Index to Session Abstracts

The Ohio Journal of Science. v98, n1 (Annual Meeting Program Abstracts), A-6-A-6
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INDEX TO
SESSION ABSTRACTS
Please see Author Index on page 45 to locate first authors of abstracts.

BIOLOGICAL SCIENCES
DIVISION

SESSION 01—p. 7
Animal Molecular Biology
09:00AM Saturday, April 4, 1998
Johnston Hall 119
Dan E. Krane - Presiding

SESSION 02—p. 8
Application & Utility of Molecular Markers in Systematic Biology
01:30PM Saturday, April 4, 1998
Johnston Hall 111
Linda E. Watson - Presiding

SESSION 03—p. 8
Aquatic Science: Fish, Frogs, Turtles; Mussels and Other Invertebrates
01:30PM Saturday, April 4, 1998
Johnston Hall 111
Michael A. Hoggarth - Presiding

SESSION 04—p. 10
Floistics & Ethnobotany
01:30PM Saturday, April 4, 1998
Johnston Hall 106
Lazarus W. Macior - Presiding

SESSION 05—p. 11
Forest Ecology
09:00AM Saturday, April 4, 1998
Johnston Hall 106
Frederick John Kluth - Presiding

SESSION 06—p. 12
Land Animal Ecology
01:30PM Saturday, April 4, 1998
Johnston Hall 119
Alan B. Cady - Presiding

SESSION 07—p. 14
Plants: Molecular Systematics; Invasive Species
09:00AM Saturday, April 4, 1998
Johnston Hall 108
Michael S. Barker - Presiding

SESSION 08—p. 15
Plant Ecology
01:30PM Saturday, April 4, 1998
Johnston Hall 104
Mary Benninger-Truax - Presiding

SESSION 09—p. 17
Plant Physiology
09:00AM Saturday, April 4, 1998
Johnston Hall 118
Carolyn J. McQuattie - Presiding

SESSION 10—p. 18
Wetland Ecology
09:00AM Saturday, April 4, 1998
Johnston Hall 104
David A. Francko - Presiding

EARTH & SPACE SCIENCES
DIVISION

SESSION 11—p. 19
Geography
09:00AM Saturday, April 4, 1998
Johnston Hall 111
Jeffrey J. Gordon - Presiding

SESSION 12—p. 19
Geology
09:00AM Saturday, April 4, 1998
Johnston Hall 015
Ann F.H. Graetsch Harris - Presiding

SESSION 13—p. 20
Geology: Till Revisited and Other Geology
01:30PM Saturday, April 4, 1998
Johnston Hall 015
Julie Weatherington-Rice - Presiding

EDUCATION DIVISION

Session 14—p. 21
Education: Applications for Effectiveness of Instructional Delivery
03:00PM Saturday, April 4, 1998
Johnston Hall 203
Janet E. Hurn - Presiding

ENGINEERING & TECHNOLOGY DIVISION

SESSION 15—p. 22
Engineering: Simulation, Chemistry & Communication
03:00PM Saturday, April 4, 1998
Johnston Hall 115
Luigi Messineo - Presiding

ENVIRONMENTAL SCIENCE & RESOURCE MANAGEMENT
DIVISION

SESSION 16—p. 23
Environmental Science & Resource Management
09:00AM Saturday, April 4, 1998
Johnston Hall 115
Charles A. McClaugherty - Presiding

SESSION 17—p. 24
Environmental Sciences & Resource Management
01:30PM Saturday, April 4, 1998
Johnston Hall 115
Tracy L. Engle - Presiding

MEDICAL SCIENCES & HEALTH TECHNOLOGIES

SESSION 18—p. 25
Clinical & Experimental Physiology
09:00AM Saturday, April 4, 1998
Johnston Hall 018
Steve R. Channel - Presiding

SESSION 19—p. 26
Experimental Physiology I
02:00PM Saturday, April 4, 1998
Johnston Hall 018
Judy Adams - Presiding

SESSION 20—p. 26
Experimental Physiology II
02:00PM Saturday, April 4, 1998
Johnston Hall 017
Mary D. Gahbauer - Presiding

SESSION 21—p. 27
Gestational & Neonatal Development
09:00AM Saturday, April 4, 1998
Johnston Hall 017
Lee A. Meserve - Presiding

SOCIAL & BEHAVIORAL SCIENCES DIVISION

SESSION 22—p. 28
Social & Behavioral Science
09:00AM Saturday, April 4, 1998
Johnston Hall 203
Alinde J. Moore - Presiding

PRE-COLLEGE STUDENTS
ALL FIELDS OF INTEREST

SESSION 23—p. 29
Pre-college Morning
09:00AM Saturday, April 4, 1998
Johnston Hall 201
Nicholas J. Douville - Presiding

SESSION 24—p. 30
Pre-college Afternoon
01:00PM Saturday, April 4, 1998
Johnston Hall 201
Amy M. Davis - Presiding

POSTER SESSIONS

ALL FIELDS OF INTEREST

SESSION 25—p. 32
9:00 - 11:00 AM
Saturday, April 4, 1998
Johnston Hall Commons

SESSION 26—p. 37
1:00 - 2:15 PM
Saturday, April 4, 1998
Johnston Hall Commons

SESSION 27—p. 40
2:45 - 4:45 PM
Saturday, April 4, 1998
Johnston Hall Commons

NOTE:
Undergraduate Research-in-Progress Summaries have the names of the student's advisor in (parentheses).
9:00 REGULATION OF AGP GENE ACTIVITY IN THE POSTEMBRYONIC STAGES OF THE FRUIT FLY DROSOPHILA. JENNIFER E. NATHAN (GEE KOVALCZK), DEPT. OF ZOOLOGY, MAINE UNIVERSITY, OXFORD OH 45056.

