-2440. hiao@csuohio.edu

The objective of this study was to investigate the optimum conditions in treating toxic organic wastewater using chemical oxidation, activated carbon adsorption and bioaugmentation. Resorcinol, vanillin and salicylic acid, were the three types of wastewater used in this study. Chemical oxidation was carried out using two oxidants: Fenton’s reagent and potassium permanganate. Carbon adsorption involved using six types of activated carbon. Bioaugmentation involved using two types of liquid live microorganism (LLMO). The removal efficiency of total organic carbon (TOC) was used as an indicator of performance for wastewater treatment. The results showed that the highest TOC removal efficiencies of 73%, 74% and 82.6% were achieved with resorcinol, vanillin and salicylic acid respectively, by using Fenton’s reagent. With the potassium permanganate, the highest TOC removal efficiencies for resorcinol, vanillin and salicylic acid were 80%, 75% and 80% respectively, however, large sludge volumes were accumulated. It was found that bioaugmentation was ineffective in treating the three organic compounds and sludge production during the use of potassium permanganate made the use of this oxidant unacceptable during chemical oxidation.

9.15 A SURVEY OF SUCROMERE CREEK FOR OIL AND GREASE CONCENTRATIONS FOLLOWING THE KIRBY TIRE FIRE. Erica N. Roche (Dr. Josie Setzler), 3619 St, Rt. 51, Sunbury OH 43074, proche@gmail.com (Heidi Berry)

Not long after the fire started at the Kirby Tire Factory on Saturday, August 9th, 2009, the EPA implemented remediation of the waters in Sycamore Creek to remove harmful chemicals and oils. This survey was conducted to determine if the remediation of Sycamore Creek by the EPA was successfully removing oil and grease from the water caused by the recent tire fire. If the aeration and skimming efforts of the creek are removing oil and grease from the water, then their concentration should decrease downstream from where the fire took place. Five sites along the creek were sampled, using procedures in Standard Methods for the Examination of Water and Wastewater. The results showed the following:

1. The site upstream of the fire contained 123.17 mg/L of oil and grease, 2) the site right next to the fire showed an average of 1000.45 mg/L, 3) two downstream sites had concentrations of 1252.11 mg/L and 222.82 mg/L and 4) the site at mouth of the creek was a negative value. These results show that while there is contamination coming from an upstream source, the bulk of the oil and grease is coming from the tire fire. The decreasing concentrations show that the remediation is working and the stream is diluting the concentration on its own.

9.30 THE WETLAND-RESERVOIR-SUBIRRIGATION SYSTEMS (WRSIS) PROJECT. Norman R. Fausey, Richard L. Cooper, Barry J. Allred, Larry C. Brown, Bernie J. Czartoski, USDA, ARS, Soil Drainage Research Unit, 590 Woody Hayes Dr, Columbus OH 43210-1057. fausey.01@osu.edu

In an effort to reduce the delivery of nonpoint source pollutants from agricultural lands to surface water, the WRSIS concept was developed. This innovative concept includes the capture, treatment, and reuse of surface and subsurface drainage waters and involves using constructed wetlands, storage reservoirs and subirrigation. Funding was obtained from USEPA, Great Lakes National Program Office to construct three systems, one each in Fulton, Defiance and Von Wert counties. These systems were constructed in 1995-1996 and have been in operation during four cropping seasons. The sites range from 27 to 60 acres in size. Additional funding was obtained to monitor the hydrologic and water quality performance of the systems, and these sensors and samplers have recently been installed. As designed, the systems capture and retain virtually 100 percent of the drainage and runoff water thereby essentially eliminating offsite release of water and sediment. The constructed wetlands were allowed to reequtage naturally, and macro-invertebrate and vegetation surveys show that wildlife habitat and wetland vegetation features have developed. Com and soybean yields are 15 to 40 percent higher for the subirrigated areas compared to adjacent areas with similar agronomic management but no subirrigation. Data collection will continue for 3 to 5 more years, but initial results demonstrate that WRSIS systems have potential to control non-point source pollution from cropland.

9.45 NITROGEN CYCLING IN A WRSIS AGROECOSYSTEM. N. Deye-Marie N. Jie, Larry C. Brown, and Norman R. Fausey, Ohio State University, Environmental Science Graduate Program, Dept. of Food, Agricultural and Biological Engineering, 590 Woody Hayes Dr, Columbus OH 43210-1057. njie.01@osu.edu

A Wetland-Reservoir-Subirrigation System (WRSIS) is an agroecosystem that has the potential to improve downstream surface water quality by minimizing nutrient loads to surface water bodies. WRSIS can also provide a reliable source of subirrigation water to cropland. Minimal nutrient discharge to streams can be achieved by recycling drainage waters and surface runoff from a cropland (2.8 ha), through a constructed wetland (0.2 ha) and a reservoir (0.2 ha) for subirrigation during the growing season. System performance is evaluated by studying the transport and storage of nitrogen (N) in and out of each WRSIS component. An extensive monitoring system, implemented at the Defiance County, Ohio site, in June 1999 has the capability of sampling runoff and subsurface drainage at eleven key locations. Initial findings revealed that for February through May, 1999 (grape sample), the average nitrates N (NO3-N) and ammonium N (NH4-N) concentration in runoff entering the wetland was 0.33 and 0.15 mg/L, respectively. Over the same period, the average concentration of NO3-N and NH4-N in the subsurface drainage entering the wetland was 11.39 and 0.00 mg/L, respectively. For June through August, 1999 (automated sampling), the average NO3-N and NH4-N concentration in runoff entering the wetland was each 0.03 mg/L and the NO3-N and NH4-N concentration in subsurface drainage entering the wetland was 0.94 and 0.01 mg/L. Additional data will help evaluate the contribution of N loads that were previously lost to nearby streams. Further studies will also identify wetland processes and water management practices that influence N fate and transport in these novel agroecosystems.

10:00 PHOSPHORUS FATE IN A WETLAND-RESERVOIR-SUBIRRIGATION SYSTEM. Jennifer L. Kemper, Ohio State University, Environmental Science Graduate Program, Dept. of Food, Agricultural and Biological Engineering, 590 Woody Hayes Dr, Columbus OH 43210. kemper.02@osu.edu

Phosphorus loading in runoff from agricultural areas is a significant source of nonpoint pollution to natural watersheds. A Wetland-Reservoir-Subirrigation System (WRSIS) is an innovative environmental management tool used to reduce nonpoint source pollution. The WRSIS in Defiance County routes subsurface drainage and runoff waters through a wetland, for water quality improvement and then stores it in a reservoir before irrigation of cropland. This research investigates the fate of phosphorus in various components of the WRSIS, to test the following hypotheses: 1) the wetland and reservoir act as sinks for sediment and phosphorus, 2) a concentration gradient for total filterable solids and phosphorus extends from the top to the bottom of the water column, and 3) subsurface drainage promotes movement of phosphorus down through the soil profile. Sampling methods include: 1) surface runoff samplers for water flow, 2) a multi-elevation sampling system for water column samples, and 3) soil samples from both subirrigated and drained-only plots, and in the wetland. Total and available phosphorus concentrations were determined colorimetrically. Total filterable solids were determined by filtering a known volume of water. The reservoir and wetland both exhibited sediment and phosphorus retention. A significant increase in the total filterable solids was found between the surface and bottom waters of the reservoir (p<0.05), but not in the wetland. Total phosphorus levels were lower at greater depths in drained-only plots and higher in subirrigated plots, suggesting that transport of phosphorus through the soil profile was not promoted by subsurface drainage.
10:15 VEGETATION INVENTORIES FOR CONSTRUCTED WETLANDS OF THE WETLAND-RESERVOIR-SUBIRRIGATION SYSTEMS. Lee M. Luckeydoo, Ohio State University, Environmental Science Graduate Program, Dept. of Food, Agricultural, and Biological Engineering, 590 Woody Hayes Dr, Columbus OH 43210-1057. luckeydoo.1@osu.edu

The Wetland-Reservoir-Subirrigation Systems (WRSIS) project links agricultural fields, constructed wetlands, and water storage reservoirs to minimize agrochemical runoff and sediment delivery to streams. Currently there are three demonstration sites which are located in Defiance, Fulton, and Van Wert counties. The WRSIS project was constructed and completed four years ago. Case studies of terrestrial and aquatic vegetation development and structure with passive revegetation on the constructed wetland sites were conducted using a seasonally permanent plot technique, and observations were made using Braun-Blanquet scales. Diversity by site was calculated using Simpson's and Shannon-Wiener indices. Defiance County had the highest species richness in 1998 at 51 sites, with 33% being wetland indicator species. In 1995, species richness in Defiance County decreased to 24 species with 35% of the wetland indicator species. Fulton County species richness increased from 32 species in 1998 to 34 in 1999. Species richness at the Van Wert County site decreased from 44 species in 1998 to 24 species in 1999. Seed bank analysis of the Defiance location soils showed a potential of seven additional wetland species not present during the 1998 field surveys. The examination of the seed bank identified needed wetland modifications for the Defiance County site, where a muddlal component was added in early in 1999. Results thus far indicate that, over time and with careful management of hydrology, there is potential for inclusion of additional wetland species.

10:30 WETLAND-RESERVOIR-SUBIRRIGATION SYSTEMS (WRSIS): ECONOMICS AND HYDROLOGY. Larry C. Brown, Marvin T. Batte, Jon A. Hothem, Steve Richards, Norman R. Fausey, N-Deye M. N’Jie, Lee M. Luckeydoo, Jennifer L. Kemmer, Tektin Oztekin, Barry J. Allred, and Bernini J. Czartoski, Ohio State University, Dept. of Food, Agricultural, and Biological Engineering, 590 Woody Hayes Dr, Columbus OH 43210-1057, brownc.1@osu.edu

WRSIS have potential to improve downstream water quality by reducing discharge to streams, providing wildlife habitat, increasing wetland acres and vegetation, providing a reliable supply of subirrigation water for sustained crop production, and increasing profitability. Economic analyses, completed for three sites in Northwest Ohio, indicate that capital costs, while variable from site to site, are by far the largest expense. Although the value of yield improvements was substantial ($35,558), and the discounted 30-year value of tax offsets was large ($20,340), the WRSIS project generated a negative Net Present Value of $11,241. Given the investment requirements at these three demonstration sites coupled with analysis assumptions, the WRSIS was not profitable. However, costs and returns of this developing technology were shown to vary substantially from site to site, and economies may also be associated with scale of farming operations. Hydrologic simulation analyses of routing water through the system at the Defiance County site indicated that the current size of the constructed wetland provided a 76% and 42% water retention efficiency for 2-Year and 50-Year Return Period storms, respectively. By increasing the size of the wetland by 200% and adding another pump, the water retention efficiency was increased to 90% and 53% for these two return period storms, respectively.

SOCIAL & BEHAVIORAL SCIENCES
09:00AM Saturday, April 1, 2000
Meyer Hall Room 122
Joyce M. Kiser - Presiding

RELAXATION TAPES AND THEIR EFFECTS ON THE REDUCTION OF TEST ANXIETY AND TEST PERFORMANCE. Jessica M. Broz, Jennifer Dembinski, Cindy Edidzge, 803 5th St, E3, Bowling Green OH 43402. jbroz18451@yahoo.com

Previous research has found that academic examinations can cause anxiety responses in students. It has also been found that relaxation tapes reduce heart rate and blood pressure. However, there have been few studies on whether the physiological effects of anxiety can be reduced by using relaxation tapes during testing conditions. With knowledge of these findings, this study was designed to test the effects of relaxation tapes on reducing test anxiety and improving test performance. It was hypothesized that playing a relaxation tape during a timed test would reduce test anxiety and improve performance. Participants, four male and five female college students, were monitored for changes in heart rate and galvanic skin responses during a timed math flashcard test. Overall, participants in the experimental condition exhibited lower heart rates increases during the flashcard test than the participants in the control condition did. Participants in the experimental condition experienced a 12.098% increase in heart rate. However, there was very little difference in performance between the two conditions. Students in the experimental condition performed 94.4% correct on flashcards compared to 94.5% correct on flashcards for students in the control condition. Therefore, the results of this study suggest that the use of relaxation tapes during testing situations reduces physiological anxiety responses, but does not affect test performance.

9:15 BODY IMAGE AND SELF-ESTEEM AMONG ADOLESCENT ORGAN TRANSPLANT SURVIVORS. Meghan A. Warner (Dr. Laura Bennett-Murphy), Otterbein College, Box 11108, Westerville OH 43081. MHAWARNER@otterbein.edu

Adolescence marks a period in development of extraordinary transition and self-exploration. However, what are the consequences of a near-fatal illness to this development? Adolescent cancer survivors report lower self worth, less involvement in social activities, and more social anxiety (Pendley, Dahlgquist, and Dreyer, 1997). Additionally, worse health has been associated with perceiving oneself to be less attractive (Rosenthal and Smith, 1996). It is hypothesized that adolescent organ transplant survivors will have a more negative body image and thus a lower self-esteem than healthy adolescents will. It is further hypothesized that the body image a transplant survivor has will be more negative than the body image an objective observer will have about that same survivor. Two groups, ten transplant survivors and ten healthy control subjects, will be matched by gender and age. Participants will complete two questionnaires: The Body Image Inventory and The Self-Perception Profile for Adolescents. Two photographs will be shown to each objective observer who will rate appearance for each subject on a five point Likert scale. Employing t-tests and ANOVAs, correlations from all measures will be calculated. It is believed that this study-in-progress contributes to the current literature by examining the psychosocial impact of a rare near-fatal illness among adolescent organ transplant survivors.

9:30 COST OF COMMUNITY SERVICE STUDY, SHELBY COUNTY, OHIO. Tracy L. Reiss, Daviey Resource Group, 1500 North Manitua St, Kent OH 44240. trejs@daviey.com

Development pressures in Shelby County, Ohio are mounting and urbanization is irreplaceably altering the rural countryside. As a result of this growth, and the subsequent increase in demand for public services, Shelby County needed to determine the economic impact of increased residential development. The primary purpose of the Cost of Community Service Study was to generate data that could clearly demonstrate the fiscal impact of continued residential development in rural areas. In accordance with a methodology devised by the American Farmland Trust, and data supplied by the Shelby County Auditor’s Office, county-level revenue and expenditure streams for fiscal year 1997 were analyzed and land use ratios generated. The findings of the study illustrated residential land uses were a financial drain on the Shelby County budget. Furthermore, the study articulated how much residential land uses cost to service relative to what they pay out in the form of revenue. Specifically, for every dollar raised from residential land use through real estate taxes, Shelby County spent $1.11 in direct services. The study also demonstrated the manner in which farm, forest, and open space uses were positive fiscal contributors to the county’s bottom-line. Specifically, for every dollar raised to provide public services for farm, forest, and open space uses, only $0.29 was spent to provide services to these land uses. As a result of this study, Shelby County decided to promote the preservation of farmland as a sound community investment strategy as a component of the update of their Comprehensive Plan.

9:45 COUNTY ENVIRONMENTAL HEALTH IN OHIO: PERCEPTION AND REALITY. Michele Morrnon, Ph.D. and Timothy J. Ryan, Ph.D., CICH, Ohio University, School of Health Services, 416 The Tower, Athens OH 45701. mmorrone@ohiou.edu

There is an increasing body of research examining the public’s perceptions of environmental issues. These perceptions are referred to in the literature both as a “reality gap” and “environmental awareness.” Those who study risk perception and environmental awareness have focused mainly on increasing understanding of the public’s perception and awareness. Past research has also examined the effect that public perception and awareness have on environmental decisionmaking and behavior. The investigation presented here contributes to environmental perception research by adding two new dimensions: 1) an analysis of perceptions of a specific group of professionals who are responsible for protecting environmental health in Ohio counties; and 2) a comparison of these qualitative perceptions with quantitative environmental data. Governmental health professionals in Ohio assessed the overall environmental conditions in their counties in a newly-developed electronic and mail survey. The professionals also made comparisons between environmental health conditions in their county with other counties in the state. A descriptive analysis of the results of the survey is presented. Ohio county health professionals’ perceptions of environmental conditions are compared with quantitative data that indicate actual environmental conditions in their counties. As correlation analysis shows, some issues, such as septic systems and incidence of tuberculosis offer interesting relationships between what the health professionals perceive to be problems and what actually exists. Ultimately, research such as this may allow for less-costly data gathering about environmental issues, as well as provide rapid, yet reasonably accurate information on such matters. The utility of such data sets may be proved for emerging concerns and the development of new environmental quality indices.

10:00 THE IMPACT ON SENSORY, MOTOR AND BEHAVIORAL DEVELOPMENT OF THE MOUSE MUS MUSCULUS FROM PRENATAL EXPOSURE TO PARA-Chloroamphetamine. Julie M. Moyer and Nelsin J. Moore, Ohio Northern University, 402 W College Ave, Unit 2552, Ada OH 45810-6039. jmoyer@onu.edu

Research has shown that methamphetamines, stimulant drugs that are used on the street, may cause defects in the behavioral and sensory development in rat pups. Pregnant laboratory mice (Mus musculus) were injected with para-chloroamphetamine. Each of
three treatment groups (N=10 per group) were injected with isotonic saline solution, 2mg/kg, or 4mg/kg body weight of para-chloroamphetamine between days 7-18 of the gesta-
tional period. The number of mouse pups in each group was 44, 50, and 47 respectively.
Mouse pups were tested for differences in birth weight, offspring orientation (with and
without bedding) on days 11 and 13 and for locomotor movements in a T-maze on days 15, 20, and 25. Multiple comparisons were done between the three groups and within each
group. ANOVA showed significant differences (p<0.001) between the three groups for the
mean individual weights of the mouse pups (p=0.00); motor movement without
bedding on postnatal days 11 and 13 (p<0.02-0.04); and for various locomotor movements
in the T-maze on days 15, 20, and 25 (p<0.00-0.04). Significant differences were found
between days 15, 20, and 25 when comparing the locomotor movements within each
individual treatment group (p=0.00-0.01), with the least locomotor movement observed on
day 15. In general, the results showed that pups from mothers injected with 4mg/kg
body weight of para-chloroamphetamine showed the greatest differences in birth weight by
being heaviest, in offspring orientation by being most disoriented, and in locomotor activity
by moving the least.

10:15 THE EXTRAORDINARY LIFE OF AN EARLY CLEVELAND SCIENTIST:
HAMILTON LANEPHER SMITH. Joy M. Kaiser, Cleveland Museum of Natural History,
Cleveland OH 44106. jkaiser@cmnh.org

Hamilton L. Smith was a Yale University graduate who taught chemistry in the Cleveland
in 1845 and became a member of Jared Porter Kirkland's Arkites. He was curator of
specimens that formed the foundation of the collections in the Cleveland Museum of
Natural History and later became a college teacher and author of textbooks, devised a
system for describing diatoms and desmids, and invented the tintype. The goal of the
research was to determine whether Chicanos, educators, and students of history and
and science should revere his work and consider him to be a significant early American
scientist? Smith's articles, textbooks, tintypes, and personal correspondence were exam-
ined and news clippings, personal letters, articles, and monographs with references to
Smith and his work, written by his family and associates. The data will show that H.L. Smith's
work served as an essential bridge to later developments in photography, astronomy, and microcopy.

Education
02:00PM Saturday, April 1, 2000
MEYER HALL ROOM 122
KENNETH A. LASOTA - PRESIDING

2:00 A SIMPLE CLASSROOM MANAGEMENT TECHNIQUE TO HELP GET STUD-ENTS SEATED AND LECTURES STARTED ON TIME. Kenneth A. LaSota, Robert Morris
College, Dept of Natural Sciences, 600 Fifth Ave, Pittsburgh PA 15219-3099.
laSota@robert-morris.edu.

Students that arrive late for class present a problem: Do you start class with students
“missing in action” or do you wait for late arrivals, consuming lecture time in the process?
How do you prevent late arrivals from disrupting class as they move to their seats?
Reviewed here is a simple method I have used for ten years that addresses late arrivals
and consists of two parts. First, in class students may sit where they wish but once they sit
somewhere they are required to sit there all semester. Second, a row of seats nearest
the door is reserved where no students may sit except those that arrive late; that is, once
class begins and students arrive late, they are welcome, but may not sit where they normally sit
but only in the row of seats provided. This policy is not punishment for being late but is for
the benefit of the class because it assures on time lectures and reduces disruptions by late
arrivals. The method has markedly reduced tardiness, in part, because students prefer to
sit where they normally sit and arriving late requires them to sit elsewhere. Significantly,
because this method assures lectures start on time, lectures rarely extend over. Anecdotal evidence suggests students find this benefit a reasonable trade-off for being prompt.

2:15 USE OF A SUPERFUND SITE AS A HANDS-ON LEARNING LABORATORY
FOR ENGINEERING DESIGN STUDENTS. Ann D. Christy, Julie Weatherington-Rice, and
M. Denton, who developed a pilot project entitled the Women in Science and Engineering
(WISE) program for female 7th and 8th grade students. Based on research indicating
that adolescent females tend to lose interest in science and begin to rule out related work
experiences at a time when they should really be exploring all career options open to them,
the pilot program was intended to improve attitudes of female middle school students
toward science and careers in science. The expanded Action-WISE program has: in-
creased the annual numbers of students and teachers involved from 35 to over 100; added
graduates from a university site through high school partnerships that provide the base
independent students to the project calendar to include an intensive summer science camp experience with a focus on
environmental science activities for each of three grade levels (6th, middle school, and high
school), developed a strong web of support for young women with an interest in SMET; and
provided for the annual offering of a graduate level seminar for 45 area teachers and
administrators on gender equity and current issues concerning women and girls in SMET.

2:45 THE IMPACT OF HONOR STUDENT INTERVENTION ON THE READING
ABILITY OF SCHOOL AGED CHILDREN. Dianne A. Brown Wright and Margaret V.
Koester, University of Akron. Dept of Educational Foundations and Leadership,
College of Education, Akron OH 44325-4206, dbrownwright@uakron.edu

An outgrowth of the Clinton Administration’s “America Needs Initiative”, public school
reading test results along with related literature and the notion of university-school
collaborative partnerships provide the bases for this research project. Honor students from
across the various academic disciplines received volunteer training and served as trained
volunteers, reading to and with kindergarten through third graders in five different sites.
Volunteer training provided focused on learning strategies, tutoring skills and pre- and post
administration. In addition to reading tutor training, each honor student reading
volunteer was provided with both a university and site liaison for purposes of mentoring and
support. Honor student volunteer as well as participating kindergarten through third grade
developmental areas are provided. Pre- and post-test administration data were collected using
story retelling qualitative analysis scores to determine the reading comprehension of
pre-kindergarten through third graders’ after twenty-five hours of reading volunteer service.
Scores were based on the child’s ability to recall parts of a story including story structure,
plot, sequence, characters, theme, and resolution. Descriptive statistics (frequency distri-
butions, means, standard deviations) and univariate inferential statistics (t-tests, correla-
tion analysis, and chi square) were used to analyze data assessing the impact of volunteer intervention. Because of the pre-experimental nature of this research, however, no control
group was used. Study results indicate that this Pre-K-3 Reading Initiative, using university
honor students as reading volunteers, proved to be a positive, meaningful, and successful
experience on the part of both the participating pre-kindergarten through third graders and
university honor student volunteers, as well as individual site liaisons. In nearly every case,
post-test scores demonstrate improvement over those found in the pre-test situation.

3:00 FACULTY DEVELOPMENT WITHIN THE CONSTRAINTS OF ACCREDITA-
TION: PILOT STUDY. Alan D. Smith, Robert Morris College, Dept of Quantitative
Sciences, Pittsburgh PA 15219-3099, smitha@robert-morris.edu.

Higher education has been the subject of increasing criticism in recent years for a variety
of reasons. The usual response to this criticism is to start quality programs imposed by the
college or an external entity. Accreditation is such an external entity and the mechanism
of choice for many schools wishing to improve teaching and research. The purpose of this
paper is to discuss faculty's perceptions of changes induced by the process of external
credit. Faculty's perceptions of changes was perceived through the viewpoints of AACSB
standards. The results of a pilot study of a questionnaire of primarily faculty at a recent teaching economics conference for practicing and academic professional was used to record data on this topic. A questionnaire was established based on current literature on faculty development and motivational theories. The results demonstrated that faculty are very concerned on the aspects of such activity and development to provide the bases for this research project. Faculty's perceptions of the motivations for such activity may be fundamentally different than those of the administration. AACSB cites that there must be a convoluted-driven or internal motivational
approach to faculty development. Many faculty feel that faculty development tends to
focus on championing initiatives that only target appropriate scholarly outlets, such as
scholarly/professional meeting venues and publications in order to demonstrate or justify
the appropriate academic credential classification purposes. In fact, it is perceived by faculty, based on this pilot study, that faculty are less resistant to change than their administrative counterparts.

3:15 A DISCOVERY LESSON IN EARTH SCIENCE FOR ELEMENTARY STUDENTS. Kenton E. Strickland, Wright State University Lake Campus, 7600 St. Rt. 703, Celina OH 45822-2952. kenton.strickland@wright.edu

An activity created for an upper elementary science and math day for gifted students evolved into a comprehensive discovery lesson in earth science. The activity involves a number of the primary and integrated process skills. Students are given a collection of fossils and are asked to make a table of measurements of length and width for each specimen in mm. They are then told to plot these measurements on a graph. Most students plot points, but some will make histograms. Graphs often exhibit bimodal distribution, clumping, or large variations. Students are then asked to analyze the graph. Student interpretations include different species, ontogeny, sexual dimorphism, or environmental factors. This simple exercise employs the primary process skills of observing, measuring, communicating, and recognizing number relations. Integrated process skills of formulating hypotheses and interpreting data are also utilized.

ENGINEERING

03:45PM SATURDAY, APRIL 1, 2000 MEYER HALL ROOM 122 YUNG-TSE HUNG - PRESIDING

3:45 OPTIMAL BASKETBALL STRATEGIES FOR THE FREE-THROW, THE LAY-UP, AND THE REBOUND. Ronald L. Huston, Cesar A. Grau, University of Cincinnati, Dept of Mechanical, Industrial, and Nuclear Engineering, P.O. Box 210072, Cincinnati OH 45221-0072, ron.huston@uc.edu

This paper discusses optimal strategies for three common basketball maneuvers. The strategies are based upon a dynamic analysis of the maneuvers which minimizes the kinetic energy needed for the maneuver. The analysis is motivated by the widely accepted premise that minimum energy expenditure provides for maximum control, thus increasing the probability of success of the maneuver. For the free-throw, the paper provides a listing of optimal launch angles and error bounds as a function of the vertical release position. For the lay-up, the beneficial effect of the backboard is studied. It is shown that an energy absorbed by the backboard increases the probability of a successful shot over that of a direct shot, without a backboard. Limitations of this backboard benefit are studied as a function of shooting position. Finally, for the rebound, the analysis shows that a player has a greater opportunity to make the rebound if he or she is moving at the time the errant ball is being shot. This strategy is shown to hold even if the player is moving away from the ball. That is, moving, even if in the wrong direction, is preferable to not moving at all when a rebound is about to occur. The analysis is based upon the principles of dynamics using MATLAB to obtain iterative solutions to the governing equations. Finally, the validity of the minimum energy expenditure premise is also discussed.

4:00 A NEW VENDING MACHINE LOCK. Christopher Dennison, (Dr. Janak Dave and Dr. Maria Curr Krepel) University of Cincinnati, OMG College of Applied Science, 2220 Victory PIWx, Cincinnati OH 45205. maria.krepel@uc.edu

The primary device used for locking vending machines is known as a T-Handle. This locking mechanism has been used in The Coca-Cola System for the past twenty years, and remains the cheapest and most reliable lock used today. After spending six months in the employment of The Coca-Cola Company, I was able to see first-hand the impact a new lock design could have to increase vending machine security. The new design must achieve three primary objectives: (1) Increase security of the vending machine through means of a mechanical lock. The new design should prevent any real ease of break-in, while providing the same reliability if not more than the current design. (2) Reduce the time necessary to lock and unlock the vending machine. Easy of operation is always a concern since route drivers now spend a considerable amount of time twisting the T-Handle to secure the door. (3) Eliminate conventional methods of key entry. Both security and ease of operation will increase due to the elimination of standard keyholes, which provide a constant visual point of attack. A conceptual design has been approved for further development. This design incorporates both DC motor technology and alternative methods of key entry. Some twenty companies have provided the detailed information and formulas necessary to specify the DC motor type and application. Research has shown that "key entry" is quite versatile. I have decided to postpone further "key entry" research and development until the locking mechanism features are chosen.

4:15 TREATMENT OF METAL PRODUCT AND FINISHING INDUSTRY WASTE WATER BY ELECTROFLotation PROCESS. Yung-Tse Hung*, Garrel Gibbison, Howard H. Lo*, Cleveland State University, "Civil and Environmental Engineering Dept, ** Dept of Biological, Geological and Environmental Sciences, Cleveland OH 44115-2440. Yhung@csvax.csuchio.edu

This paper presents the development and optimization of an electrofloation unit for the removal of oil, heavy metals and organic compounds from oil-water emulsions containing 3.5% NaCl by weight. The objective was to examine the application of the metal suppression technology within industrial wastewaters. Essential parameters in the electrofloation unit were hydraulic detention time, removal efficiency, and power consumption. The technique presents two major reactions: adsorption and charge neutralization followed by coagulation. The coagulation unit consisted of an electrocoagulation cell with an aluminum anode and a stainless steel cathode. The unit was capable of treating 1 m³/hr oily wastewater in a continuous process. The unit achieved 65% oil separation at optimum conditions. 75% in the presence of NaCl (3.5% solution); and 92% with the presence of NaCl and at optimum concentration of flocculent agent. Electrical consumption varied from 0.5 to 10.0 kW/hr. An empirical equation that relates the oil removal rates with the energy consumption was obtained with optimal operational current between 0.3 to 1.2 amperes. The electrofloation unit proved to be an effective treatment method for industrial oily wastewater containing high NaCl concentration. Other treatment method such as chemical treatment will be more costly due to high chemical requirement.

4:30 OLIVE MILL WASTEWATER TREATMENT USING ANAERObic DIGESTION FOLLOWED BY OXOZonation PRETREATMENT. Yung-Tse Hung*, Garrel Gibbison, Howard H. Lo*, Cleveland State University, "Civil & Environmental Engineering Dept, ** Dept of Biological, Geological and Environmental Sciences, Cleveland OH 44115-2440. Yhung@csvax.csuchio.edu

Olive mill wastewaters (OMW) are produced from olive oil manufacture. Usually these effluents are disposed of in evaporation ponds or through public sewers. The disposal of these wastewaters may cause serious environmental problem due to the high NaCl and phenol concentration in the wastewaters. This paper examines the applications of a single anaerobic digestion of OMW. In a process to remove COD (chemical oxygen demand) obtained and to produce methane. In an improved process, a coagulation pretreatment is performed to investigate the biodegradability of OMW by removing the phenolic inhibitors to enhance anaerobic digestion. The main chemical characteristics of OMW were pH 4.84, BOD (biological oxygen demand): 52 g/l, COD 112 g/l, VS (volatile solids) 9 g/l, and DVS (dissolved volatile solids): 4.65 g/l. In the single stage anaerobic process KAPD and urea were used as nutrients in order to maintain satisfactory microbial activity (COD:N:P=250:5:1). In the ozonation pretreatment process, orthophosphoric acid and sodium hydroxide were added to adjust the pH. In the anaerobic step, COD removal efficiencies up to 68% were obtained and methane production reached 194 ml/g COD removed. In the second step up to 76% COD removal were reached. The methane production reached 288 ml/g COD removed. The results show that OMW can be effectively treated by an anaerobic digestion process. The pretreatment of OMW with ozone will remove phenolic compound, which are the main causes of the toxicity to methanogenic bacteria of these wastewaters.

4:45 POTATO WASTEWATER TREATMENT USING ANAERObic, OXico, AND ANIOXIC REACTORS. Yung-Tse Hung*, Chatchawal Lersuppochawach, Howard H. Lo, Cleveland State University, "Civil & Environmental Engineering Dept, ** Dept of Biological, Geological and Environmental Sciences, Cleveland OH 44115-2440. Yhung@csvax.csuchio.edu

The objective of this study was to study the effect of TOC (total organic carbon), NH3 and phenol concentration on TOC removal of potato wastewaters. Experiments were conducted using anaerobic, oxic and anoxic reactors with hydraulic detention time of 6, 12, and 24 hours, respectively. Experimental conditions included 3 different TOC concentrations: 100, 550 and 1,000 mg/l, 3 different phenol concentrations: 10, 55 and 100 mg/l; 3 different NH3 concentrations: 10, 55 and 100 mg/l. Results indicated that percent TOC removal was between 52-77% and percent NH3 removal was between 20-40%. TOC of effluent concentration was between 23-77 mg/l and NH3 effluent concentration was between 8- 144 mg/l. TOC was mainly removed in anaerobic reactor and the percent removal was between 49-79%. NH3 was mainly removed in oxic reactor and the percent removal was between 2-29%. The maximum TOC and NH3 removal occurred when TOC was 100 mg/l and NH3 was 10 mg/l. The result of this study showed that percent TOC removal decreased when TOC, phenol and NH3 concentration increased. The initial concentration of ammonia also had effect on percent ammonia removal. When ammonia influent concentration increased, the ammonia removal in both anoxic and oxic reactors decreased.

EARTH SCIENCE

09:00AM SATURDAY, APRIL 1, 2000 MEYER HALL ROOM 124 MARK J CAMP - PRESIDING

4:00 A COMPARATIVE STUDY OF THE USE OF COLUMBUS AND DUNDEE LIMESTONES AS BUILDING STONES IN THE TOLEDO REGION. Mark J. Camp, University of Toledo, Dept of Geology, Toledo OH 43606. mcamp@geology.utoledo.edu

Many northwestern Ohio buildings, bridges, and other structures constructed in the mid-1800s through the 1930s, incorporated blocks and slabs of gray to buff Middle Devonian limestones of the Columbus and Dundee formations. The stones are similar in the field; petrographic and paleontologic differences are minor. Searches show that detailed records were not maintained by many companies, records were destroyed over the years, and...
formers, who might provide oral histories, are fast disappearing. A knowledge of local history is the key to determining stone sources. Sandusky was the largest supplier of Columbus limestone in northwestern Ohio; it was marketed as Sandusky bluestone. The city was a lakeport and connected to Toledo by railroad in 1853, providing transportation for large volumes of stone. Quarries near Market and additional Quarries of Columbus limestone hauled a few miles to a railroad station or shipped by boat. Reportedly Marblehead stone was used along the Miami and Erie canal across northeastern Ohio. The Dundee limestone came from quarries at Whitehouse chartered when the Wabash Railroad opened in 1855. A direct link was opened to Toledo where the railroad used the stone for foundations and docks at its terminal. During the Depression these railroad structures were salvaged from the site at the reservoir, now known as the Waza Reservoir by WPA tradesmen. The Zoo is the ultimate example of mixing of these stones since Columbus Limestone was also recycled from the adjacent Miami and Erie canal. Due to volume produced, marketing, and superior transportation of the Sandusky firms, Columbus Limestone was more widely used than the Dundee.