The Drosophila Antigen-5-related (Agp) gene is active in the proventriculus, a three-layered structure located at the junction of the fore- and midguts. The Agp gene product appears to be a component of the peritrophic matrix, a tubular membrane that protects the midgut epithelium from ingested material. The matrix acts a barrier to pathogens entering the gut, and the Agp gene product may participate in the immune response within the gut. My objective is to determine what activates the Agp gene in the postembryonic stages of Drosophila. Offspring have shown that in the embryo, the Agp gene is active within the proventriculus, a cell layer which extends completely around the circumference of the outer layer. By the end of the larval stage, the region of activity has extended to a ring five cells wide. The Agp gene is inactive during the pupal stage, but is reactivated following eclosion. My research is focussed on answering the following questions: 1) What activates the additional Agp gene expression seen in larvae as compared to embryos, and 2) what reactivates Agp expression in the adult following eclosion? This project uses in situ hybridization of labeled AgpRNA probes to find, paraffin-embedded sections of larvae and adults to study Agp gene activity during different developmental stages and following different experimental treatments. Specifically, hatching or eclosion, intestine feeding, and the hormones juvenile hormone and ecdysone are being examined for their roles in activating Agp during the larval and adult stages.

9:15 ENVIRONMENTAL IMPACTS PROVIDE A USEFUL MEASURE OF GENE FLOW DURING THE LARVAL AND ADULT STAGES OF THE OLENTANGY RIVER-BASED ON PCR AMPLIFICATION OF POLYMORPHIC INDICATORS OF LONG TERM SELECTION DUE TO POLLUTANTS AND SUGGEST THAT GENETIC ANALYSES OF MAYflies FROM THE OLENTANGY RIVER, (EUTHETOMA CAERULEUM), HAVE BEEN TAGGED AND FOLLOWED FOR FIVE YEARS. IN THIS STUDY, MORE MOVEMENT OF THE FISH FROM Locations diagnostic for subfamilies appear to have changed in a punctuated and progressive manner. Long histories of subpopulation turnover, in turn, tend to reduce genetic variation at both proximal and distal populations. Cladograms generated by a parsimony approach, however, suggest that barriers to migration may be substantially more important than isolation-by-distance factors in maintaining exhibited genetic population structuring.

10:00 EVOLUTION AND FUNCTION OF HIGHLY REPEATED SHORT SEQUENCES IN THE RABBIT GEMONE. ALLEN J. YORK & DAN E. KRANE, WRIGHT STATE UNIVERSITY, DEPT. OF BIOLOGICAL SCIENCES, DAYTON OH 45435.

C-repeat sites of natural isolates have been observed to have increased as a punctuated and progressive manner during evolution, indicating that a limited number of prognostic genes have given rise to new repeats in waves of dispersion. A total of 15 rabbit C-repeats (10% of all those that have been sequenced to date) are known to contribute functional elements to the genome into which they are inserted. These functional role may include: upstream promoters, polyadenylation signals, and in the case of four repeats with significant portions of the coding region of the gene into which they have been inserted.

10:15 A FIRST LOOK AT THE SUMATRAN RHINOCEROS (DICERORHINUS SUMATRENSIS) MAJOR HISTOCOMPATIBILITY COMPLEX. JAMES D. BRANSON, JAMIE BRANSON, RAYMOND HEITHAUS, BIOLOGY DEPT., KENYON STATE UNIVERSITY, DEPT. OF BIOLOGICAL SCIENCES, DAYTON OH 45435.

The Rhinoceros MHC is encoded by different alleles differ in their possible peptides bound. Therefore individuals that are heterozygous at all or most MHC loci will assume the widest range of pathogen protection. MHC and general genetic maintenance are the essential ingredients for successful management of endangered vertebrate populations. In this study I propose to examine the MHC for a proposed breeding pair of Sumatran rhinoceros from the Cincinnati Zoo. Both a blood and hair DNA isolation procedure will be utilized to ultimately compare MHC polymorphisms. The series of intended procedures are as follows: DNA isolation, polymerase chain reaction amplification, MHC comparison via SSCP analysis, and the cloning of MHC sequences. My research plans serve to begin rhinoceros MHC isolation, polymerase chain reaction amplification, SSCP analysis, and the cloning of MHC sequences. My research plans serve to begin rhinoceros MHC isolation, polymerase chain reaction amplification, SSCP analysis, and the cloning of MHC sequences.
SESSION 02
APPLICATION & UTILITY OF MOLECULAR MARKERS IN SYSTEMATIC BIOLOGY
01:30PM SATURDAY, APRIL 4, 1998
JOHNSTON HALL 111
LINDA E. WATSON - PRESIDING

1:30 USING INTER-SIMPLE SEQUENCE REPEAT (ISSR) MARKERS IN NATURAL POPULATIONS. ANDREA D. WATSON, OHIO STATE UNIVERSITY, DEPT. OF PLANT BIOLOGY, 1735 NEIL AVE., COLUMBUS, OH 43210-1293.

ISSR markers are based on single-primer PCR reactions where the primer sequence is derived from simple sequence repeats (SSRs; microsatellites) with a 5'- or 3'-flank of 1-3 nucleotides. The amplified region lies between two SSRs oriented on opposite DNA strands within an amplifiable distance. ISSR bands are inherited in a cocontinuous, Mendelian fashion, but are scored as dominant markers (homo or hetero). ISSR markers have primarily been used to study cultivated plants (e.g., cultivar identification), but tests of the method in natural populations of Persea americana and Hybanthus have shown their usefulness for assessing patterns of hybridization, and species relationships. ISSR markers generally exhibit high variability in natural populations (upwards of 90% polymorphic). Individual DNA accessions of species included in this test of ISSR utility could be identified with one to three primers. Where comparative allozyme, RFLP, and RAPD data were available, ISSR markers have been more variable and have yielded better resolution of species relationships and population-level patterns.

2:00 RESOLUTION OF SYSTEMATIC, PHYLEOGEOGRAPHIC, AND POPULATION GENETIC STRUCTURE IN PERCID FISHES FROM MITOCHONDRIAL DNA CONTROL REGION SEQUENCES. CAROL A. STEPHEN, DEPARTMENT OF BIOLOGY, CASE WESTERN RESERVE UNIVERSITY, CLEVELAND, OH 44106.