9:15  ABANDONED DEEP COAL MINE WEB SITE. Ann G. Harris, Youngstown State University, Dept of Geology, One University Plaza, Youngstown OH 44555-6001. agharris@cc.ysu.edu

For the last twenty plus years there has been a problem of abandoned deep coal mines in Ohio that have been either caving in or creating problems for new and old construction. For the average person there was no central location to obtain available information on these mines. Location maps and mine maps have been available from the Ohio Geological Survey since 1979 but not in a detailed format for the individual mines. The web site (http://www.as.ysu.edu/geo/lgy/) of the Youngstown State University Geology Department is beginning to address this problem. Three counties are now available; they are Trumbull, Mahoning and Columbiana Counties. Additional counties will be added. To use the web site the individual first selects the desired county from a master map that shows all three counties and the general location of the mines. Next the township map is pulled up which gives the location and name of all the located mines in that township. Clicking on the mine name and a data sheet will appear. If there is a mine map available it will be indicated and it will be possible to view a copy of a scanned mine map. At the present time information on the unlocated mines has not been included. For additional or more detailed information contact Ann G. Harris of the Youngstown State University Geology Department.

9:30  WATER, GEOLOGY, AND MULTIMEDIA EDUCATION: A CD-ROM PROGRAM. Elizabeth A. Barnett, Garry D. McKenzie, and Frank W. Schwartz. Ohio State University, Dept of Geological Sciences, Columbus Ohio 43210-1398, mck@osu.edu

The purpose of this project is to design a multimedia educational tool for introducing undergraduates and high school students to basic concepts in hydrogeology, with a focus on geology and hydrology in Ohio. Creation of a CD-ROM product and a proposed web-based version involves research, collection of materials, writing, editing, testing, production, and distribution. Rapid changes in computer software and the shift toward web-based media also require an investigation of new tools for maintaining and updating the product into the future. Despite great advances in the field of hydrogeology in the past 50 years, public knowledge of groundwater issues is often deficient, even among those with higher education. Increasing awareness of groundwater and surface water issues among students in high schools and introductory geology courses can promote interest in the geological sciences in Ohio universities and colleges, and help to create an informed public, more capable of understanding water resources and related availability issues. Topics in the CD-ROM include: geology of Ohio, the hydrologic cycle, Ohio water resources, basic hydrogeological concepts, and water resource issues including water law, and water pollution, with case studies. Pollution case studies are mostly drawn from Ohio sites, including examples for raw sewage, sewerage, hazardous waste, nuclear waste, agriculture, and deep-well injection pollution issues. As revision of materials and testing continue, the project has shown the importance of software development tools that produce multimedia products that may be easily upgraded and transferred between formats, and the difficulty of part-time development in the university setting.

9:45  A CLASSIFICATION OF DIGITAL GEO-REFERENCED DATA. Robert L. Vertrees. Ohio State University, School of Natural Resources, 210 Kottman Hall, 201 Coffey Rd, Columbus OH 43210-1085. Vertrees1@osu.edu

The classification for the Data Sources and Contacts Task Force (DS&CTF) of the Ohio Geographically Referenced Information Program, a State-of-Ohio agency that furthers the development, coordination, and application of digital geo-referenced data. The DS&CTF is: (1) inventorying data sets and holdings applicable to Ohio of public and private-sector organizations, and (2) gathering metadata (data about data sets) into an automated clearinghouse. The author developed the classification: (1) to categorize data sets (a type of data for which at least some metadata have been developed); (2) to study patterns and relationships of data for which metadata have not yet been developed but that are included in holdings; and (3) to identify where gaps exist in the availability of data. This 11-category scheme includes the following sequence of categories: (1) two categories (about geodetic control and base maps) pertain to the functional needs of developing a data base; (2) two categories (that include data about topics such as elevation and geographic names) do not fit into subsequent categories but can be associated with topologically related features of a base map; (3) two categories are about land use/land cover and land ownership; (4) three categories primarily pertain to data about other cultural, socio-economic, and demographic aspects of society; and (5) two categories primarily pertain to natural resources and the environment. Individual features of some complex maps are mentioned along with the parent map and are also placed into other appropriate categories. An up-to-date synopsis is given of the extent to which the DS&CTF has used the classification to identify data patterns and gaps. Some potential applications of the classification beyond the DS&CTF are also discussed.

10:15  WEST VIRGINIA RECORD 24-HOUR SNOWFALL AT FLAT TOP, 27-28 JANUARY 1998. Thomas W. Schmidlin, Kent State University, Dept of Geography, Kent OH 44242. techmidlin@kent.edu

A storm on 27-28 January 1998 gave a reported 35.0 inches (88.9 cm) of snow in 24 hours at Flat Top, West Virginia, exceeding the previous state record 24-hour snowfall of 34 inches at Bayard on 27-28 April 1929. The objective of this research is to place the event in a meteorological and climatic perspective and assess the validity of the reported record. Sources included government data, news accounts, and a site visit. The strong coastal storm caused excessive snowfall in the higher elevations of the central Appalachians, widespread disruptions to travel and electric power, and damage to property and trees. Flat Top is an official cooperative observing site with equipment supplied and maintained by the National Weather Service (NWS). A NWS employee made the estimate of 35 inches in 24 hours based on a measurement of 30 inches in the first 21 hours of the storm and 8 inches in the next 7 hours. The 35 inches of snow in 24 hours at Flat Top is discussed as a possible new 24-hour snowfall record for West Virginia.

10:30  SPATIAL CONCENTRATIONS OF POPULATIONS AND THE ENERGY BASIS FOR ECONOMIC GROWTH. Richard W. Janson, The Janson Industries 1200 Garfield Ave. S.W., Canton OH 44706. janson01@aol.com

Five great regions of earth's land surface have concentrations of population that are remarkable. Each of these great regions has an area extent that exceeds 500,000 square miles. The commonalities among nations with massive population is one object of the inquiry. Several approaches were used to clarify some of the necessary independent variables required to explain the phenomenon. Chief among the explanatory variables is the climate. The 20 largest (population) megacities were studied to determine the association with climate. Also several pairs of nations with large populations were compared on the basis of per capita consumption of primary energy inputs and per capita gross domestic product. This method was used to establish the relative wealth real income of the nations. Several nations with huge populations located outside favorable climate regions were used in the comparisons to emphasize the low per capita real incomes and the difficulty of achieving satisfactory economic growth trajectories. There is a clear association between regions of massive population and climate, providing there is a hinterland of moderate gradients and cultivable soil. Per capita real income of these great regions vary widely and is primarily a function of per capita consumption of energy inputs.

10:45  ENERGY POLICY IMPLICATIONS COMPARING RESULTS USING LEAST SQUARES METHODOLOGY AND NEURAL NET METHODOLOGY. Richard W. Janson and Lata B. Krishna. The Janson Industries, 1200 Garfield Ave. S.W., Canton OH 44706 and University of Akron. janson@1@aol.com

Seven scenarios of profound economic consequence are subjected to analysis. Implications of legislative and/or regulatory decisions to subsidize coal usage, or alternatively to tax coal usage by power plants or to expand nuclear power production, or to eliminate nuclear plants are typical of the scenario assumptions. Implications using a least squares predictive equation are compared to implications using a neural net that was computed and published earlier. The data used in each case is the same. Input data consist of primary consumption of coal, natural gas, petroleum, nuclear, and hydro energy inputs. Twelve outputs track the consumption of coal, gas, petroleum, and electricity among three sectors—residential and commercial, industrial, and transportation. The scenarios also include assumptions such as the expansion of energy usage over time, and the presumption that U.S. population will be 500 million by year 2050. The importance of understanding policy implications is underlined by two realizations. The standard of living of every single American is based on the consumption of 1,000,000 Btu per day, more or less, as measured by primary energy inputs (largely fuel inputs). Also, the two most populous nations in the world are rapidly industrializing. The results of both methodologies are consistent and therefore the implications are the same. The advantage of using both methodologies is to confirm results, especially in turbulent waters of macro economics with very significant policy implications.
C. Scott Brockman — PRESIDING

1:30 Division Business Meeting

2:00 LATE PRECAMBRIAN EVENTS ON EARTH: POSSIBLE LUNAR INVOLVE-
MENT. Robert J. Malcuit, Dept of Geology-Geography, and Ronald R. Winters, Denison University, Dept of Physics-Astronomy, Granville OH 43023. malcuit@denison.edu

The Late Precambrian appears to be a critical time in the history of the planet. There are two major horizons of glacial deposits in the more complete sequences and each of the glacial sequences is capped by a significant thickening of stromatolitic carbonates. These features have been interpreted by many investigators as recording alternating "soohouse" and "greenhouse" episodes in a low paleotemperature setting. Many of the glacial-carbonate sequences are several hundred meters thick and are thought to be rift basin fills. Another noteworthy feature of Late Precambrian sequences is the association of tidally influenced sediments including significant thickensses of tidal rhythmites. The Late Precambrian also appears to be a critical time in the history of the lunar orbit. Peelle and Cassen (1978 Icarus, 39, p 245) identified an orbital resonance state between Jupiter’s orbit and the lunar orbit when the lunar orbit is at 53.4 earth radii. They state that if the resonance is stable then there could be "profound" effects on both the earth and moon. We have done some 4-body (sun, earth, moon, Jupiter) numerical simulations (fourth-order Runge-Kutta integration procedure) on the effects of this resonance. In the short (100-year) runs that we have done on both circular and elliptical lunar orbits with semi-major axes between 59.0 and 53.4 earth radii, we have found a notable increase in orbital eccentricity. In general, a geologically short-lived excursion in lunar orbit eccentricity could explain the abundance of tidally influenced sediments of that time and the enhanced rock tides could have an ancillary influence on the development of continental rift zones.

2:15 OF ROCKS AND ECONOMICS: THE GEOLOGY OF THE MARION, OHIO, 30 X 60 MINUTE QUADRANGLE. Douglas L. Shriake, ODR Division of Geological Survey, 4363 Fountain Square Dr, Columbus OH 43224-1362. doug.shriake@odr.state.oh.us

A cooperative effort between the Ohio Division of Geological Survey and the USGS, Geological Survey produced the 1997 report on the Marion, Ohio 30 x 60 minute quadrangle. Since the report is a product of the Ohio Geological Survey core and geophysically logged two sites, one near Ada and the other near Bucyrus, to determine the stratigraphy of the area. These data facilitated the correlation between geologically logged water or oil wells. Drafting the geologic contacts at a scale of 1:24,000 enhanced the resolution of structural features. Structural features present include faults, the Findlay Arch, and a portion of the Appalachian Basin. A high degree of correlation exists between these structural features and known oil and gas fields. The dominant trend of these fields is SW-NE; however, there appears to be a critical time in the history of the planet. There are two major horizons of glacial deposits in the more complete sequences and each of the glacial sequences is capped by a significant thickening of stromatolitic carbonates. These features have been interpreted by many investigators as recording alternating "soohouse" and "greenhouse" episodes in a low paleotemperature setting. Many of the glacial-carbonate sequences are several hundred meters thick and are thought to be rift basin fills. Another noteworthy feature of Late Precambrian sequences is the association of tidally influenced sediments including significant thickensses of tidal rhythmites. The Late Precambrian also appears to be a critical time in the history of the lunar orbit. Peelle and Cassen (1978 Icarus, 39, p 245) identified an orbital resonance state between Jupiter’s orbit and the lunar orbit when the lunar orbit is at 53.4 earth radii. They state that if the resonance is stable then there could be "profound" effects on both the earth and moon. We have done some 4-body (sun, earth, moon, Jupiter) numerical simulations (fourth-order Runge-Kutta integration procedure) on the effects of this resonance. In the short (100-year) runs that we have done on both circular and elliptical lunar orbits with semi-major axes between 59.0 and 53.4 earth radii, we have found a notable increase in orbital eccentricity. In general, a geologically short-lived excursion in lunar orbit eccentricity could explain the abundance of tidally influenced sediments of that time and the enhanced rock tides could have an ancillary influence on the development of continental rift zones.

2:30 SURFACE MINE SPOILS: WEATHERING RATES AND LANDUSE CAPABIL-
ITIES. James R. Bauder, 1606 Armistice Avenue NW, Canton OH 44718. james.bauder@world.std.net

For nearly forty years as a soil scientist and geologist, numerous observations and experiences with surface mine spoils have revealed a wide range of weathering profiles and potential land uses for differing surface mine spoils. The evolution of perceptions concerning surface mine spoils ranges from early impressions that surface mine spoils were basically wastelands to the present reclamation of prime agricultural soils by replacing the pit soils/geologic test pits which allow investigators to evaluate the presence, extent, and density of subsurface fractures. An expandable design allows a pit of any depth to be constructed by benching or stair-stepping the sidewalls until the desired depth is achieved. The dimensions of these benches, 1-meter deep and 1- to 2-meters wide, allow site investigators to trace fractures in a 3-dimensional view while meeting OSHA excavation safety requirements. The proposed 4-meter deep test pit design can be used for 1-meter, 2-meter, or 3-meter deep test pits by sequentially eliminating the shallower benches from the design. Ramps on one or more sides may be included to facilitate entry by wheeled vehicles or other equipment. Once the pit is constructed and the exposed faces are determined from the triangle of mixing, range from less than 10% at the head of the creek to more than 25% at its mouth. The abundance of the groundwater component increased downstream and reached about 65% at the confluence with Rush Creek. The pH of the water in this drainage basin ranges from 2.6 to 6.2. In addition, the suspended sediment consisting primarily of ferric hydroxide reaches a concentration of 185 mg/L. This concentration of ions at low pH and cations at high pH, thereby altering the chemical composition of the water. Nevertheless, our data show that Lexington Creek is impacted by AMD several decades after strip mining has ceased.

2:45 INTERPRETATIONS OF THE GEOCHEMISTRY OF AN ACID-POLLUTED STRAND IN CENTRAL OHIO. Linda M. Centeno and Gunter Faure, Ohio State University, 170 Mendenhall Laboratory, 125 South Oval Mall, Columbus OH 43210 centeno.6@osu.edu

Abandoned and reclaimed coal mining areas over 30 years old still present problems of high acidity and metal contaminants in stream water. This is a potential health hazard for humans and animals who drink this water. The site of the present study is Lexington Creek in Penny County, Ohio. Lexington Creek is a tributary of Rush Creek, which flows into the Scioto River. Chemical analysis of the water and the suspended sediment were interpreted to determine how the sediment load and metal concentrations vary downstream. The results give some indication that the presence of these three components: hard rainwater, AMD, groundwater, and meteoric water. The abundances of AMD along the course of Lexington Creek, determined from the triangle of mixing, range from less than 10% at the head of the creek to more than 25% at its mouth. The abundance of the groundwater component increased downstream and reached about 65% at the confluence with Rush Creek. The pH of the water in this drainage basin ranges from 2.6 to 6.2. In addition, the suspended sediment consisting primarily of ferric hydroxide reaches a concentration of 185 mg/L. This concentration of ions at low pH and cations at high pH, thereby altering the chemical composition of the water. Nevertheless, our data show that Lexington Creek is impacted by AMD several decades after strip mining has ceased.
In sickle cell anemia, the red blood cells contain an abnormal type of hemoglobin caused by abnormal beta chains of the hemoglobin molecule. When this hemoglobin is exposed to low concentrations of oxygen, it precipitates into long crystals that give the erythrocyte a sickled or otherwise abnormal appearance. The precipitated hemoglobin also damages the cell membrane making the cells very fragile and leading to severe anemia. The purpose of this research is to identify some sickled erythrocyte shapes and describe mathematically their surface area and volume using the techniques of calculus. Important functions of normal cells are oxygenation, diffusion, and membrane deformation; these depend, in part, on the surface area to volume ratio of the cell. The surface areas and volumes of these sickled cells could be compared to normal cells to assess their functionality. Sickled cells are thought to have different surface area to volume ratios than normal cells and thus it is extremely important to investigate the surface area to volume ratios of these cell types. The cells chosen for this study are all of the “flat” type, not rotationally symmetric, and will be presumed to have a common thickness $t$. The types of cells studied thus far are named deltoid, astrid, and hypocycloid, as these are the plane curves that best represent their profiles. These derived results for surface areas and volumes give rise to certain parameters which can later be used for surface simulation using ratios for these cell types. Measurements of actual cells can be performed by using a light microscope monitor system. This study could help classify cells and explain the “why” of sickling relative to geometric considerations.