Sequences from 300 individuals for the 1200 bp mtDNA control region were tested to discern evolutionary relationships at congeneric through subpopulation levels. Systematics, fine and broad scale geographic patterns, and divergences were resolved for the pike-perches Sizimiochetus, native to Europe and North America, and the similar gammarids introduced to the Great Lakes of North America. Walleye, Stizostedion vitreum, have substantial genetic diversity and divergences among glacial refugia, lakes, basins, and spawning groups. Spawning phylipadary and natal homing appear to have increased divergences. In contrast, native and introduced populations of the rufus Gymnocypris have low intrapopulation genetic variability, resulting from bottlenecks during the ice Ages and subsequent rapid northward expansion. The introduced populations of G. carinum in the Great Lakes was genetically identical to that from the Danube River region. The history of glacial refugia and recolonization has resulted from bottlenecks during the Ice Ages and subsequent rapid northward expansion. The introduced population of G. carinum in the Great Lakes was genetically identical to that from the Danube River region. The history of glacial refugia and recolonization has resulted from bottlenecks during the Ice Ages and subsequent rapid northward expansion. The introduced population of G. carinum in the Great Lakes was genetically identical to that from the Danube River region. The history of glacial refugia and recolonization has resulted from bottlenecks during the Ice Ages and subsequent rapid northward expansion.


With 550-600 species, the genus Viola is the largest member of the Violaceae. Comparative analyses of relationships in Viola worldwide have been accomplished, but not so modern approaches been used to investigate macroevolution or speciation in the genus. Phylogenetic studies of Viola using internal transcribed spacer DNA sequences, place South American sections at the base, depict the two largest Northern Hemisphere sections, and show that taxa inhabiting the same habitat on separate islands. Studies of the sagebrush species are dominant components of desert vegetation worldwide. To test existing classifications and further resolve systematic relationships, we sequenced the internal transcribed spacer (ITS) of nuclear ribosomal DNA and a 1200 bp portion of chloroplast gene ndhF, and subjected the datasets to phylogenetic analyses, both independently and combined. The resulting molecular phylogenies are congruent with morphology. However, the molecular phylogenies are strongly congruent with each other, despite being from different genomes. Furthermore, there is strong concordance with biogeography. Several South American clades are basal to the entire tribe, probably representing multiple, isolated lineages. The Mediterranean clade is monophyletic and exhibits a pattern of recent and rapid radiation. Many species of this tribe have hybridized in the Great Lakes region, associated with breeding systems modified by human populations.

3:00 BREAK


The Anthemidaceae is primarily an Old World tribe of approximately 109 genera and 1740 species, with two major centers of diversity, including the Mediterranean Region and the Cape Province of South Africa. The tribe is widely recognized for its horticultural species that include the daisies, chrysanthemums,忘了, tarragon, chamomile, wormwood, and yarrow. Ecologically, the sagebrush species are dominant components of desert vegetation worldwide. To test existing classifications and further resolve systematic relationships, we sequenced the internal transcribed spacer (ITS) of nuclear ribosomal DNA and a 1200 bp portion of chloroplast gene ndhF, and subjected the datasets to phylogenetic analyses, both independently and combined. The resulting molecular phylogenies are congruent with morphology. However, the molecular phylogenies are strongly congruent with each other, despite being from different genomes. Furthermore, there is strong concordance with biogeography. Several South African clades are basal to the entire tribe, probably representing multiple, isolated lineages. The Mediterranean clade is monophyletic and exhibits a pattern of recent and rapid radiation. Many species of this tribe have hybridized in the Great Lakes region, associated with breeding systems modified by human populations.

3:45 A MITOCHONDRIAL DNA PERSPECTIVE ON RELATIONSHIPS IN THE ORCHIDACEAE. JOHN V. FREUDENTSTEIN, DEPARTMENT OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44242.

Molecular systematic studies have focused largely on examination of DNA sequences of genes and spacers from the plastid genome, and of highly repeated genes or spacer sequences from the nuclear genome. However, additional sources of data are available, including mitochondrial sequences and single-copy nuclear sequences. Sequences for the nad1-b mitochondrial intron were obtained via automated sequencing from species representing numerous tribes from across the five traditional subfamilies of Orchidaceae. The sequences show a relatively low rate of change, and the intron genealogies — less than those seen for the plastid gene ndhF — but exhibit a large amount of length variation. This combination of features means that sequence alignment is fairly straightforward, and provides an excellent opportunity to study the evolution of intron length. In contrast, mitochondrial introns are more useful for untangle taxa, although some indicate homoplastic. The basic insertion pattern appears in most cases to be a direct duplication of short adjacent sequences (1-10 bp). In some cases, much larger insertions of over 100 bp were observed. The data set is useful for the analysis of the family, although there is not enough variation to provide resolution at lower levels (i.e., within subfamilies). The pattern expresses in large part with other molecular data for the family.

4:15 DISCUSSION

SESSION 03
AQUATIC SCIENCE: FISH, FROGS, TURTLES; MUSSELS AND OTHER INVERTEBRATES
01:45PM SATURDAY, APRIL 4, 1998
JOHNSTON HALL 118
MICHAEL A. HOGGARTH - PRESIDING

1:45 HABITAT SEGREGATION OF A NATIVE AND AN EXOTIC AMPHIPOD: THE ROLE OF FOOD AVAILABILITY AND FISH PREDATION. GREG A. BURKART, MARY J. GONZALES & MATT C. THOMAS, WRIGHT STATE UNIVERSITY, DEPT. OF BIOLOGICAL SCIENCES, DAYTON OH 45439.

We documented the habitat preference of two amphipod species present in Lake Erie: the native species, Gammarus fasciatus and an introduced species, Echinogammarus ichnus. We analyzed the relative importance of food availability and vulnerability to fish predation of both species. A survey of macrophyte beds and zebra mussel colonies revealed that the exotic species was more abundant in zebra mussel habitats than was the native species. The opposite trend was observed in macrophyte beds. Under lab conditions the growth of each species was different when fed a diet of zebra mussel feces and macrophytes (FP) or macrophytes with ephymes (ME). The native species grew larger when fed FP. The exotic grew larger when fed ME. This suggests that the habitat preference is not dependent on the type of food available. In the lab, macrophyte and zebra mussel habitats were simulated to examine the effects of habitat on amphibian vulnerability to fish predation. When zebra mussels were present yellow perch consumption rates of the native amphipod were greater than the rates of the exotic. The opposite trend was observed in macrophyte habitat. This suggests that fish predation is an important factor driving the observed habitat segregation.

2:00 FISH ABUNDANCE AND SPECIES RICHNESS CRITERIA FOR RANKING OHIO RIVER EMBAYMENTS AND BACKWATERS. TED M. CAVENDER AND ANDREW BURN, OHIO STATE UNIVERSITY, MUSEUM OF BIOLOGICAL DIVERSITY, 1315 KINNE Rd., COLUMBUS OH 43212.

Twenty-five Ohio River embayment and backwater sites between river miles 80 and 480 were sampled periodically over an 18 year time span as part of a monitoring program on Ohio River shoreline sites. Collection data were analyzed at each site to produce profiles on utilization of the localities by young of the year fishes. Close to 80 species were found at the 25 sites of which...
15 species were represented only by adult individuals or were considered very rare occurrences. Sites were ranked by total number of species and total number of individuals collected (minus gizzard shad). The top ranking sites showed a cumulative total of 46 and 53 fish species. The maximum taken in one collection was 22 species recorded at three sample sites. In looking at numbers of young of the year, the best sites had 10 or more species each with population size greater than 1% of the total catch at the site. Each species showed large variations in abundance over the sampling period. Correlation analysis was run to determine negative or positive association between species. Different distribution patterns were observed for some species when their linear occurrence along the Ohio River shorelines was examined.

2:15 THE INVERTEBRATE PREY OF THE NORTHERN LEOPARD FROG, RANA PIPIENS, IN A NORTHEASTERN OHIO POPULATION, ALEXANDER B. COLLIER, JOE B. KEPER, AND LOWELL P. ORR, DEPT. OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44242.

We analyzed the stomach contents of 13 adult and 19 juvenile Rana pipiens collected from a rehabilitated wetland in Summit County, Ohio during the summers of 1996 and 1997. First season juveniles were sacrificed and their stomachs were removed intact, and preserved individually in alcohol. We flushed the stomachs of adults to obtain their contents and released most frogs untarnished. The stomachs of three adults sacrificed following this procedure did not contain additional materials. We identified the invertebrate prey to family when possible using a dissection microscope. The adult and juvenile frogs ingested a total of 142 invertebrates representing 2 phyla, 3 classes, 12 orders, and at least 34 distinct families. Major prey items included members of the orders Coleoptera, Hemiptera, Homoptera and Orthoptera. Many stomachs also contained portions of recently shed skin or unidentified plant material and other debris. All prey items may have been inadvertently ingested with some frequency. We examined a greater diversity of taxonomic prey including invertebrates from 17 families not consumed by adults. Approximately 67% of all prey consumed were either fissionary or crawling organiments. Saltatory and flying insects were ingested less frequently. The presence of both diurnal and nocturnal prey indicates that the frogs fed throughout the 24 hour period. Our preliminary findings support the notion that Rana pipiens is an opportunistic species which feeds on a wide variety of prey.

2:30 POSSIBLE ANTIBACTERIAL PROPERTIES INTRINSIC TO RANA PIPIENS (NORTHERN LEOPARD FROG) EPITHELIUM. JOHN A. McGEHIE, DAVE A. CASAMATTA AND ALEX B. COLLIER, DEPT. OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44242-0001.

All animals are exposed to a variety of potential bacterial, viral, fungal, and parasitic infections. Amphibians may be particularly vulnerable to actinomycete disease due to their moist, permeable skins. Many amphibian species possess granular glands in the skin, which produce noxious or toxic secretions that decrease the animal's palatability to predators. Rana pipiens secretes no known noxious substances and is palatable to many predators, but the integumentary epithelium of this species secretes mucus. Our findings support the notion that Rana pipiens produce noxious or toxic secretions that decrease the animal's palatability to predators.

3:30 POPULATION STATUS AND MICROHABITAT UTILIZATION BY THE PURPLE CATSWAP, A FEDERALLY LISTED ENDANGERED SPECIES OF FRESHWATER MUSSLER, MICHAEL A. HOGGARTH, DEPT. OF LIFE AND EARTH SCIENCES, OTTERBEIN COLLEGE, WESTERVILLE OH 43081.

The purple catspaw (Epiphasma obliqua obliqua) comprises the seventh most abundant of the 26 species of musslers found in Killbuck Creek in Wayne, Holmes and Coshocton counties, Ohio. A total of 67 living specimens of this species was found. The species occurs for a distance of 13.5 km stream miles with the largest number of individuals (49) collected within a 100 meter reach of Killbuck Creek. The distribution of this species extends upstream of this center of population for a distance of 0.8 km and downstream for a distance of 12.7 km.

4:00 INVASION OF LAKE ERIE'S WESTERN BASIN BY NEOGODIUS MELANOSTOMUS (PALLAS). KEN BAKER, DEPT. OF BIOLOGY, HEIDELBERG COLLEGE, TIPPER, OH 44883.