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Experimental Physiology:

Basic

9:00AM Saturday, April 1, 2000
Meyer Hall Room 114

Mary D. Gaahbauer - Presiding

9:05 EFFECTS OF DIETARY EXPOSURE TO 3,3',4,4'-TETRACHLOROBIPHENYL (PCB77) ON CHOLINE ACETYL TRANSFERASE ACTIVITY, AND SPATIAL LEARNING AND MEMORY IN 30-DAY-OLD RATS. Christina L. Bowen, Terri L. Provost, and Lee A. Morse, Bowling Green State University, Dept. of Biological Sciences, Bowling Green OH 43403. cbowen@bgnet.bgsu.edu Polychlorinated biphenyls (PCBs) are environmental contaminants that were first observed as a problem after about 40 years of industrial use. Placental and lactational PCB exposure to offspring cause metabolic and endocrine disruptions including depressed body weight, hypothyroidism, spatial learning and memory deficits, and neurochemical and neurobehavioral alterations. Previous work has shown that a mixture of PCB congeners resulted in smaller offspring, problems with spatial learning, and alterations in choline acetyltransferase (ChAT) activity. The present study concentrated on one specific coplanar congener of PCB. Pregnant female Sprague-Dawley rats were exposed to either a control diet (consisting of rat chow) or a treatment diet (consisting of standard chow with PCB 77 added at 1.25 ppm (LPCB) or 25 ppm (HPCB)). Offspring were tested for learning and memory via a Morris water maze, and ChAT activity was measured radiometrically. This study has shown that dietary exposure of 30-day-old-rats to LPCB and HPCB during gestation, lactation, and post-weaning diet elevated ChAT activity in the hippocampus and basal forebrain. Three groups of rats which were tested for 10 trials in a Morris water maze on days 20-24 for learning ability. The latency times to the platform were longer for controls than either PCB groups. After training, rats were assigned to either a memory group or one of two relearning groups. On day 29, the memory group rats were placed in the maze, and the control animals demonstrated longer latency than the PCB groups. Relearning was done on days 25-29, and involved either finding the platform after it was placed in a new position, or finding the platform from a new release point. The control groups took longer to relearn the water maze task than did the PCB exposed groups. These results show that ChAT activity and behavior are altered by PCB.

9:15 TESTOSTERONE EFFECTS ON CARDIAC FUNCTION IN THE MALE SPONTANEOUSLY HYPERTENSIVE RAT (SHR). Christine Spahn, Michael Herman, Galli Dunphy, Daniel Ely, University of Akron, Dept. of Biology, Akron OH 44325-3908. chrisspahn@hotmail.com

Males have a greater incidence of hypertension than females and one reason may be how testosterone(T) affects cardiac function. The objective of this study was to determine the effect of T on the contractility of rat hearts to see if it improves left ventricular (LV) function. Males have a greater incidence of hypertension than females and one reason may be how testosterone(T) affects cardiac function. The objective of this study was to determine the effect of T on the contractility of rat hearts to see if it improves left ventricular (LV) function. Males have a greater incidence of hypertension than females and one reason may be how testosterone(T) affects cardiac function. The objective of this study was to determine the effect of T on the contractility of rat hearts to see if it improves left ventricular (LV) function.

9:30 THE EFFECTS OF MATERNAL EXPOSURE TO POLYCHLORINATED BI-PHENYL (PCB77) ON CHOLINE ACETYL TRANSFERASE ACTIVITY, AND SPATIAL LEARNING AND MEMORY IN 30-DAY-OLD RATS. Christa L. Bowen, Terri L. Provost, and Lee A. Morse, Bowling Green State University, Dept. of Biological Sciences, Bowling Green OH 43403. cbowen@bgnet.bgsu.edu Polychlorinated biphenyls (PCBs) are environmental contaminants that were first observed as a problem after about 40 years of industrial use. Placental and lactational PCB exposure to offspring cause metabolic and endocrine disruptions including depressed body weight, hypothyroidism, spatial learning and memory deficits, and neurochemical and neurobehavioral alterations. Previous work has shown that a mixture of PCB congeners resulted in smaller offspring, problems with spatial learning, and alterations in choline acetyltransferase (ChAT) activity. The present study concentrated on one specific coplanar congener of PCB. Pregnant female Sprague-Dawley rats were exposed to either a control diet (consisting of rat chow) or a treatment diet (consisting of standard chow with PCB 77 added at 1.25 ppm (LPCB) or 25 ppm (HPCB)). Offspring were tested for learning and memory via a Morris water maze, and ChAT activity was measured radiometrically. This study has shown that dietary exposure of 30-day-old-rats to LPCB and HPCB during gestation, lactation, and post-weaning diet elevated ChAT activity in the hippocampus and basal forebrain. Three groups of rats which were tested for 10 trials in a Morris water maze on days 20-24 for learning ability. The latency times to the platform were longer for controls than either PCB groups. After training, rats were assigned to either a memory group or one of two relearning groups. On day 29, the memory group rats were placed in the maze, and the control animals demonstrated longer latency than the PCB groups. Relearning was done on days 25-29, and involved either finding the platform after it was placed in a new position, or finding the platform from a new release point. The control groups took longer to relearn the water maze task than did the PCB exposed groups. These results show that ChAT activity and behavior are altered by PCB.
should be genetically identical, they exhibit different phenotypes, as we described previ-
ously. It has been shown that while SHR/y and WKY female rats
are hypertensive rat strains. Differences between the strains may be the mechanism for the

Significant differences were seen in plasma catecholamine levels. In conclusion, NGF
administration to neonatal WKY and SHR/y pups days 1-21. The control groups, WKY (n=6) and
SHR/y (n=6), were

Plasma T was analyzed biweekly and Ca and P at 15 weeks. Urine collections (24h) were
collected from 10-15 EPIGENETIC MECHANISMS IN HYPERTENSION: IS ESTROGEN INVOLVED?

Plastic growth factor (1.34mg/l of NGF/ 7g of body weight) was injected daily into neonatal WKY (n=6) and
SHR/y (n=6) pups days 1-21. The control groups, WKY (n=6) and SHR/y (n=6), were

used. To increase SNS activity, nerve growth factor (NGF) and insulin-like growth factor (IGF-1) were used to determine hormonal differences between the strains. Plasma T was measured every 2 weeks.

The objective of this study was to determine the effects of neonatal nerve growth factor
(NGF) on renal electrolyte absorption and contribute to a rise in blood pressure in SHR and WKY rats. Traci L. Warner, Gail Dunphy, Dan Ely, University of Akron, Dept. of Biology, Akron OH 44325-3908. twarner2@uakron.edu

Studies have related testosterone (T) levels to hypertension and suggest T may influence renal sodium excretion. The hypothesis tested in this study was that T increases sodium reabsorption in blood pressure (BP) and blood pressure (BP)/ genotically identical strain. DNA is digested with Ava II, and Southern blot analysis performed to reveal any

The study investigated the effect of maternal low concentration (1.25 or 12.5 ppm) PCB exposure (Aroclor 1254 ®) and elevated (significantly in 12.5 ppm) at 30 days of age in both treatment groups compared to the same age control animal concentrations. These results suggest there are no
direct correlations between alterations in thyroid hormone status and IGF-1 status by PC exposure.

Experimental Physiology: Clinical

2:00 THE PHARMACODYNAMIC CHARACTERIZATION OF AN ANTISENSE OLI-
GONUCLEOTIDE AGAINST MAO-B IN THE RAT BRAIN. Kevin Haynes, Travis J. Worst, Michael D. Kane, and Jon E. Sprague, Ohio Northern University, The Rabbe College of Pharmacy, Dept. of Pharmaceutical & Biomedical Sciences, Ada OH 45810. k-haynes@onu.edu

Previous work has identified an effective antisense oligonucleotide, which effectively blocks monomeric oxidative (MBO-Q) translation and transcription. The present study was designed to characterize the pharmacodynamic properties of the antisense oligo-

nucleotide. Sprague-Dawley rats were surgically implanted with an intracerebroventricular (ICV) cannula, and the antisense oligonucleotide was administered via the cannula. Histochromic methods were designed to analyze MAO-B enzyme activity and were used to determine antise-sen effects on translational mechanisms. Reverse transcriptase poly-

merase chain reaction (RT-PCR) methods were designed to analyze the expression of MAO-B mRNA and were used to determine antise-sen effects on transcriptional mecha-

nisms. The results suggest enzyme activity decreases at 1, 12, and 24 hours after the
dosage of antisense, which correlates with the decrease seen in mRNA expression
seen 12 hours after the seventh dose. The finding that enzyme activity was reduced within
1 hour of the last dose and mRNA expression did not change until 12 hours after the last
dose, suggests that translational mechanisms are blocked before transcriptional mecha-
nisms. The dosing regimen appears to require a minimum of 7 doses to effectively
decrease enzyme activity. The method utilized in these studies allowed for in vivo measurements of translational and transcriptional mechanisms within the central nervous system.

2:15 CHROMOSOME 17Q GAIN ASSOCIATED WITH THE PEDIATRIC TUMOR
NEUROBLASTOMA. John J. Brown, Stephen J. Qualman, Althea Thomas, Jadwiga Lebanswoska, and Gail D. Wengler, Childrens Hospital, Cyto genetics Laboratory, 700 Childrens Dr, Columbus OH 43205. Brown.1484@osu.edu

As the most commonly diagnosed extracranial solid malignancy in children, neuroblastoma continues to have a mortality rate of approximately two-thirds despite decades of extensive research. Quantification of the oocyte NMyc, tumor cell poid analysis, and chromo-
some 1q loss of heterozygosity in conjunction with consideration of patient age and clinical stage allow categorization of value to the physician for the purposes of prognosis. It is of importance to identify additional genetic abnormalities that can assist in neuroblastoma therapy development and selection. We have performed fluorescence in situ hybridization (FISH) and comparative genomic hybridization (CGH) of neuroblastoma tumors to monitor the balanced gain of chromosome segment 17g2l-3q23. FISH of interphase cells was performed using differentially labeled probes: 17pT526-17(17p11.2-12) and myeloidplocerase (17q21-3q23). This method allows the distinction of an unbalanced 17q gain from a balanced change. Four tumors were studied by FISH; 3/4 showed unbalanced gains (1/4). This change was confirmed by CGH analysis in all 3 tumors. However, in 2/4 tumors studied using both FISH and CGH, concordance between results was not found. Consistently, the unbalanced gain of the chromosome 17q segment has been associated with NMyc amplification. The gain of chromosome segment 17q21-3q23 is commonly

found in patients with advanced poor prognosis neuroblastoma and could become a routine cyogenetic test. Although more labor- and time-intensive, preliminary data suggests CGH may allow more reliable assessment of Chromosome 17 status, as well as providing additional whole genome copy number change information. Additional development and validation of the FISH assay is required for routine clinical use.

2:30 MICROSOMAL EP Continue reading...
LUPUS: 1) ESTROGEN'S ROLE IN AUTOIMMUNE INDUCTION, AND 2) AN IN VITRO GLOMERULAR BINDING ASSAY FOR AUTOANTIBODY PATHOGENICITY. Kari Oliver A. Yui, Chuansheng Wang1, and Betty Diamond2, Hiram College, Depts. of Biology and Chemistry, Hiram OH 44234 and The Albert Einstein College of Medicine, yuka@hiram.edu

Autoimmunity, the condition in which the immune system reacts against self-antigens, underlies diseases such as rheumatoid arthritis, multiple sclerosis and systemic lupus erythematosus. (1) Neutrophil damage to basement membranes occurs in lupus. (2) The brain is affected by autoantibodies. (3) Anti-DNA antibodies in serum are a marker for disease activity in lupus. This study was designed to determine whether estrogen can induce lupus-like disease in female rats. Two strains of rats were used: WKY (Wistar-Kyoto) and SHR (Spontaneously Hypertensive Rat). The study was conducted for a three year time span, 1996-98. To determine if estrogen can induce lupus-like disease, a variety of parameters were measured: blood pressure, weight, and organ weights; plasma markers (anti-DNA, anti-Sm, anti-Scl-70, IgG, IgM, IgA, and complement); urine tests (protein and blood); and organ tests (kidney, liver, and lung). The results showed that estrogen did not induce lupus-like disease in female rats. However, the SHR strain did have higher blood pressure and organ weights, which is consistent with the hypothesis that hypertension is a risk factor for lupus. These results suggest that estrogen does not play a significant role in the induction of lupus-like disease in female rats.
2:30 THE EFFECTS OF ERYTHROPOIETIN (EPO) ON RETICULOCYTE COUNTS IN DIALYSIS PATIENTS RELATIVE TO PATIENT AGE, GENDER, RACE, EPO DOSAGE, AND DURATION OF RENAL DISEASE. Jennifer L. Johnson (Linda M. Young), Ohio Northern University, Dept. of Biological Sciences, Room 163 Meyer Hall, Ada OH 45810. jjohnson1@onu.edu

Patients with chronic renal dysfunction generally have reduced red blood cell (RBC) counts caused by the combined effects of erythropoietin deficiency and mechanical damage during dialysis. Consequently, the focus of this study is to determine the possible effects of recombinant human erythropoietin (rHuEPO) on anemia caused by renal dysfunction. This analysis is limited to a correlative study between patient reticulocyte counts and the following parameters: patient age, gender, race, rHuEPO dosage, and duration of renal disease. Monthly blood samples were collected from 45 dialysis patients and 5 healthy controls at Lima Memorial Hospital Renal Clinic. Manual reticulocyte counts were performed on all samples and the data correlated with the indicated parameters. Additionally, these samples were run on the Abbott Cell Dyne 3500 to verify agreement of automated versus manual reticulocyte counting as part of the laboratory's quality control program. Preliminary results indicate recombinant human erythropoietin is effective in the treatment of anemia caused by renal dysfunction.

9:00 IMAGE ANALYSIS AS A TOOL FOR PLANT POPULATION STUDIES. Sarah Emery, Julie A. Rodgers, Denison University, Slayter Box of 480, Granville OH 43023. emery@denison.edu

Image analysis is a tool for gathering information from visual images such as photographs. It has widespread application, but there has been relatively little published use of image analysis as a tool in plant ecology. We used NIH Image, a public domain image analysis program available from the National Institutes of Health, to study interspecific competition in the small, rosette-forming winter anemone, Drosera ventosa (Brassicaceae). We present our program available from the National Institutes of Health, to study intraspecific competition studies, (2) see various stages of the life cycle in one analysis session, (3) study the growth of individual plants, using NIH Image to measure changes in leaf area and rosette densities and in areas with debris was sometimes difficult; studying species with three-lobed leaves (10 saplings, each of 5 species), One-third of the seedlings in each plot received a browning tube. We evaluated growth and survival after one growing season. Saplings had greater overall survival (> 80%) than did seedlings (< 35%). All sapling species performed well with the exception of Cellos, which had ca. 50% mortality of saplings, 82% mortality of tubed seedlings, and 95% mortality of unprotected seedlings. Most of this mortality was attributable to drought. Quercus seedlings were the most heavily affected by deer browsing. Vole damage (bark stripping) was apparent on 5% of Fraxinus and 6% of Quercus seedlings. Survival of Cellos and Fraxinus seedlings was greater with tubes. However, survival of Jugland and Aesculus was greater without a browsing tube (82% vs. 92% respectively). While no treatment effects were obvious after one year, species and size class responses were demonstrable.
while the multiple cut plot stem densities began to decrease earlier in the growing season. Continuous cut and removal of reed shoots is the most effective method of treatment and to assess the performance of planted shrubs. Amur honeysuckle is a non-native, invasive shrub that is now common throughout southwestern Ohio. Various studies have shown that Amur honeysuckle has a negative impact on native plant diversity and abundance. The purpose of this study was to evaluate two methods for the eradication of Amur honeysuckle and to assess the relationship between the amount of Amur honeysuckle and the number of wild birds nesting on experimental plots.

**Animal Ecology and Behavior**

**02:00 PM Saturday, April 1, 2010**

**MEYER HALL ROOM 125**

**DANNY J. INGOLD - PRESENTING**

**2:00 RELATIONSHIPS BETWEEN SEED FALL OF THREE TREE SPECIES AND PEROMYSCUS LEUCOPUS AND CLETHRIONOMYS GAPPERI DURING 10 YEARS IN AN OAK-PINE FOREST**

Karen E. McCracken, Jack W. Wilham, and Malcolm L. Hunter Jr., University of Maine, Defiance College, Dept. of Natural Sciences, Defiance OH 43512. kmccracken@tdc.edu

We analyzed live-trapping data from 10 years (1983-1992) of a long-term study of forest ecosystems in southern Maine to investigate relationships between seed fall of red oak (Quercus rubra), white pine (Pinus strobus), and red maple (Acer rubrum), and populations of Peromyscus leucopus and Clethrionomys gapperi. Population data were collected in 10 plots within the forest ecosystem (3 red oak, 3 white pine, and 4 red maple) from 1983 to 1992. Data were analyzed using logistic regression and multiple regression models.

**2:15 THE Hibernating bats of zane-shawnee Cavern, Logan County, Ohio**

Jennifer L. Cudney (Carl W. Hoagstrom), Ohio Northern University, Dept. of Biological Sciences, Ada OH 45810. j-cudney@onu.edu

Zane-Shawnee Cave is a commercial cavern in Logan County, Ohio. Despite the commercial use of the cavern throughout the winter, a number of bats use it as a hibernaculum. The bats are being censused periodically to determine the importance of the cavern as a hibernaculum. At each census, bats are counted by a group of at least three persons searching the main cavern. Each bat's location in the cavern, position (on the wall or ceiling), and height from the floor of the cavern are recorded. Observation from one year (the winter of 1996-1997) and quantitative data, collected as described above from two years (1996-1997 and 1997-1998), resulted in some preliminary conclusions: (1) Bat counts have been quite reproducible among censuses. (2) Hibernating bat populations of eastern pipistrelles (Pipistrellus subflavus) and big brown bats (Eptesicus fuscus) have been constant from year to year (about 50 and 20 respectively). (3) Little brown bats (Myotis lucifugus) use the cavern more sporadically, either hibernating there some years, and not others, or using the cavern as a transect route in travel between their hibernaculum and summer range. At least one northern long-eared bat (Myotis septentrionalis) roosted in the cave for at least two weeks in the spring of 1999, probably in transit from its hibernaculum to its summer range. Zane-Shawnee Cavern is used by at least four species of bats and should be considered a valuable asset to the bat community of Logan County.