Round gobies were first recorded in North America in 1990 from the St. Clair River, probably introduced via ballast waters from transoceanic vessels from the Black, Caspian or Azov Seas. In 1993, the first gobies were recorded from Lake Erie at the mouth of the Grand River by Fairport Harbor. In 1996, the first gobies were recorded from the western basin of Lake Erie, OH and West Sister island. In 1996, I conducted a set of SCUBA-based surveys of benthic fishes and crayfish on the north side of Killays island, in shallow-water, rocky-bottomed habitat likely to be invaded by gobies. No gobies were observed there during numerous dives. In summer 1997, 1 goby was observed in West Sister on the north side of Kelleys Island, in shallow-water, rocky-bottomed habitat deemed likely to be invaded by gobies. No gobies were observed there during numerous dives. In summer 1997, I increased my study to include sites from the east, and south sides of Killays Island, the east and west sides of West Sister Island, the south side of West Sister Island, and a set of 12 sites on Con, Cib, and Locust Point Reefs. At all locations, 80 sq m transects were surveyed for abundances of gobies and other benthic fishes, and for crayfish. Video was recorded among transects to document possible future changes in zebra mussel coverage. The highest gobie densities were observed for West Sister (2.2 m² in August, 3.9 m² in October). Abundances on the south side of Killays Island increased from June (0.3 m²) to August (0.7 m²) but remained low (<0.1 m²) on the east and north sides. Goby numbers by South Bass never exceeded 0.1 m². Abundances on the reef study sites varied from 0.1 to 1.3 m², with variation possibly associated with site depth, substrate composition, and location on the reefs.

4:15 DENSITY AND DIVERSITY OF AQUATIC SPECIES IN THE CONSTRUCTED RIPARIAN WETLAND ON THE OLENTANGY RIVER, COLUMBUS. MATTHEW W.
1:30 THE OHIO JOURNAL OF SCIENCE: APPROACHING ITS CENTENNIAL.

WILLIAM R. BURK, JOHN N. COUCH BIOLOGY LIBRARY, UNIVERSITY OF NORTH CAROLINA, CB#3280 COKER HALL, CHAPEL HILL, NC 27599-3280.

The origins of The Ohio Journal of Science, the official publication of The Ohio Academy of Science, are traced to its initial forerunner, The O.S. Naturalist, issued in November 1801. The idea of creating an Ohio natural science journal had been expressed nearly a century ago by members of The Biological Club of Two Ohio State Universities, especially by botanist, William A. Killerman (1850-1908), who wanted to create a botanical journal. A committee of six individuals from the Club developed a plan of publication for a natural science serial, which after slight modification, was adopted 7 May 1900. John H. Schaffter (1886-1939), botanist, became the Editor-in-Chief, with five associate editors representing different areas of research. The name of the serial changed as its disciplinary scope broadened: The O.S. Naturalist (November-December 1900); The Ohio Naturalist (January 1901-June 1914); The Ohio Naturalist and Journal of Science (November 1915-December 1915); The Ohio Naturalist and Journal of Science (November 1915-present). Since its 1900 issue was printed, the Journal has been guided by 18 editors, and it has published 97 volumes, two cumulative indexes, and two Special Issues. Among its features have been book reviews; obituaries of Academy members; and Academy Presidential Addresses.

1:45 THE OSU AT MARION CAMPUS NATURE CENTER AND PRAIRIE: 20 YEARS OF CONSERVATION, EDUCATION AND RESEARCH. ROBERT A. KIEL, DEPT. OF PLANT BIOLOGY, OHIO STATE UNIVERSITY AT MARION, 1465 MT. VERNON AVE., MARION OH 43302.

Prairie plant communities, once plentiful in central Ohio, are now exceedingly scarce. Existing prairie remnants continue to be threatened by development and invasion by exotic species. Interest in prairies is currently high because of their historical and ecological importance. The central feature of the OSU—Marion Campus Nature Center and Prairie is an 8-acre tallgrass prairie established on fallow farmland about 1978 starting with plants and seeds from a natural prairie remnant located nearby, the Claridon Prairie. The prairie is dominated by grasses such as Big and little blue stem, switchgrass and Indian grass and forbs including round-headed bush clover, gray-headed coneflower, tall sunflower and prairie dock. Several regionally rare plants occur there including state-listed prairie false indigo (Baphelia lactea) and royal cattail (Silene regia). A pond and shelter-house have been added to the site and administration of the prairie has been formalized to include a faculty director and two student coordinators. The prairie is the focus of a nature education program through which OSU—Marion students interested in nature teaching visit area schools and also lead tours at the prairie. In addition to its being a field site for several graduate student and faculty life science studies, ongoing restoration ecology research compares methods of increasing plant diversity. Efforts are underway to enlarge the prairie to 24 acres.

2:00 THE BEGINNINGS OF WRITTEN FLORAS AND TAXONOMIC MONOGRAPHS IN NORTHAMERICAN BOTANY (1800-1840). RONALD L. STUCKEY, HERBARIUM, MUSEUM OF BIOLOGICAL DIVERSITY, OHIO STATE UNIVERSITY, COLUMBUS OH 43212-1192.

Among the first botanical publications of any given geographical area is a list of plants, which is the simplest written flora. The monograph, a comprehensive treatment of the known genera of a family or known species within a genus, provides the names, descriptions, locations, and keys to facilitate their identification. Because of the need for accurate floras, monographic studies became necessary for certain large and/or difficult genera. From 1800-1840, those botanists who were writing floras also prepared the earliest botanical monographs. Examples of botanists who wrote both floras and monographs (cited with name of plant group) were: A. Michaux on Quercus (1801); H. Mullienbarg on Juglans, Fraxinus, and Quercus (1801), Salix (1806), Gramineae (1817); C. S. Rafinesque on Calliclithce and Potamogeton (1811); T. Nuttall on Erigonum (1817); D. L. von Schweinitz on Viola (1822) and Canex (1824, with J. Torrey, 1825). A. Gray on Rhynchospora (1835); and J. Torrey on Cyparissaceae (1836).


A floristic survey of the pteridophyte flora of Mt. Iraya, Batan Island, Bataanes Province in the Philippines was conducted in 1990-96. Species richness along an altitudinal gradient was examined, and the conservation status of the taxa determined. Mt. Iraya, an active volcano in the northeasternmost part of Batan Island, is the highest peak (1,009 m) in the province. It occupies an area of 1,246 ha. A total of 96 species were collected, representing about 91% of the total species reported for the province. Of these, ten species are Philippine endemics and eight have strong eastern Asian affinities. The Bataanes populations representing the southern or eastern limit of their ranges. Recent collection efforts added fifteen new species records for the mountain, one new genus record for the Philippines and one undescribed species. The lowland elevation (0-200 m) is the richest in species composition (30 spp.), while the lower montane forest (ca. 500-900 m) has the largest proportion of endemic taxa. Only three species were recorded at the summit. Nine previously reported species have not been recollected.

2:30 THE DIVERSITY OF VASCULAR PLANTS IN AN ANDEAN CLOUD FOREST RESERVE (MAQUIPUCUNA, ECUADOR). ROBERT M. RHOADES & GRADY L. WEBSTER, DEPT. OF BOTANY, MIAMI UNIVERSITY, OXFORD OH 45056 & HERBARIUM, UNIV. OF CALIFORNIA, DAVIS, CA 95616.

The Bosque Protector Maquipucuna forms the core (5000 ha) of a 30,000 ha florisoc region on northern western slopes of the Andes northwest of Quito, Ecuador. The western-most lower montane and upper montane cloud forest is mostly secondary below 1700 m. Floristic inventory from 1989 to 1997, as well as literature & herbarium surveys, (c. 4300 collections total), have documented approximately 1460 species of vascular plants, including more than 220 pteridophytes. Naturalized exotics comprise only about 40 species. The flora has a high number of endemic taxa represented in 29 families with 340 species, including 92 pteridophytes and 60 hemiparasites. Orchidaceae, Arecaceae, Bromeliaceae, Eriocaulaceae and Gesneriaceae have the largest numbers of flowering plant epiphytes. Above 2000 m, temperate families such as Coriceae, Cunoniaceae, Hydrangeaceae, Magnoliaceae, and Rosaceae occur, but with few species respectively. Floristic affinities of the Maquipucuna flora appear closest to the Pacific coast cloud forest of the Ocho region in Colombia. Conservation of the Maquipucuna vegetation and flora presents critical problems because of proximity to Quito and continued development, but efforts are being made by numerous agencies and individuals. The upcoming publication of a detailed checklist for Maquipucuna will be an important step to support this and adjacent reserves of plant diversity.

2:45 INDIGENOUS SWidden AGRICULTURE OF THE WANA WITHIN THE MOROWALI NATURAL RESERVE OF CENTRAL SULAWESI, INDONESIA. CYNTHIA L. RICCIARDI AND JAN SALICK, DEPT. OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

Morowali Nature Reserve, established in 1980, encompasses the Wana ancestral homeland. This paper documents the swidden cycle of this group of upland agriculturists to understand their presence with influence on the forest. Community members were interviewed and observed in their gardens. Composition, structure, and diversity of swiddens and house gardens were evaluated quantitatively. Additional sources of food, collected or purchased, and major non-timber forest products were investigated. Unlike other swidden agriculturists, the Wana have less gender-specific tasks, often have conjoining swiddens and concurrent burns, repeatedly fire poorley burned areas, intercrop Oriza spp. and Zea mays, and rarely plant fruit trees in swiddens. Thus, follow management is minimal. Younger and older house gardens are more diverse than intermediate gardens due to the presence of fruit trees in the former and dominance of Manihot esculenta in the latter. House gardens are more diverse than swiddens. Edible wild plants are gathered yet cultivated plants are preferred. Collection of rattan (Calamus spp.) and damar (Agathis spp.) provide a limited cash income. Recent governmental efforts to settle the Wana in lowland villages have been largely unsuccessful. However, a few populations, including this study group, have become less mobile, resulting in deleterious effects on the surrounding forest community.

3:00 EFFECTS OF MODIFIED MILPA AGRICULTURE ON SUSTAINABILITY. JAMES A. SPURNEY AND JAMES C. CAVENDEN, DEPT. OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

Soil physical and biological characteristics are useful indicators of agricultural sustainability as they relate to soil conservation and crop production. This project examines the factors that they relate to the Mayan milpa and other farming systems of Belize, Central America. Soil samples were collected from a Maya milpa farmer’s fields in cultivation or in various stages of regeneration, as well as from fields of a large Bolivian farm where mechanized techniques and chemical fertilizer are used. Soil samples were analyzed for the following characteristics: 1. Physical - Water Stable Aggregate (WSA) formation using a wet-sieving technique. 2. Biological - A preliminary assessment of endomycorrhizal (VAM) fungi activity by isolation of VAM propagules. 3. Chemical - Soil nutrient analyses for nitrate, ammonium, phosphorus, potassium, organic matter, pH and CEC. Initial assessment for WSA formation indicates that the Mayan milpa may maintain a surface - Soil nutrient analyses for nitrate, ammonium, phosphorus, potassium, organic matter, pH and CEC. Initial assessment for WSA formation indicates that the Mayan milpa may maintain a surface
assessment of the VAM and elaborate on the physical and chemical characteristics of the soils of the two types of farms.

3:15 EFFECTS OF ECOTOURISM ON AGRICULTURE IN A YAGUA VILLAGE IN THE PERUVIAN AMAZON. Susan R. Lamont, 316 Pearson Hall, Miami University, Oxford OH 45056.