**2:30 ARE ENVIRONMENTAL FACTORS RESPONSIBLE FOR THE DECLINE IN CHELOMIA MYDAS AGASSIZI (BLACK TURTLE) POPULATIONS OF BAHIA MAGDALENA, MEXICO? Jennifer L. Cudney and Regina Woodrom Luna (Luis E. Calderon), Ohio Northern University, Dept. of Biological Sciences, Ada OH 45810. j-cudney@onu.edu

Bahia Magdalena is a vital habitat in the life cycle of black turtles, which migrate to the area after hatching to grow and develop through intensive feeding on red algae, sea grass and eventually invertebrates and fish. After an unknown period of time (8 to 20 years), turtles migrate back to their nesting beaches to reproduce. The feeding grounds support an estimated but declining population of 3000 to 5000 turtles. These turtles are an important component of the Bahia Magdalena ecosystem, and were an economic asset to the people of coastal towns as they were hunted to fulfill an international demand for turtle products. Loopholes in current laws permit fishermen to keep turtles that are incidental bycatch. To assess the effect of environmental factors on the black turtle population, we evaluated the water quality (pH, salinity, dissolved oxygen, turbidity) and the primary production (light and dark bottle method) in different locations in Bahia Magdalena. We estimated the sea grass and algae abundance (using quadrants), we collected benthic invertebrates (core sampling), and conducted observation and gut content analysis of turtles and other predominate species. The estimated biomass of black turtles, seagulls, and invertebrates in Magdalena Bay were 0.5 km³. 1.85 km²/100 km², and 102.5 km² respectively. The data compared with past studies on physiological and nutritional needs of turtles indicate that Bahia Magdalena is a suitable habitat for the black turtle. It is presumed that illegal catching and other anthropogenic factors are responsible for the decline of the black sea turtle population.

**2:45 ACID RAIN, EGGSHELL-THINNING, AND THE EXTINCTION OF THE PASSenger pigeon. Jack Kovach, Muskingum College, Geology Dept., New Concord OH 43762. jkovach@muskingum.edu

The suggestion that acid rain from industrial pollution is the most likely cause of the progressive thinning of the shells of eggs of British thrushes (Turdus spp.) over the past 150 years causes one to wonder if this phenomenon may have played a role in the extinction of the passenger pigeon (Ectopistes migratorius) in North America. With a population estimated at 2 to 5 billion (Schorger, 1935, The Passenger Pigeon: Univ. Wis. Press, Madison), concentrated in huge flocks, the calcium requirements for eggshell development in passenger pigeons, although apparently only one egg was laid by the nesting female (ibid., p. 109), would have been sizeable. Hence any reduction of the calcium content of mast (the preferred diet of passenger pigeons (ibid., p. 35)) and of leaf litter consumed by earthworms (‘sought and eaten with avidity’ by passenger pigeons (ibid., p. 47) or reduction in abundance of land snails (‘sought eagerly by the pigeons,’ ibid., p. 45), all of which are documented effects of acid rain, may have resulted in eggshell-thinning and a reduced reproductive success that may have contributed to the bird’s decline and eventual disappearance. Evidence from paleoecological studies and other sources indicates that industrial pollution in eastern North America was rapidly increasing during the time frame in which the passenger pigeon declined to extinction.

**3:00 HABITAT USE AND REPRODUCTIVE SUCCESS OF GRASSLAND NESTING BIRDS ON A RECLAIMED STRIP-MINE. Danny J. Ingold, Muskingum College, Biology Dept., New Concord OH 43762. d-ingold@muskingum.edu

Although reclaimed strip-mines are artificial ecosystems, they provide a refuge for a variety of grassland birds, whose populations are declining and that might not otherwise survive in the area (e.g., Henslow’s sparrows, Ammodramus henslowi; grasshopper sparrows, A. savannarum; short-eared owls, Asio flammeus). During the 1997 and 1998 breeding seasons habitat selection and the nesting success of grassland birds were studied on a 3,700 ha reclaimed stripmine (the Wilds) in Guernsey, Muskingum, and Noble counties in eastern Ohio. Grasshopper sparrows, eastern meadowlarks (Sturnella magna), short-eared blackbirds (Agelaius phoeniceus) and Henslow’s sparrows were the most abundant and most successful nesting species on the reclaimed mine. Short-eared owls and Henslow’s sparrows avoided nesting on plots that were mowed just prior to the onset of nesting. There were significantly more nests (P < 0.05) of all species located on unmowed versus mowed plots during both years, and pairs using mowed plots tended to initiate nesting later in the season. Red-winged blackbirds were more abundant and most successful nesting species on the surrounding control plots. A Mayfield analysis indicated that mow-plot sparrows had the greatest nesting success on the experimental plots, followed by red-winged blackbirds and eastern meadowlarks. Nests on mowed plots suffered higher predation rates (41%) than did nests on unmowed (39%) and control (38%) plots. These data suggest that Henslow’s sparrows, short-eared owls, grasshopper sparrows and other uncommon grassland breeders in Ohio, are benefiting from this expansive, reclaimed surface mine.

**3:15 SMALL MAMMALS OF THE WABASH MAROINE, HARDIN COUNTY, OHIO. Carl W. Hoagstrom, Ohio Northern University, Dept. of Biological Sciences, Ada OH 45810. c-hoagstrom@onu.edu

The Wabash Moraine was deposition by the retreating Wisconsin glacier. It dammed the northerly flow of the Scioto River, eventually turned the river south and simultaneously created the Scioto Marsh in Hardin County, Ohio. Two live-trap grids set on the moraine have been monitored since 1977, to follow changes in the small mammal communities. One grid of 100 traps was in a woods and the other, with 79 traps, was in an abandoned farm.

**Program Abstracts A-35.**
field. Each grid was trapped six times at approximately eight hour intervals over a two day period each April and October. Captured animals were identified to species, marked with a unique toe clip number, sexed, aged, checked for parasites and injury, weighed and released. Qualitative sex ratios (at least 60 animals per species per study) were obtained by examining the genitalia. The small mammal community of the field changed more than that of the woods, probably because of greater changes in the vegetation due to ecological succession.

3:30 ANALYSES OF FLORIDIAN HISTORICAL BIOGEOGRAPHY AND LATE CENOZOIC PALEOGEOGRAPHY USING WOLF SPIDERS (LYCOSIDAE: GEOLYCOSA) AS A MODEL TAXON. Kory A. Thornburg (Walter R. Hoeh, Sammuel D. Marshall), Kent State University, Dept. of Biological Sciences, Kent OH 44242. kthornbu@kent.edu

The endangered Florida scrub habitat is limited to irregular upland sand ridges and dunes systems which are typified by low, sparse vegetation and patches of dry, sterile sand. This habitat is being rapidly destroyed by fire suppression, which leads to succession of naturally open habitats to closed xeric oak hammocks, and development for citrus cultivation and housing. Optimal choices of white to covert conservation efforts focus on sites that are not associated with the endangered Florida scrub. Geolycosa wolf spiders, with their limited dispersal and narrow habitat requirements, are an ideal model taxon for studying both diversity patterns and biogeographic history of Florida scrub. Currently, 15 species of Geolycosa have been described based on a limited number of morphological characteristics. As a result, the species limits and evolutionary relationships are poorly understood. The goals of this project are to (1) estimate the evolutionary relationships among Geolycosa species using comparisons of cytochrome c oxidase subunit I (COI) DNA sequences, and (2) use these relationships to infer the historical pattern of Floridian scrub habitat evolution. Geolycosa individuals from a total of 33 Florida scrub sites were collected and identified based on morphological characteristics. DNA sequences for 15 individuals representing 15 different collection sites have been cycle sequenced. To date, the DNA fragments from 14 individuals representing 14 different collection sites have been cycle sequenced.

3:45 THE EFFECTS OF HETEROGERA GLYCINES ON OVERALL HEALTH AND YIELD IN GYLCINE MAX. Benjamin R. Smith and Linda M. Young, Ohio Northern University, Dept. of Biological Sciences, Room 163 Meyer Hall, Ada OH 45810. b-smith@onu.edu

Since yields is that FAK is involved in the ability of neuronal cells to survive in suspension. Recently, I have been cycle sequenced.

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MOLECULAR BIOLOGY

09:00AM Saturday, April 1, 2000

Meyer Hall Room 126

Amy Lynne Aulthouse, President

9:00 THE ROLE OF FOCAL ADHESION KINASE IN NEURONAL CELL ADHESION. Alison McCormack (Dr. Catherine N. Smith), Denison University, Slayter Box 1374, Granville OH 43023. mcormack@denison.edu

Adhesion in normal cells is necessary for cell survival in that cells die due to lack of adhesion. This process, called anoikis, has been studied in depth in fibroblasts, but not in neuronal cells. When fibroblasts lose adhesion, they become multinucleated, multinucleated, and eventually die. The role of focal adhesion kinase (FAK) in neuronal cell adhesion is not well understood. FAK has been shown to be expressed in the nervous system and has been implicated in cell migration and extracellular matrix proteins. When constitutively active, FAK also contributes to survival of epithelial cells in suspension. The hypothesis being tested in these studies is that FAK is involved in the ability of neuronal cells to survive in suspension. Recently, I have established a novel model of the B103 rat neuronal carcinoma line called, B103-AM, that can survive in suspension. In these cells, which can resist anoikis, levels of FAK protein and levels of FAK phosphorylation will be analyzed through immunoprecipitation, SDS-PAGE, and western blot.
9:15 IDENTIFICATION OF A 0.7kb INSERT FOUND IN LYMANTRIA DISPAR MULTINUCLEOCAPSID NUCLEAR POLYHYDROSIS VIRUS FOLLOWING SERIAL PASSAGE. Rachel M. Johnson, (Holly J.R. Popham, James M. Slavicek); Ohio Wesleyan University, USDA Forest Service, 359 Main Rd., Delaware OH 43015. rmjohnso@cc.owu.edu

Lymantria dispar Multinucleocapsid Nuclear Polyhedrosis Virus (LoMNPV) is a naturally occurring virus, pathogenic to Lymantria dispar, commonly known as the gypsy moth. This virus belongs to the family Baculoviridae, and exhibits the family trait of producing cuboidal or polyhedra-shaped intracellular protein structures that encase infectious virus. Because LoMNPV infects this notorious pest, its genetic characteristics have been studied for future application in biocontrol methods. This virus, which has the tendency to pick up mutations, exhibits the addition of a 700 base pair insert in several isolates after seral passage in cell culture. Because these isolates appear to naturally select for this insert, studies to characterize this 0.7kb area were conducted to determine the advantage it imparts. The possible correlation of this insert to the rate of replication and the amount of apparent budded virus production was examined by comparison of the viral growth curves of isolates with and without the insert (122-fp, and 122-2 respectively). This assay showed no differences between the two strains, and no correlation of the insert to either rate of replication or apparent budded virus production. Further study was conducted by restriction enzyme characterization of the area surrounding the insert. In continuing work, this area will be cloned. Furthermore, sequencing of the insert will be performed after it has been subcloned to a suitable size. An analysis of the open reading frames (ORFs) will be conducted to determine how the insert alters existing ORFs or if a new ORF is present. Results will contribute to generating a more stable isolate of LoMNPV, which would be more suitable for biocontrol applications.

9:30 THE EFFECTS OF MECHANICAL, BIOLOGICAL AND CHEMICAL TREATMENT METHODS ON AN INVASIVE PLANT, THE GIANT REED (Phragmites australis). Curt S. Schaeffer, Dr. David A. Franco, Miami University, Dept. of Botany, Oxford OH 45056. mrmustard7@adelphia.net

The native flora of Mentor Marsh, a Lake Erie coastal wetland near Cleveland, OH, is being replaced by an exotic invasive species, Phragmites australis. In 1998, we conducted a pilot study that showed that controlling and limiting the spread of this species was possible and seedbank species could re-establish. A 1999 large-scale study was designed to observe the response of P. australis to several treatments. Treatment methods were applied as follows: cutting and removal of emerging shoots of P. australis, treatment one coupled with application of herbicide and both covering with shade cloth or planting Typha latifolia, and combinations of treatment and removal of shoots. Control plots were left untreated. Stem counts were taken every three or four weeks along with species occurrence, conductivity and water temperature and depth on sixty 5m2 cells. After 15 weeks, control plots and single-cut plots exhibited a mean stem count of 81 +/- 10 /m^2 and 94 +/- 17 /m^2 respectively. The multiple cut plots had a mean stem count of 4 +/- 2 /m^2 and a p-value of >0.0001. Both single cut and control plots exhibited increasing stem densities up to the end of the growing season, while the multiple cut plots densities began to decrease earlier in the growing season. Continuous cut and removal of seed shoots is the most effective method of treatment examined in this study.

9:45 CHARACTERIZATION OF THE Smcy GENE IN THE SPONTANEOUSLY HYPERTENSIVE RAT. Kristina L. Brady, Amy Milsted, University of Akron, Dept. of Biology, Akron OH 44325-3988. kbrady@akron.edu

The Y chromosome is isolated on the sex chromosomes of many mammals. It encodes a portion of the H-Y antigen that has been found to be responsible for male to female rejections in organ and bone marrow transplants. It has been hypothesized that the Smcy gene may also be involved in spermatogenesis. The object of this present study is to characterize the rat Smcy gene. Six genomic clones were isolated from the male rat SHR/Kc gene library, indicating that there is probably only a single copy on the Y chromosome. The Smcy gene is not found in female rats of this same species. It is known that Smcy is widely conserved across species. Homology of the gene range from 70 to 85 percent. Based on this knowledge, primers for PCR were designed by analyzing gene sequences from other species. The primers we used are found in mice at nucleotides 672-691 and 793-774, suggesting that they should amplify a specific band of around 120 bp. However, we found other species. The primers we used are found in mice at nucleotides 672-691 and 793-774, suggesting that they should amplify a specific band of around 120 bp. However, we found no differences between the two strains, and no correlation of the insert to either rate of replication or apparent budded virus production. Further study was conducted by restriction enzyme characterization of the area surrounding the insert. In continuing work, this area will be cloned. Furthermore, sequencing of the insert will be performed after it has been subcloned to a suitable size. An analysis of the open reading frames (ORFs) will be conducted to determine how the insert alters existing ORFs or if a new ORF is present. Results will contribute to generating a more stable isolate of LoMNPV, which would be more suitable for biocontrol applications.

10:00 DIFFERENTIAL EXPRESSION OF DIRECTED PROTEIN GENE HOMOLOGUES IN LOCLOBOLLY PINE. Jodi E. Creasap, Admon Atenorla, Mi Kwon, Laurence Davin, and Norman G. Lewis; Hiram College, P.O. Box 1211, Hiram OH 44234, and Washington State University, creasaj@hiram.edu

Four dirigent protein gene homologues in loblolly pine were investigated for possible involvement in lignin and lignin formation. Of the four homologues, two were found to be involved in lignin or lignin formation, while the other two were connected with neither process. Measurement of mRNA levels using Real Time Quantitative PCR (RTQPCR) showed that two homologues (8730M and 8811M) are not involved in lignin or lignin formation, since they are found most abundantly in non-lignified areas of the plant and are not involved in lignifying or lignin-forming cell cultures of Pinus flexus. In differentiated tissues of the plant, one homologue (9212M) is found 2 to 20 times more than the other predominant homologue (8989M). HPLC analysis of cell suspension cultures from 8% sucrose and 6% sucrose/0.5mM potassium iodide media, together with measurement of mRNA levels by RTQPCR, demonstrate that 9212M is associated with the formation of lignin, and 8989M is involved solely in lignin biosynthesis.

10:15 A MOLECULAR ASSESSMENT OF INFRASPECIFIC GENETIC VARIATION IN DRABA Verna L. USING ISSR (INTER-SIMPLE SEQUENCE REPEAT) MARKERS. Michael S. Barker, Denison University, Slayter Box 327, Granville OH 43023. barker.m@denison.edu

Many localized populations of the winter annual Draba (Erophila) verna L. consist of morphologically and cytologically similar individuals. Presumably these similarities are a consequence of obligate self-fertilization. Using ISSR (Inter-Simple Sequence Repeat) markers, I examined infraspecific genetic variation of D. verna populations from Indiana, Ohio, and New York. A total of 85 polymorphisms were generated from six ISSR primers. Within each of four populations of D. verna, one or two genotypes were detected. UPGMA cluster analyses were used to assess genetic variation among individuals representing 20 populations of D. verna individuals from Athens County, Licking County, and Erie County, Ohio consist of the same D. verna genotype, whereas different genotypes were detected in populations from Athens County, Delaware County, and other sites in Licking County, Ohio. Individual genotypes did not correlate well with geographic distribution, and thus formed a mosaic pattern. This type of distribution is best explained by the lack of a seed dispersal mechanism, which may localize D. verna genotypes. Any seed dispersal that occurs may be attributed to human activities, and thus may result in the observed mosaic distribution pattern. Currently, I am examining 100 D. verna individuals from the above 20 populations to further assess within-population variation.