A growing number of developing countries are embracing ecotourism as a development option that promotes conservation of tropical forests while enabling economic progress. Few studies have documented the effects of ecotourism among other factors transforming rural societies. This study's focus is to determine, through comparison between three villages, the impacts of ecotourism on agriculture in a native Yagua village in the Peruvian Amazon. The objectives are to describe agricultural methods used in each village, and to determine factors influencing agriculture and the effect of each factor. Hypotheses are: 1) shift from a subsistence to a monetary economy leads to decreases in size and number of farm plots, crop diversity, and time allocated to agricultural activities; 2) existence of a market for craft products leads to increased demand for certain craft materials, resulting in cultivation and transplant of wild craft species into farm plots. Results of data collected through stratified random sampling of farm plots and interviews with community members supported the first hypothesis but disproved the second. Influence of the tourist market in the Yagua village resulted in smaller fields, less crop diversity and less time spent on agriculture, yet craft plants were overexploited from both farm plots and the surrounding forest.

3:30 POLLINATION ECOLOGY OF PEDICULARIS IN THE CHINESE HIMALAYA. I. Lazarus W. Magor, Dept. of Biology, University of Akron, Akron OH 44325-3908.

A study of 14 Pedicularis species in the Himalayan alpine meadows of China in 1996 indicated regular pollination by Bombus including species with elongate, nectarless corolla tubes, moderate pollen-foraging constancy; sympathy of up to 9 Pedicularis species in one meadow, absence of nectar from Pedicularis hybrids; microhabitat specificity of Pedicularis species and absence of other pollinator species specificity. In 1997, pollinator behavior was corroborated by videotape recording. Nectar foragers pollinated nototrichously or perforated corolla tubes without pollinating. Pollen foragers on nectarless, long-tubed P. cuneiopetala, P. longiflora tubifloras and P. longiflora hongyuanensis pollinated stectomitchially. Although pollinators were very scarce on Pedicularis, sympatric species of other genera were more frequently pollinated. On Acer, 24% of pollinators were monandric for Acerralum pollen, while 67% foraged for nectar only. Queens and workers of at least 5 Bombus species pollinated Acer. Although Acer was locally common, Pedicularis longiflora tubifloras exhibited disproportionately greater bloom in many populations blooming sparsely or not at all in the previous season. Despite pollinator scarcity, 46% of P. c. tubifloras flowers set fruit. By contrast, 27% of Pedicularis ventriculata flowers fruited. The data indicate the need for further investigation of the reproductive process in Pedicularis.

3:45 NATURAL LEVELS OF POLLEN DEPOSITION AND POLLEN TUBE GROWTH IN A WILD POPULATION OF CLARKIA UNGUICULATA (ONAGRAEACEAE). M. Smith-Huerta, Dept. of Botany, Miami University, Oxford OH 45056.

Understanding natural pollen deposition rates and pollen tube growth dynamics in plants forms an integral part of pollination ecology studies and provides important information on some of the factors that affect reproduction in wild populations. Pollen deposition and pollen tube growth were surveyed in a wild population of Clarkia unguiculata in Northern California. Open pollinated stigmatic and style were collected at 6, 24, and 48 hrs after full stigma receptivity. The total number of pollen grains on the stigma and the number of pollen tubes in the style were counted. Samples harvested at 6 hrs had an average of 61.8 pollen grains on the stigma and 10 pollen tubes in the style/stigma junction. By 24 hrs the average number of pollen grains on the stigma increased to 77.8 and to 22 pollen tubes at the style/ovary junction. At 48 hrs, there were 147.8 pollen grains on the stigma and 49.7 pollen tubes at the style/stigma junction. The average number of ovules per ovary in this population was found to be 101.9. Average seed set in this species is expected to be approximately 60 seeds per ovary, only about 50% of the available ovules. In this study, enough pollen grains to yield full seed production reached the stigma by 6 hrs after full stigma receptivity. Enough pollen tubes to reach full seed production reached the style/stigma junction by 48 hrs.

4:00 MORPHOLOGICAL CHANGES DURING THE APOMICTIC CYCLE OF CUPHEA PARSONSII. Melissa A. Linker, Dr. Shirley A. Graham, Kent State University, Dept. of Biological Sciences, PO Box 5190, Kent OH 44242-0001.

The change from apomictic and sexual reproduction has been widely studied in a number of plants, like Arabidopsis, but has only recently been discovered in the genus Cuphea. In both cases the switch to apomixis is evidenced by noticeable changes in morphology of the flowers. Cuphea parsonsi (L.) Br. is the focus of this research in which the changes in pollen fertility, stamen number, petal number and color, seed set, and phasomagnogamy/monogamy are being studied in both sexual and sexual flowers from greenhouse and field populations. C. parsonsi flowers all year, and the sexual forms occur in the greenhouse specimens for a period of 2-3 months during the winter. The morphological changes in the apomictic flowers indicate a general reduction in fitness, evidenced by the reduction or absence of stamens or inferitor pollen, and a decrease in seed set. Further research is planned to determine whether the change in breeding system is triggered by a change in a specific environmental factor.

4:15 DICTYOSTELID CELLULAR SLIME MOLDS OF ST. JOHN, V.I. Nicole D. Cavender and James C. Cavender, Dept. of Horticulture & Crop Science, Ohio State University, Columbus OH 43210 & Dept. of Environmental & Plant Biology, Ohio University, Athens OH 45701.

This research project was designed to study the diversity of cellular slime molds of St. John, V.I., an island of 31 sq. km., 65% of which is vegetationally intact as Virgin Islands National Park. Our interest is in determining what effects area and insular environment have on csm diversity by comparing our data with known csm diversities on Puerto Rico and at Tikal, Guatemala. Soils were collected during August (hot/moist) and December (warm/moist) and processed for csm at Ohio University using a soil dilution-bacterial enrichment technique. In addition to species presence, density and frequency of occurrence were also determined. A total of 1795 isolations, representing 16 species were made from 20 sites in five habitats: moist and forest, agave-cactus and coastal scrub, and white mangrove. Moist forest and agave-cactus scrub had the greatest species richness (11) although densities were greatest in moist forest. The number of csm species on St. John is about 1/2 that of Tikal but only somewhat less than the 1/2 Puerto Rico given data presently available.