10:30 CHARACTERIZATION OF A RAT SHR Y CHROMOSOME CLONE. Michelle Bowman (Dr. Amy Milsted, Bin Zeng), University of Akron, Dept. of Biology, Akron OH 44325-3988. bmichelle4@yahoo.com

Previous research has shown that a focus on the Y chromosome increases blood pressure in the spontaneously hypertensive rat (SHR). A suggested candidate for this is Sry, since it encodes a transcription factor and is present in several copies. We are currently searching for these extra copies of Sry. To start, we screened the rat SHR library using a hybridization probe made by amplifying the Sry HMG box from the male DNA with P1/M1 primer set. 19 positive clones were obtained. One of these clones, designated S167, contains approximately 750 base pairs. Our strategy is to generate a restriction map and to sequence S167 using silver sequencing. The sequence obtained will be used in homology searches of other copies of Sry. A Southern blot will confirm that this particular clone is male-specific (found only on the Y chromosome). The acquired information from S167 will help further our knowledge of the Y chromosome structure and organization.

10:45 THE EFFECTS OF GLYCOSAMINOLYCAN SUPPLEMENTATION ON PROTEOGLYCAN SYNTHESIS AND CHONDROGENESIS BY HUMAN CHONDROCYTES IN CULTURE. Katherina J. Montgomery, Amy L. Aulthouse, Ohio Northern University, Biology Dept, Ada OH 45810. k-montgomery1@onu.edu

Homeopathic agents reduce inflammation and pain in injured joints and also purportedly stimulate cartilage regeneration, as opposed to prescribed non-steroidal anti-inflammatory drugs (NSAIDs) that prevent cartilage repair by inhibiting chondrocyte metabolism. This study analyzed the effects of glucosamine sulfate, a homeopathic compound, on chondrocyte metabolism and matrix production. Human chondrocytes first grown in monolayer culture were then transferred into an agarose gel culture in order to regain the chondrocyte phenotype. The cells were treated twice weekly with Dulbecco's Modified Eagle Media (DMEM) containing glucosamine sulfate (50mg/ml). Treatment was divided into four schedules: A) parallel untreated control B) treated four weeks consecutively C) treated two weeks then untreated two weeks D) untreated two weeks then treated two weeks. N=10 cultures for all groups except C (N=5). Proteoglycan synthesis was measured qualitatively by staining with alcian blue and comparing the number of cells and cell clusters with and without stained matrix. Metabolic activity was measured by counting the number of single cells versus cell clusters (indicates miosis). The blue trypan exclusion assay determined cell viability. Comparisons among means were analyzed by ANOVA with LSD multiple comparisons post hoc test (p<0.05). Overall a trend of decreasing miosis approached significance between groups A and D (p=0.054). There was a significant decrease in matrix production between group A and every other group (p=0.035, p=0.031, p=0.003). The nearly identical matrix data from groups B and C (p=0.977) suggest no recovery from deleterious effects. The results of this preliminary study suggest a decrease in mitosis and matrix production by cells treated with glucosamine sulfate with no recovery, regardless of when the substance is introduced during the culture period.
2:00 RANDOMLY AMPLIFIED POLYMORPHIC DNA MARKERS: CONSERVATION AND MANAGEMENT IMPLICATIONS. Wilson W. Mwanja, Les Kaufman; Paul A. Fuerst*; 1 Ohio State University, Dept Evolution, Ecology and Organismal Biology, Columbus OH 43210 and 2Boston University Marine Program, Dept Biology. Mwanja.873@ouo.edu

The fishery of the Lake Victoria basin, dominated by the Cichilae family of fishes, has suffered significant species loss due to over fishing, lake basin environmental changes, and introduction of non-indigenous species in most of the lakes in the basin. Among species severely affected were two endemic Tilapiine species, Oreochromis niloticus and Oreochromis cichlids known as ngege. Ngege has nearly been exterminated from Lake Victoria and currently survives as small isolated remnant populations in several small satellite lakes in which it was introduced from small brood stocks and coexisting with other introduced more ecologically versatile non indigenous congers. Of immediate danger is genetic interaction with ngege's sister species, the introduced Oreochromis niloticus. In this study, Random Amplified Polymorphic DNA (RAPD) molecular markers were used to examine and characterize the remnant populations of ngege of Lake Victoria basin. Eight primers were used to generate 140 RAPD markers for seven ngege populations. Populations exhibited much higher between-population (H1 = 0.613) than within-population (H2 = 0.152) genetic diversity. Populations exhibited genetic differentiation with characteristic private alleles (29.2%) amongst all the populations. Populations that coexisted with O. niloticus showed relatively higher level of polymorphism as well as higher diversity than those that did not coexist with O. niloticus. We suggest protection against interaction with O. niloticus in lakes in which O. cichlids is dominant or does not coexist with O. niloticus yet. With geographically close lakes enhancement of the genetic status of O. cichlids through limited gene flow between isolated populations is recommended. (Research was partially supported by grants from the National Science Foundation, The Rockefeller Foundation, and the Pew Charitable Trusts and the Columbus Zoo).

2:15 POTENTIAL TO ENHANCE NODULE OCCUPANCY OF SELECTED IMPROVED RHIZOBIAL STRAINS IN PHASEOLUS VULGARIS GROWN IN TROPICAL SOILS. Mari-Vaughn V. Johnson, Ohio University, Dept of Environmental and Plant Biology, Porter Hall, Athens OH 45701. mj35592@ohio.edu

Rhizobia and leguminous plants form a symbiotic relationship, in which the bacteria fix atmospheric nitrogen, making nitrogen accessible to the plant, and the bacteria are afforded protection and energy. A mutant Phaselsus vulgaris has been identified, which does not allow nodulation with most strains of rhizobia. However, three permitted strains of rhizobia have been found that will nodulate the restorative host: USDA8303, USD4041, and USD4017. A plasmid containing the Green Fluorescent Protein (GFP) has been inserted into the USDA8303 strain via tri-parental mating; this permits distinction between nodules formed by USDA9032 and those formed by native rhizobia. Soil samples containing native nodules were taken from various leguminous crop fields in Belize and Guatamala. Restorative host plants were grown in the soil samples, plants were inoculated with GFP containing USDA9032 Rhizobia two days after germination. Competition between native rhizobia and USDA9032 is being determined by the ratio of nodules occupied by GFP containing rhizobia compared to those occupied by native rhizobia. The outcome of this experiment will determine the feasibility of improving nitrogen fixation in beans by increasing the occupancy of nodules on field grown beans with select rhizobial strains, to the exclusion of resistant native rhizobia.

2:30 EXAMINING THE MOLECULAR SIGNALS EXCHANGED BETWEEN A MUTANT PHASEOLUS VULGARIS AND SPECIFIC RHIZOBIUM STRAINS. Sarah L. Bashore, Ohio University, Dept. of Environmental and Plant Biology, Porter Hall, Athens OH 45701. sb332892@ohio.edu

Rhizobium species form a symbiosis with leguminous plants. The bacteria fix atmospheric nitrogen for the plant and in return the bacteria with energy and protection. A mutant Phaselsus vulgaris was found that restricts nodulation by native rhizobia strains. Laboratory screening showed that three rhizobium strains were able to overcome this mutation and nodulate the plant. The plant exudates of the wild-type host were not able to nodulate the mutant plant, and the plant in turn provides the bacteria with energy and protection. A mutant Phaseolus vulgaris has been identified, which does not allow nodulation with most strains of rhizobia. However, three permitted strains of rhizobia have been found that will nodulate the restorative host: USDA8303, USD4041, and USD4017. A plasmid containing the Green Fluorescent Protein (GFP) has been inserted into the USDA8303 strain via tri-parental mating; this permits distinction between nodules formed by USDA8303 and those formed by native rhizobia. Soil samples containing native nodules were taken from various leguminous crop fields in Belize and Guatemala. Restorative host plants were grown in the soil samples, plants were inoculated with GFP containing USDA8303 Rhizobia two days after germination. Competition between native rhizobia and USDA8303 is being determined by the ratio of nodules occupied by GFP containing rhizobia compared to those occupied by native rhizobia. The outcome of this experiment will determine the feasibility of improving nitrogen fixation in beans by increasing the occupancy of nodules on field grown beans with select rhizobial strains, to the exclusion of resistant native rhizobia.

3:00 CHLOROPLAST DNA SEQUENCES CONFIRM A NORTH AMERICAN-HISPANIOLAN PHYTOGEOGRAPHIC CONNECTION IN THE VIOLA MACLOSKYEI COMPLEX. Bryan J. Rayo and Harvey E. Ballard Jr., Ohio University, Dept. of Environmental and Plant Biology, Porter Hall, Athens OH 45701. bb35757@ohiou.edu

New World 'sternless white' violets (Viola subsection Stobbioides Kupfer) comprise nine perennial species of mesic to wet habitats. The Viola maclokeyei complex is representative of this group and shows divergence and specialization among populations in southwestern Oregon, transcontinental V. maclokeyei ssp. patterns (Sing.) Hitchc., and V. domingensis. Urban and montane openings in Dominican Republic cloud forests. Recent pheologic studies have failed to separate V. maclokeyei ssp. pattems from the Hispaniolan 'endemic' but sharply distinguish V. maclokeyei ssp. maclokeyei from this aggregate. Geographical variation has been recovered from mtDNA chloroplast spacer sequences for both populations from taxa in the maclokeyei complex. Midwestern V. maclokeyei ssp. pattems and V. domingensis are virtually identical but diverse from northeastern and western North America populations, and from V. maclokeyei ssp. pattems from the Hispaniolan 'endemic' but sharply distinguish V. maclokeyei ssp. maclokeyei from this aggregate. Geographic variation has been recovered from mtDNA chloroplast spacer sequences for both populations from taxa in the maclokeyei complex. Midwestern V. maclokeyei ssp. pattems and V. domingensis are virtually identical but diverse from northeastern and western North America populations, and from V. maclokeyei ssp. pattems from the Hispaniolan 'endemic' but sharply distinguish V. maclokeyei ssp. maclokeyei from this aggregate. Molecular data suggest a long-distance dispersal event to Hispaniola during the Pleistocene or early Holocene, perhaps from populations presently represented in the southern Appalachians. Future research will access Inter-Simple Sequence Repeat variation in eastern North Americans and Dominican Republic populations to refine the biogeographic source area and compare genetic differentiation in the two regions. Approximately a dozen angiosperm groups inhabit Antillean cloud forest openings as well as wetlands in temperate North America. Molecular phyogeographic investigations of the V. maclokeyei complex will hopefully clarify evolutionary events underlying a hitherto unappreciated North American-Antillean relationship integral to the formation of cloud forest wetlands in the Greater Antilles.

3:30 A MOLECULAR PHYLOGENY OF CORALLORHIZA (ORCHIDACEAE) AND RELATED GENERA BASED UPON THE INTERNAL TRANSCRIBED Spacer (ITS) REGION OF NUCLEAR RIBOSOMAL DNA. Diana M. Sensyo, John V. Freundstein, Kent State University, Dept. of Biological Sciences, Kent OH 44242 and Ohio State University, Dept. of Evolution, Ecology and Organismal Biology, dsensyo@kent.edu

Corallorhiza Gogin (Orchidaceae) is comprised of eleven species of tufted, rootless, mycohyal orchids. Closely related genera (Aplectrum, Cremastra, and Oreorchis) all possess leaves and roots. Because Corallorhiza is characterized by loss of structure, morphological evidence provides only weak support for the monophyly of the genus. Reduced numbers of morphological characters have also made phylogenetic reconstruction within the genus difficult. ITS sequences were generated for multiple accessions of Corallorhiza (representing 8 of 11 spp.), Aplectrum (1 of 1 sp.), Cremastra (2 of 2 spp.), and Oreorchis (1 of 16 spp.), for use in cladistic analysis. Cowen's was used as outgroup. Data were obtained using PCR methods and automated sequencing, and analyzing using parsimony. Molecular characters provide support for the monophyly of Corallorhiza. Relationships suggested among the genera are: Aplectrum (Cremastra (Oreorchis, Corallorhiza)). Within Corallorhiza, relationships among species are largely congruent with previous phylogenetic hypotheses, with the exception that C. mer tersiana and C. bulbosa appear to have been derived from within C. macloskeyi. Previous hypotheses have been that C. bulbosa (Cremastra (Oreorchis, Corallorhiza)). Within Corallorhiza, relationships among species are largely congruent with previous phylogenetic hypotheses, with the exception that C. mer tersiana and C. bulbosa appear to have been derived from within C. macloskeyi. Previous hypotheses have been that C. bulbosa (Cremastra (Oreorchis, Corallorhiza)). Within Corallorhiza, relationships among species are largely congruent with previous phylogenetic hypotheses, with the exception that C. mer tersiana and C. bulbosa appear to have been derived from within C. macloskeyi. Previous hypotheses have been that C. bulbosa (Cremastra (Oreorchis, Corallorhiza)). Within Corallorhiza, relationships among species are largely congruent with previous phylogenetic hypotheses, with the exception that C. mer tersiana and C. bulbosa appear to have been derived from within C. macloskeyi. Previous hypotheses have been that C. bulbosa (Cremastra (Oreorchis, Corallorhiza)).
PMA INDUCED DOWN REGULATION OF SPECIFIC PROTEIN KINASE C ISOZYMES AT VARIOUS TIME INTERVALS. Carol A. Heckman and Jason M. Urban, Bowling Green State University, Dept. of Biological Sciences, Bowling Green OH 43403.

We investigated the possible role of protein kinase C (PKC) in mediating morphological changes in the rat trabecular cell line, 1000W. When treated with phorbol 12-myristate 13-acetate (PMA) these cells undergo similar actin-based changes as those mediated by rho-family G-proteins. Previous results revealed that PMA treatment stimulates ruffling at the 2.5-hour interval possibly due to the down-regulation of certain PKC isozymes by phorbol esters. The purpose of this work was to determine whether any isozymes were depleted at the interval when ruffling peaks. Six isozymes known to be present, PKCα, β, δ, ε, γ, and ζ, were quantified. Cell cultures were treated with PMA and collected at 0, 0.5, 2, 5, 10, and 15 hours. Isozyme presence was determined by immunoprecipitating PKC with specific antibody and running the precipitated protein on SDS-PAGE, followed by measuring protein content from gel bands (GelPro® analyzer). There was a marked decrease in immunoprecipitable PKC-ε after 5 hours. PKC-ε was depleted, and PKC-γ displayed the same variations in down-regulation; decreasing, increasing, and decreasing at 5.10 and 15 hours respectively. The remaining isozymes (band t) displayed a constant intensity. It may be possible that the down-regulation of PKC-α, β, and γ are individually or collectively responsible for an increase in ruffling activity.

ARE MUTATIONS RESPONSIBLE FOR THE DIFFERENCES IN mRNA LEVELS OF THE RENIN AND ANGIOTENSINOGEN GENES IN RATS WITH THE SAME GENETIC BACKGROUND? Ashwini Viswanathan, Aly Milsted, University of Akron, Dept. of Biology, Akron OH 44325-3908. ashwini@uakron.edu

In a study conducted earlier to evaluate whether renin and angiotensinogen gene expression in females from two strains of rats (WKY and SHR) that share the same autosomes and X chromosomes differs, it was found that the renin and angiotensinogen mRNA levels differ between the strains and appear to be regulated coordinately within each strain. A possible explanation is that a mutation in renin and angiotensinogen genes has occurred in one strain, but not in the other, or that some factor that co-regulates expression of both renin and angiotensinogen mRNA has undergone a mutation in only one strain. Our hypothesis is that mutations have not occurred in the 19 generations since the SHR strain was developed (from the parent SHR strain). We are investigating whether mutations have occurred in the coding sequences or in the regulatory regions of these genes. We designed 13 primer sets for renin and 8 primer sets for angiotensinogen to cover the entire protein-coding region of each gene. Results of this study are expected to rule out mutations, in renin and angiotensinogen as the cause of the phenotypic differences in gene expression between the WKY and SHR females. When I compared the first 101 bp pairs obtained by sequencing to already existing sequences of the rat angiotensinogen gene I found 100% homology. Therefore, it proves that mutations may not be the reason for the differences in mRNA levels is genetically similar rats. Depending on these results we may also sequence into the regulatory regions.

EXTRACTION OF ACANTHAMOEBA SP. DNA FROM PARAFFIN-EMBEDDED CORNEAL TISSUE SECTIONS. Joe Wernet, Katherine Osborn, Barbara Fink, Greg Botton, David Wilke, Paul Fuerst, and Thomas Byers. Ohio State University, Dept. of Molecular Genetics, 464 W. 12th Avenue Columbus OH 43210. Wernet.3@osu.edu

Acanthamoeba are the genus of amoebae that cause keratitis. This occurs primarily in contact lens users. The amoeba can colonize tissue, causing a painful, and potentially sight threatening infection which is difficult to treat. Effective treatment depends upon accurate diagnosis. As part of a study to examine the effect of eximer phototherapeutic keratectomy on Acanthamoeba keratitis (AK) in infected human corneas, fixed and paraffin-embedded cornea tissue sections were examined for the presence of Acanthamoeba DNA. These cornea cones were previously incubated with Acanthamoeba and appeared to be severely infected when later examined using a stilt lamp procedure. However, no Acanthamoeba were specifically observed. Therefore, to determine if the human cornea AK cases were in fact the result of Acanthamoeba infection, and that they were present in corneal tissue, extraction of total DNA from multiple sections samples was attempted. In addition, DNA extraction was attempted from fixed, paraffin-embedded, non-sectioned hornam cones. Following extraction, polymerase chain reaction (PCR) amplification using Acanthamoeba specific, and universal, primers will be performed. Results from these experiments will be discussed in this presentation.

THE EFFECT OF PAL INHIBITOR ON THE TISSUE CULTURE OF TRACHYPHRAGUS FORTUNI AND TRACHYPHRAGUS TAKIL PALMS. Alison L. Boutin; Katie E. Kettler; Sarah L. Wilhoite; (Dr. Kenneth Wilson; Dr. David Francko), Miami University, Botany Dept, Pearsall Hall, Oxford OH 45056. boutinla@mohio.edu

Palms have potential of producing cold tolerant lines beneficial for horticultural use. Previous research in palm tissue culture has been limited to propagation of cold tolerant lines for horticultural use. Previous research in palm tissue culture has been limited to propagation of cold tolerant lines for horticultural use. Previous research in palm tissue culture has been limited to propagation of cold tolerant lines for horticultural use.

Tissue culture propagation of cold-hardy Sabal palmetto palms. Sarah Wilhoite, Alison L. Boutin, Katie E. Kettler, David A. Francko, Kenneth G. Wilson, Miami University, Dept. of Botany, Pearlson Hall, Oxford OH 45056. wilhoisl@mohio.edu

Field trial investigation into the cold-hardiness of palms have shown that some species are viable in temperate regions. Tissue culture propagation of palms that exhibit enhanced cold tolerance may permit rapid production of cold tolerant lines for horticultural use. Previous research in palm tissue culture has been limited to coating solutions containing a trace of detergent. Embryos were then removed and placed in petri dishes on Murashige and Skoog media with varying amounts of hormones and kept at 28°C. Observations are being made regarding the success of embryogenesis among the varying cultures. Cold tolerance screening of propagated palm tissue is under investigation.

SYSTEMATICS, BIOGEOGRAPHY, AND EVOLUTIONARY TRENDS IN THE NORTH AMERICAN SPECIES OF FROELICHLIA (AMARANTHACEAE). Ross A. McCauley and Harvey E. Ballard Jr., Ohio University, Dept. of Environmental and Plant Biology, Athens OH 45701. rmc@ohio.edu

As it currently circumscribed, Froelichia Moench. is a genus of 15-20 species of annual and perennial herbs and shrubs which inhabit dry plains and coastal areas of the tropical and subtropical western hemisphere and temperate North America. This group is closely related to Gomphrena (Globe Amaranth) and Alternanthera, both planted ornamentally in North America. This work is part of a larger project to survey the genus with the goal of determining species boundaries and determining phylogenetic relationships within the group. As a portion of this work, the North American species are here reviewed using a series of morphological and internal Transcribed Spacer DNA datasets to distinguish species and reconstruct phylogenies. Preliminary analysis suggests there are four distinct species with one showing wide-ranging varietal distinctions. This is a reduction from the eight species one recognized for the region. The greatest species diversity and abundance occurs in the southwestern United States and northern Mexico where the species ranges all overlap. An apparent radiation occurred in a northward and eastward direction from this region distributing the genus in sand prairies over much of the Great Plains, the Midwest, and the southeastern coastal plain. Recent human introductions primarily along railroads in the early to mid-1900's have expanded the range of a widespread weedy species, F. gracilis (Hooker) Moq, north and east to southern Ontario and the New England states. Two of the species, F. gracilis and F. floridana (Nutt.) Moq, occur in isolated localities here in Ohio.

A SYSTEMATIC STUDY OF THE NORTH AMERICAN YELLOW LADY'S SLIPPER ORCHIDS. Julie A. Morris and John V. Freundenstein, Kent State University, Dept. of Biological Sciences, Kent OH 44242. jmorris@kent.edu

The North American Yellow Lady's Slipper Orchids (Cypripedium) and their relatives present a large amount of variation that has caused significant taxonomnic confusion when relying on morphological characters alone. In this study, the group was investigated using inter-simple sequence repeat (ISSR) markers. Samples were taken from multiple populations of C. parviflorum var. parviflorum and C. parviflorum var. pubescens sampled from across their ranges, as well as from populations of C. kentuckense, C. candidum and C. montanum. One population of C. californicum was studied for group comparison. Individuals were scored for the presence or absence of bands for 8 ISSR primers, and the data were analyzed cladistically using parsimony, and phenetically using UPGMA and neighbor-joining. The relationship of the ISSR patterns to variations in floral morphology was also investigated. Populations of C. pubescens and C. parviflorum are intermixed in all of the analyses with very few patterns relating to morphological differences or geographic locations. This could mean that they should not be treated as distinct and that morphological groupings are based on consequences, or that they are experiencing secondary hybridization. Populations of C. kentuckense fall out in two clades associated with two different populations of C. pubescens. This could also be due to convergent evolution or occurrences of secondary hybridization. The distinctness of C. candidum and C. montanum from the rest of this clade is well supported.
9:30 EVOLUTIONARY RELATIONSHIPS AMONG SPECIES OF TROPICAL LIA-NAS: ASSEMBLING A MOLECULAR PHYLOGEY OF TRIBE BIGNONIEAE (BIGNONIACEAE): Andrew C. Robie, Warren D. Hauk, Denison University, Slayter Box 1511, Granville OH 43023. robie_a@denison.edu

Bignoniaceae are a pantropical family of flowering trees and lianas with a center of diversity in the New World tropics. Bignonieae, the largest of the eight tribes in the family, is an ecologically vital component of tropical wet and dry forests in Central and South America. The lack of definitive morphological characters, compounded by the large number of species in the tribe, has led to controversy surrounding traditional classification systems. Currently, there is no well-developed hypothesis of phylogenetic relationships within Bignoniaceae. We assembled a molecular phylogeny for 18 representative members of the tribe and 11 outgroups based on the internal transcribed spacer (ITS) regions of nuclear ribosomal DNA in order to 1) confirm the tribe’s monophyly, 2) gain a general understanding of the evolutionary relationships among genera of Bignoniaceae, and 3) support the monophyly of genera within the tribe. In preliminary analyses, monophyly of Bignoniaceae was supported with a 74% bootstrap value based on a strict consensus phylogeny from 18 most parsimonious trees for 118 ingroups and 11 outgroups. We identified two distinct clades within the tribe which may differ in diversity of pollination syndromes. One clade is composed of taxa pollinated by bees alone, whereas the second contains taxa with a more diverse group of pollinators including bees, syrphid moths, and hummingbirds. The monophyly of genera Anemopaegma, Memora, and Arrabidae was established with bootstrap support of 100%, 71%, and 65%, respectively.

9:45 LYCOPSIDS FROM THE LATE DEVONIAN CLEVELAND SHALE OF OHIO, USA. Shya Chitalaya, The Cleveland Museum of Natural History, 1 Wade Oval, University Circle, Cleveland OH 44106-1757. schitalaya@cmnh.org

Several outcrops of Cleveland Shale are explored for their paleobotanical contents. Outstanding in the fossilized plants are the remains of lycopods (club-mosses) here called lycopsids in general. They belong to the group of vascular plants named Pteridophytina. These remain largely land plants, the fossils containing the morphological features in the case of tree bark. They were studied with incident light and polarized light magnification using a stereo microscope. For this study, the compressions were first washed gently with water and then cleared with HCL, HF, and HNO3, one after the other (using a water wash after every transfer) in the same order to dissolve the minerals like Calcium, Silica and Pyrite from the shaly matrix. Also transfers were tried on cellulose acetate film from the cleared surfaces of the specimens. It was observed that the features on the bark are varied into ten different patterns suggesting the variety of lycopsid trees grown in the wet coastal forests around the Late Devonian Ohio Sea.

10:00 CHARLES WILKINS SHORT’S ‘BOTANICAL MEMORANDA’ (1833-1840). Ronald L. Stuckey, The Ohio State University, Museum of Biological Diversity, 1315 Kinnear Rd, Columbus OH 43212-1192.

Medical botanist, Charles Wilkins Short (1794-1863), is best known for his pioneering floristic studies of Kentucky, and for his well-prepared collections of dried plants, which he distributed to over 75 botanists throughout the world. This paper presents an analysis of his 49-page handwritten manuscript of “Botanical Memoranda” prepared during his most active years of fieldwork, when he was exchanging massive quantities of specimens with his correspondents. Short’s manuscript consists mostly of descriptive notes about plants, places visited, weather conditions, topographic features, names of people, trip costs, and miles traveled on his field excursions throughout parts of Kentucky. To make Short’s unpublished “Botanical Memoranda” useful to botanists of the twenty-first century, annotations are prepared as appendices. For example, (1) The 213 plant names are provided with their present-day equivalents, (2) explanatory notes are added for 80 items referring to names of mostly people and places, and (3) eight species are recorded as rare, six from only one locality, and six seen for the first time. With renewed interest in the production of local, state, and national floras fostered through environmental, conservation, and educational efforts, knowledge from field notes of past plant surveys are important sources necessary for understanding floristic changes.

**PLANT PHYSIOLOGY AND ECOLOGY**

2:00 PM SATURDAY, APRIL 1, 2000

**MEYER HALL ROOM 128**

**DAVID A. FRANCO - PRESIDING**

2:00 GERMINATION AND DORMANCY OF THREE INLAND HALOPHYTE SPECIES. Christie T. Carter and Irwin A. Unger, Ohio University, Dept of Environmental and Plant Biology, Porter Hall, Athens OH 45701. cfranco@ohio.edu

Collections of Salsola tragus and Suaeda marina seeds, and large seeds (>2 mm) of Atriplex prostrata and Salsola europaea were obtained in October, 1998, in an inland salt marsh in Rittman, Ohio. Fresh seeds of S. prostrata germinated in light and dark at all thermoperiods. The highest germination occurred in the 20:35°C thermoperiod and the lowest occurred in the 5:15°C thermoperiod in both light and dark treatments for fresh seeds and exhumed seeds. Fresh seeds of A. prostrata exposed to light and dark treatments germinated in darkness except in the 20:35°C thermoperiod (4%). Exhumed seeds May, of A. prostrata germinated (>75%) in all thermoperiods in light and dark. By 1999, 83% of A. prostrata and 94% of S. europaea seeds germinated in the ground. No fresh seeds of S. marina germinated in light or dark. Exhumed seeds of S. marina had greater than 75% germination in the 5:15°C thermoperiod and less than 6% germination in the 20.35°C thermoperiod. Less than 4% of exhumed seeds germinated in darkness. Salsola europaea and A. prostrata seeds have nondeep physiological dormancy while large seeds of S. europaea are nondormant.

2:15 FACTORS AFFECTING GERMINATION RATES OF LUPINUS PERENNIS. Katie C. Abel and Dr. Helen Michaelis, Bowling Green State University, Dept of Biological Sciences, Bowling Green OH 43402. kabell@bgsu.edu

Lupinus perennis, sole food source for the larval form of the endangered Karner Blue butterfly, is a vital part of a vanishing prairie ecosystem in northwest Ohio, the Oak Savannah. The project reported in this paper is part of a series of studies where we have explored factors affecting germination of the Oak Savannah native, L. perennis. Specifically, this research investigated the fitness levels of six discrete Lupinus perennis populations, which have diverse combinations of conditions caused by environmental and human factors. Because of these differences, Lupinus perennis populations will have varying levels of fitness with respect to germination. Each population contributed 75 seeds, which were divided into six replications of 15 seeds. These seeds were surface sterilized, placed on filter paper, stratified for 60 days, and then germinated in a randomized block design in the growth chamber. Data were analyzed using a Kruskal-Wallis one-way ANOVA which indicated that there was a significant differences in germination rates among the populations at the 12 hour measure (p<0.01). This finding indicates that differences exist in fitness levels with respect to germination among the six different populations that were investigated in this study. These differences indicate the need for a closer look at the effects of environment influencing the fitness levels of the populations. However, all populations probably will be different from each other simply because L. perennis can grow in differing environments. Caution is recommended when seeds from multiple populations will be used in a single study because the seeds may have significantly different levels of germination.

2:30 SOIL SEED BANK AND ABOVEGROUND VEGETATION IN CLEARCUT AND MATURE OAK-HICKORY FORESTS OF SOUTHEASTERN OHIO. Christine J. Small, Brian C. McCarthy, Ohio University, Dept of Environmental and Plant Biology, Athens OH 45701. cs225388@ohio.edu

Studies suggest that seed banks play a role in forest recovery following meso-scale disturbance. However, few studies have focused on seed banks of eastern deciduous forests, particularly relative to site conditions and anthropogenic disturbance. Our objective was to examine the influence of harvesting and topography on seed bank (SB) and understory (US) composition in oak-hickory forests of southeastern Ohio. We established 192-2.5 m quadrats in regenerating clearcut (CC; < 10 yr) and mature second-growth (SG; > 125 yr) stands of similar species. In each quadrat, US vegetation was sampled in spring and summer 1998. SB samples (1,000 cm²) were collected in winter 1999 for greenhouse germination. US richness was greater in CC than SG quadrats (total S = 117 vs. 103; mean S = 14.98 vs. 12.60; P < 0.05, respectively). SB richness was also greater in CC than SG samples (total S = 46 vs. 45; mean S = 2.59 vs. 1.67 (P = 0.01), respectively). Stand age showed the strongest influence over composition, with older stands containing significantly more species than SG samples (< 5%). Similarity between US and SB composition was low in both CC and SG samples (< 30%). Soil characteristics influenced in CC and SG, with strong divergence of N- and S-slope samples (< 40% similarity). Our results support other indications low US SB similarity and decreasing SB richness with forest successional stage. The strong influence of disturbance and aspect on these strata emphasizes the importance of site conditions to forest recovery following disturbances such as clearcutting.

2:45 BIOMASS ALLOCATION AND RESPROUT ABILITY OF PRINCESS TREE (PAULOWNIA TOMETOSA) ACROSS A LIGHT GRADIENT. A. Christina Williams and Brian C. McCarthy, Ohio University, Dept of Environmental and Plant Biology, Athens OH 45701. aw575587@ohio.edu

Accumulation of Woody plants to low light environments may interfere with their ability to respout. We examined the patterns of biomass allocation and respout ability of Paulownia tomentosa (Sophoraceae), an xerophytic species, in three light environments. Plants were grown in shade houses in a common garden with two replicates of three light treatments: ambient light, artificial edge, and shade. The shade treatment mimicked light patterns and levels typical of a deciduous forest understory. The artificial edge provided an intermediate light regime. Seedlings were clipped to ground level and representative plants were harvested periodically over the growing season. Plants allocated more to below-ground biomass in the first weeks of the experiment and then shifted allocation to above-ground biomass. Plants grown in shade had lower relative growth rates (RGR) and higher specific leaf area (SLA), leaf area ratio, and leaf weight ratios than plants in the other light treatments. The ability to respout was shown to be influenced by the amount of accumulated below ground biomass and since this was lowest in the shade treatment, respouting was reduced in low light. P. tomentosa responded holistically to the stresses of light and artificial grazing treatment. A pattern of increased root to shoot ratio with increased light follows that found in other studies. However, increased SLA was not correlated to an
PROGAMMATIC ABSTRACTS

3:00 ANATOMY AND ELEMENT LOCATION IN ROOTS OF SUGAR MAPLE SEEDLINGS FROM LIMED AND UNLIMED FOREST SITES. Carolyn J. McQuaig1, Robert P. Long1, Thomas Hal1, USDA Forest Service, 359 Main Rd, Delaware OH 43015 and 2Pennsylvania Bureau of Forestry. cmcquagtt@defenders.org

Poor survival of sugar maple (Acer saccharum Marsh.) seedlings on acidic forest soils in north-central Pennsylvania may be due in part to the acidiy and chemical composition of the soil. Lime application to these soils results in significantly greater survival of sugar maple seedlings. Anatomy, mycorrhizal colonization, and element microdistribution in roots of sugar maple seedlings from a limed soil (pH 5.4) and a nearby unlimed soil (pH 3.8) were compared. In 1996 and 1998, ten seedlings were collected from both sites in June and August. Representative fine roots from each root system were chemically fixed and resin-embedded for light and electron microscopy or quick-frozen and freeze substituted for X-ray analysis. The remaining portion of each root system was stored for mycorrhizal assessment. At all collection times, mycorrhizal colonization was significantly greater in roots from limed than from unlimed soil. In mycorrhizal root segments, fungal hyphae generally filled cortical cells of roots from the limed soil but were sparse in root cells from the unlimed soil. In June, roots from unlimed soil were more irregular in cross section and contained more dense compounds in endodermal cells than roots from the limed soil. In roots from the unlimed soil only (June 1998 collection), precipitates in xylem and cortical cells were stained with Al, while Mn was detected in innermost cortical cells. Seedling survival in the unlimed site exhibited indicators of stress: low mycorrhizal colonization, increased root cell deterioration, and the presence of potentially toxic elements (Mn, Al) in root or fungal cells.

3:15 DENDROCHRONOLOGICAL ANALYSIS OF WHITE OAK (QUERCUS ALBA L.) RADIAL GROWTH PATTERNS ACROSS A TOPOGRAPHIC MOISTURE GRADIENT IN SOUTHERN OHIO. Darrin L. Rubino and Brian C. McCarthy, Ohio University, Dept of Environmental and Plant Biology, Athens OH 45701. drubino@muohio.edu

Annual tree growth represents an aggregate response to numerous biotic and abiotic factors. Understanding how these factors influence growth rates is a major objective of dendrochronological or tree-ring studies. The goal of this investigation was to determine the influence of moisture availability and climate on radial growth patterns of white oak growing in mixed-oak forests of southern Ohio. Using accurately dated and measured tree rings, we analyzed 120 white oak growing across an integrated moisture index (IMI). IMI is a computer-generated GIS model which combines topographic and edaphic features into a moisture index scale. To observe radial growth patterns across IMI classes (xeric, intermediate, and mesic), we modeled tree growth using orthogonal polynomials. Radial growth trends were significantly greater (ANOVA; P = 0.006) in mesic sites than in xeric sites. Decadal radial-growth trend analysis revealed significant (P < 0.05) differences in growth rate among the various IMI classes, but consistent patterns were not observed among all decades. Climatic analysis found annual growth increments to be significantly (P < 0.05) correlated with monthly drought severity, precipitation, and temperature. The number of significant correlations between climatic parameters and annual growth varies among the IMI classes and thus suggests that climate-growth relationships vary across IMI. Growth rates during years of drought and high precipitation also differed significantly across IMI, but no consistent pattern was noted among the different IMI classes. We hypothesize that radial growth and IMI may be loosely associated, but other factors may have a greater influence on radial growth rates.

3:30 LANDSCAPE CULTIVATION OF COLD-HARDY PALMAYS IN SW OHIO: MICROCLIMATE INFLUENCES. David A. Francko and Sarah Willhoite, Miami University, Dept. of Botany, Oxford OH 45056. franckda@muohio.edu

Survival/shoot growth of several cold-hardy palm species was evaluated at the Hardy Palm Demonstration Plot (HPDP) of Miami University (39°07' N) and in home garden plots a few km southwest of Oxford. Leaves were collected from USDA Plant Hardiness Zone 6a, but data on 1998-99 daily temperatures and winter minima for 1989-99 demonstrated that microclimates vary from Zone 6a in open, rural areas to Zone 7a/b in sheltered areas on campus. In the HPDP (Zone 7a microclimate), 2 to 3 year-old seedlings of Phascolophyllum hystrix (needle palm; N = 7), Sabal minor (swamp palmetto; N = 6), Trachycarpus fortunei (Chinese windmill palm; N = 7), and Sabal palmetto (cabbage palm; N = 4), and larger 10-30 gallon specimens of windmill palm and needle palm (N = 2 ea) were established in summer 1998. Representative plants were sited in Zone 6a and 5b microclimate plots in the home garden. Winter protection was minimal (burlap windscreen, pine straw mulching, antioxidant spray to leaves). Despite a severe winter (minimum temp in rural Oxford = -14°F, minimum temp at the HPDP = -2°F; weeks continuous snow cover in Jan 1999) only one plant was lost to winter injury. A larger Trachycarpus specimen exposed to -10°F in the home garden was defoliated but recovered and produced a full canopy of leaves by early 1999. Remaining seedlings experienced 2-3 limited morn and all plants grew extensively during the 1999 growing season. In spring 1999, the HPDP was expanded and several new Zone 6a - 7a microclimate plots were added on campus, in the home garden, and elsewhere in Oxford, with the above palms plus additional species (pindo palm, saw palmetto, Bermuda sabal palm. Himalayan windmill palm, California fan palm; N = over 100 plants). The collective data suggest that many palms can be grown successfully in southern Ohio with minimal winter protection.

3:45 POTENTIAL REDISTRIBUTION OF TREE SPECIES UNDER CLIMATE CHANGE IN THE EASTERN UNITED STATES. Louis R. Iverson, Anantha M. Prasad, USDA Forest Service, Northeastern Research Station, Delaware OH 43015. liversonlnr@defenders.org

Global climate change could have profound effects on the earth’s biota, including large redistributions of tree species and forest types. We used DISTRIB, a deterministic regression tree analysis model, to examine environmental drivers related to current forest-species distributions and then model possible future distributions under five climate-change scenarios associated with a doubling of atmospheric CO₂. Potential shifts of 80 common tree species in the eastern United States were evaluated based on more than 100,000 plots and 33 environmental variables related to climate, soils, land use, and elevation. Regression tree analysis was used to derive prediction rules from current species-environmental relationships. These rules were used to replicate the current distribution and predict the future potential distributions for more than 2,100 counties east of the 100th meridian. About 35 tree species were projected to expand in range and/or importance by at least 10%; 31 species could decrease in range/importance by at least 10%. Several species (Populus tremuloides, P. grandidentata, Acer saccharum, Bétula papyrifera) Thuja occidentalis) could be eliminated from the United States. The five scenarios were generally in agreement with respect to trends in potential future distributions. Actual species and forest-type redistributions will be controlled by migration rates attainable through fragmented landscapes, another area of active research.

AQUATIC BIONOMY

09:00AM SATURDAY, APRIL 1, 2000
MEYER HALL ROOM 113
SUSAN CARY - PRESIDING

9:00 BACTERIAL AVAILABLE PHOSPHATE (BAP) - A NOVEL APPROACH TO ESTIMATE AMBIDENT PHOSPHATE CONCENTRATION IN FRESHWATER COMMUNITY. Xueqing Gao and R. T. Heath, Kent State University, Kent OH 44242. xgao@kent.edu

The concentration of phosphate is known to control phytoplankton growth in freshwater communities, but estimation of the concentration of this critical nutrient is uncertain, and estimates often range over two orders of magnitude. Here we propose a novel approach to determine ambient phosphate concentration through examination of bacterial phosphate uptake, known to be responsible for most of the community phosphate uptake. Velocity of net uptake of phosphate was estimated from the bacterial growth rate (3H-thymidine and 3H-leucine methods) minus losses due to release and grazing. Using radiometric procedures we found only insignificant losses of phosphate by release and by grazing. BAP was estimated from velocity, where k is the proportional uptake rate constant. We assumed there was no discrimination between 31P- and 32P-phosphate. We found that in most cases, BAP was lower than estimates from both solute reactive P (SRP) test and Ribler’s bioassay. This suggests that the majority of SRP may not be available to bacteria and that Ribler’s bioassay estimate was only an upper limit. This study was supported by Ohio Sea Grant R/ER-43.

9:15 MICROBENTHIC CARBON DYNAMICS IN THE OLD WOMAN CREEK COASTAL WETLAND. John A. McGreevy and Robert T. Heath, Kent State University, Dept of Biological Sciences, Kent OH 44240. jmcgreev@kent.edu

Previous observations of field samples indicated the relationship between benthic bacteria and their associated grazers remains unclear. The purpose of this study was to determine whether benthic bacterial productivity was controlled through resource availability (i.e. "bottom-up" control) or protistan bacterivorous grazing (i.e. "top-down"). We conducted field observations and laboratory experiments to examine the interrelation of organic carbon (DOM detection by hot catalytic method), benthic bacterial numbers (acridine orange staining), bacterial productivity ([3H]-leucine method), protistan numbers (five counts) and protistan grazing rate (fluorometrically-tagged sediment). Data on Old Woman Creek N. C. E. R. Huron OH, differed in general from those of the macroalgal Nelumbo lutea (American water luteus). Laboratory sediment microcosms differed in the amount of dissolved organic carbon (buffered acetate) added or by different numbers of Nelumbo leaf disks placed on their surface. In both field and laboratory observations bacterial numbers and productivity increased as organic content increased. Benthic protistan bacterivory accounted for only minor losses of bacterial production (typically < 1%). We conclude that benthic bacterial productivity and numbers were controlled through "bottom-up" rather than "top-down" processes. This study was supported by Ohio Sea Grant R/ER-43.

9:30 VARIATIONS IN EPIPHYTIC DIATOM POPULATIONS OF NELUMBO LUTEA AT OLD WOMAN CREEK. Sharon E. Reed (Dr. Susan Carty), Heidelberg College, Biology Program Abstracts. SATURDAY, APRIL 1, 2000 MEYER HALL ROOM 113. meyerhallroom113@kent.edu

The studies of host specificity and population dynamics have produced contradictory results. Diatoms were sampled from Nelumbo lutea in Old Woman Creek Estuary during June, July, and August of 1999. These samples were classified and then viewed at 100× magnification to determine the genus and species. This study investigates three different aspects of these issues. First, it reveals which epiphytic diatoms occur on the
Helmbold algae in Old Woman Creek National Estuarine Research Reserve. Second, it makes a spatial comparison of populations at the inlet of the estuary compared to the outlet. Third, it examines the temporal variability of diatoms on Helmbold algae from two sites collected in 1983 and 1999. The dynamics of the population are explored to seek out future areas of research to explain variations in populations.

9:45 EFFECTS OF DIFFERENT VEGETATIVE SUBSTRATES ON ALGAL COMPOSITION IN VERNAL POOLS. Robert G. Verb, Dale A. Casamatta, and Morgan L. Vis, Ohio University, Dept. of Environmental and Plant Biology, Athens OH 45701. 

Vernal pools represent one of several types of temporary aquatic habitats found in Ohio. These may occur as ephemeral mesohabitats in a wide variety of community types. Field observations identified four types of vernal pools from community types throughout southeastern Ohio. For this study, pools were categorized by the type of dominant plant material composing their substrate. The categories were as follows: 1. Emergent macrophytes (M). 2. Mixed deciduous forest leaves and debris (F). 3. Pine spp. needles (P). 4. Old field herbs (OP). A study was designed to examine if these varying substrate types led to the production of different leachates, and if there was a resulting variation in the algal community composition. Vernal mosescoscums were collected and lined with one of the four substrate categories listed above. These mosescoscums were inoculated with an algal cocktail consisting of field-collected samples from a wide spectrum of community types. Controls consisted of mosescoscums with and without algae, but no substrate added. The algal community composition and environmental parameters were tracked over eight weeks to examine if the type of substrate contribute to the leachate composition. After three weeks of leaching, four of the six sites were more common in April and May. Bacillariophytes were rare, although two sites often noted as the basis than the control. Further, M, F, and OP mosescoscums all had significantly (p<0.05) greater biomass than P. A total of 81 algal taxa were identified. Chlorophytes were most abundant and diverse (41 taxa), followed by Cyanobacteria (20), Bacillariophytes (10), Euglenophytes (11), Chrysophytes (3), Cryptophytes (2) and Dinophytes (1).

10:00 GENETIC VARIATION AMONG INDIVIDUALS OF BATRACHOSPERMUM HELMINTOSUM (RHODOPHYTA) WITHIN AND AMONG STREAM REACHES THROUGHOUT NORTH AMERICA. Melissa M. Hall & Morgan L. Vis, Ohio University, Dept. of Environmental and Plant Biology, Athens OH 45701.

A relatively new molecular marker technique, inter-simple sequence repeats (ISSR), was used to assess the genetic variation of the freshwater red alga Batrachospermum helmintosum within a stream reach in Northeast Ohio and among streams throughout North America. For the intra-stream study, 58 individuals were collected from an approximately 200m stream length. Individuals appeared to be aggregated into three distinct areas, with no plants between areas. Using three primers, 100 polymorphic bands were scored. Although it was hypothesized that genetic variation would reflect geographic distance, the results showed six distinct genetic groupings, some of which consisted of geographically separated individuals. Overall, genetic diversity was greater among individuals than within geographic and genetic groups. To assess genetic variation among stream reaches, ten streams (3 from OH and one each from MI, IN, TN, LA, MA, RI and CT) were sampled throughout the algae’s known distribution in North America. Approximately 20 individuals were collected per stream for ISSR analysis. Five primers were used to examine variation among all individuals. Sequence data from these populations show TN as basal to the other populations, with ML being closely related and the other populations having little variation among all individuals. Sequence data from these populations show TN as basal to the other populations, with ML being closely related and the other populations having little variation among all individuals.

10:15 A SURVEY OF CLIFF AND CAVE ALGAE FROM SOUTHEASTERN OHIO. Dale A. Casamatta, Robert G. Verb, and Morgan L. Vis, Ohio University, Dept. of Environmental and Plant Biology, Athens OH 45701. dc27389@ohio.edu

Due to harsh environmental conditions, cliff walls and caves tend to have depauperate vascular plant floras. However, the rapid generation time, resistance to desiccation, and tolerance for nutrient-poor environments allow algae to colonize these areas. In addition, the presence of nutrient cycling associated with the leaching from the cliffs and caves allows for the development of algal communities. In this study, 58 individuals were collected from cliff walls and caves throughout Ohio. The algae were categorized into seven groups, including 1. Emergent macrophytes, 2. Microphytes, 3. Rhodophytes, 4. Chlorophytes, 5. Xanthophytes, 6. Dinophytes, and 7. Euglenophytes. A total of 385 taxa were identified, with the most common groups being Chlorophytes (11), Euglenophytes (11), Chrysophytes (3), Cryophytes (2), and Dinophytes (1).

10:30 FRESHWATER DINOFLAGELLATES OF BELIZE. C.A. Susan Carty, Heidelberg College, Dept of Biology, Tiffin OH 44883. scarty@heidelberg.edu

Freshwater dinoflagellates have not previously been reported from Belize although there has been extensive work with marine dinoflagellates and some work with other freshwater groups. Freshwater dinoflagellates are more frequently found in standing water and none have been found in the several streams and rivers sampled since 1990. The goal of this trip was to examine water samples from small ponds within hours of collection to improve the chance of observing swimming dinoflagellates. A potential of 1000 live organisms from each site were observed with the microscope. A total of 150 small pond samples were also collected. A small brown water pond on a peninsula and 30m from the Caribbean yielded a bloom of Thalassiosira intermedia. On the mainland, "Crocodile pond" and "Lily pond" had dinoflagellates including Gonyaulax centenella, a species of Kedanomia, and a Peridinium in the Umbonatum Group. This is the fifth report of Thalassiosira in the world.
The objective of this study was to compare prey selectivity by larval gizzard shad in a lake with nutrient-enriched water. 

The study was conducted in Lake Erie, Ohio, where larval gizzard shad were present. The lake is known for its high nutrient levels and abundant zooplankton. The study aimed to determine the feeding preferences of larval gizzard shad at different larval sizes, specifically focusing on the prey selectivity of small (<10.5 mm TL), medium (10.6-15.0 mm TL), and large larvae (15.1-28.0 mm TL).

The study used a combination of field observations and laboratory experiments to assess the feeding behavior of larval gizzard shad. Field observations included monitoring the lake's zooplankton community and larval gizzard shad distribution. Laboratory experiments involved exposing larval gizzard shad to different zooplankton diets and measuring their growth and survival rates.

The results showed that larval gizzard shad select specific zooplankton species based on their size and nutritional content. Small larvae (<10.5 mm TL) selected small cladocerans, while medium larvae (10.6-15.0 mm TL) preferred medium-sized cladocerans and nauplii, and large larvae (15.1-28.0 mm TL) selected larger zooplankton species, such as copepods and other larger zooplankton.

The study's findings suggest that larval gizzard shad have a selectivity for prey that changes with increasing size. This selectivity is likely influenced by the availability of prey and the nutritional requirements of the larvae. The results have implications for understanding the role of larval gizzard shad in the lake's food web and the factors influencing their growth and survival.
4:45 THE INFLUENCE OF DIET ON THE GROWTH OF ANURAN LARVAE (RANA PIPiens). Alex Collier, Dale A. Casamatta, and Lowell P. Orr, Kent State University, Dept. of Biological Sciences, Kent OH 44240. acollier@kent.edu

Anuran larvae play an important role in freshwater systems. They filter phytoplankton and other suspended particles from the water column and use their keratinized beaks and denticles to scrape, bite and ingest epiphytic algae and other vegetation. We compared the ability of Rana pipsiens larvae to ingest four species of green algae collected from area wetlands. Sixty tadpoles were placed in each of the following monocultures: Hydrodictyon reticulatum, Ulothrix aequulis, Zygnema pectinatum, and Spirogyra crassa. Treatment tanks containing larvae, algae and 8 L of filtered (1.0mm pore) rainwater were equipped with aerators and housed in a greenhouse during the 30 day investigation. We collected tanks were on average significantly longer and heavier than tadpoles

4:30 LAKE VICTORIA REGION: LARGE LAKES AND THEIR SURROUNDING MINOR WATER BODIES AS A NATURAL LABORATORY FOR ADAPTIVE ECOLOGY, SPECIATION AND EVOLUTION OF FISH SPECIES. Paul A. Fuerst, Les Kaufman and Wilson W Mwanja, Ohio State University, Dept. of Molecular Genetics, Columbus OH 43210. fuerst.1@osu.edu

The Lake Victoria Region (LVR) is a unique zoogeographical area. The LVR now comprises five large lakes, Victoria, Kyoga, Edward, George and Kivu, each containing a repeated set of fish faunal groups that share common origins. Evolution has repeated itself numerous times - affected by evolutionary parallelism and dispersal. Historically the LVR was more expansive, with adjoining east-west rivers, breaking up following tectonic and volcanic activity. The lakes, though zoogeographically similar, are geologically, hydrologically and limnologically different. A variety of small Asatellite@ lakes exist around larger LVR lakes. Exploratory surveys reveal significant portions of the cichlid fauna considered extinct in large lakes may survive in satellite lakes. Some satellite lakes, such as the Nabugabo lakes, retain a small number of species found nowhere else. Other satellite lakes, such as the Kyoga lakes in central Uganda, have a wide variety of species including undescribed species that seem to be sister species to extinct taxa from larger lakes. Microsatellite DNA markers which are shown to differentiate populations and species, are being used to investigate phylogenetic and macroevolutionary questions in the LVR haplochromine species. Understanding the evolutionary and hydrological processes shaping the LVR system depends on determining whether the species in small water bodies have recent origins or reflect longer historical changes. Conservation of aquatic biodiversity requires knowledge about the species and relationships among extant evolutionary and ecological groups. Molecular information will directly impact decisions about fisheries management and conservation practices in the LVR especially for the closely related species found in this geologically vast area.