4:30 EVOLUTION OF SPORE RELEASE MECHANISMS IN THE SAPROLEGNIACEAE (OOMYCETES). John Daugherty, Timothy M. Evans, Tallay Skollon, Linda E. Watson, and Nicholas P. Money, Dept. of Botany, Miami University, Oxford OH 45056, and Dept. of Biology, Hope College, Holland MI 49422.

Classical studies on spore release within the family Saprolegniaceae (Oomycetes) led to the proposition that different mechanisms of sporangial epiphysing represent stages in an evolutionary transition series. We have reevaluated this idea within a phylogenetic framework using ITS sequences of four genera and compared these data with information on the response to cosmic stress shown by each taxon. Saprolegnia emerges as the most basal genus, sister to Achlya, Thalassiosira, and Dictyochus. The stress response of these fungi is compatible with this interpretation. The resulting phylogeny is also consistent with the idea that the mechanism of sporangial epiphysing exhibited by Saprolegnia represents the pleomorphic condition from which the other mechanisms were derived independently. These alternative mechanisms of sporangial epiphysing may have resulted from a relatively small number of mutations that inhibited axenial development and altered the temporal and spatial expression of wall-loosening enzymes.

SESSION 05

Forest Ecology

09:00AM Saturday, April 4, 1998

Johnston Hall 106

FREDERICK JOHN KLUTH - PRESIDING

9:00 TWENTY YEARS CHANGE IN TREEFALL GAPS AND CANOPY TREES IN HUESTON WOODS, OHIO. James J. Runkle. Department of Biological Sciences, Wright State University, Dayton OH 45455.

My goal is to quantify the dynamics of the old-growth beech-maples forest in Hueston Woods, Ohio. In 1977 I resampled areas first sampled in 1977, collecting two sorts of data: 1) vegetation (>1 m tall) and other characteristics associated with trees, 2) tree fall within the ranges of values reported for temperate deciduous forests.

SESSION 05

The change between apomictic and sexual reproduction has been widely studied in a number of plants, like Arabidopsis, but has only recently been discovered in the genus Cuphea. In both cases the switch to apomixis is evidenced by noticeable changes in morphology of the flowers. Cuphea parsonsi (L.) Br. is the focus of this research in which the changes in pollen fertility, stamen number, petal number and color, seed set, and phasomagnogamy/monogamy are being studied in both sexual and sexual flowers from greenhouse and field populations. C. parsonsi flowers all year, and the sexual forms occur in the greenhouse specimens for a period of 2-3 months during the winter. The morphological changes in the apomictic flowers indicate a general reduction in fitness, evidenced by the reduction or absence of stamens or inferitor pollen, and a decrease in seed set. Further research is planned to determine whether the change in breeding system is triggered by a change in a specific environmental factor.

9:15 THE STRUCTURE AND DYNAMICS OF AN OLD-GROWTH WOODS IN THE HOLDEN ARBORETUM. Jodi A. Forrester and James R. Runkle, Department of Biological Sciences, Wright State University, Dayton OH 45455.

Several multi-tree blowdowns and branch dieback appear to be thinning the canopy in an old-
9:30 HERBACEOUS SPECIES AS KEYS TO DEFINING OLD-GROWTH FORESTS OF SOUTHERN CENTRAL ALASKA. TARA S. FLETCHER AND JOHN L. VANKAT, DEPT. OF BOTANY, MUNN UNIVERSITY, OXFORD OH 45056.

There is no universal definition for the term "old growth" forest because old-growth properties are specific to location. Alaska has two well-known forest types: coastal and interior forests. A third, poorly-studied type occurs in southeastern Alaska, an old-growth mesophytic old-growth forest. Old-growth mesophytic forests in this area are dominated by only two species, white spruce (Picea glauca) and paper birch (Betula papyrifera). However, herbaceous species richness is much greater. Therefore, herb species may provide additional, if not greater, insight into these forests. During the summer of 1997, we utilized 18 x 20 x 25m study plots on Fort Richardson Army Base near Anchorage to determine whether some herbaceous species uniquely characterize old-growth forests of southeastern Alaska. The plots were located to encompass various landforms and stand age classes. Percent cover estimates were conducted on 1 x 1m subplots approximately every three weeks throughout the growing season. Findings indicate that the presence or absence of herbaceous species is consistent across forest ages. However, species abundances are variable and therefore aid in defining "old growth" for this region.

9:45 THE EFFECT OF CAMERA HEIGHT ON THE ANALYSIS OF FOREST CANOPY HEMISPHERICAL PHOTOGRAPHY. SCOTT A. ROBINSON AND BRIAN C. MCCARTHY, DEPT. OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

With the increased availability of digital technology, hemispherical photography is becoming increasingly popular as a method of documenting forest canopy cover. Subsequent computer analysis of digitized images provides reasonably accurate and precise estimates of the amount of seasonal solar radiation reaching the forest floor. Presently, most published studies have utilized a camera height of 1.5 m. A camera height closer to the ground may better describe the light patterns available for seedlings and more precisely account for light conditions generated by forest fires and forest openings such as blowdown events. Therefore, we compared the results of light measurements at different camera heights to determine the best height for this research. We found that the results obtained using three different heights of 30, 150, and 350 cm were very similar. However, the camera operating at 1.5 m height produced the most reasonable results. Thus, we conclude that a camera height of 1.5 m is a good compromise between the cost of light measurement and the accuracy of results.

10:00 COMPOSITION, STRUCTURE, AND HEALTH OF DYSART WOODS, AN OLD-GROWTH MIXED MESOPHYTIC FOREST OF SOUTHERN OHIO. BRIAN C. MCCARTHY AND CHRISTINE J. SMALL, DEPT. OF ENV. AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

Dysart Woods retains National Natural Landmark status because of its virgin white oak and mixed mesophytic vegetation. The overall purpose of this research was to establish a long-term study of forest and soil dynamics in an unmanaged forest. Here we report the baseline results of woody vegetation composition, structure, and health. Two 0.35 ha permanent plots (30 x 70 m) were established on opposing north- and south-facing slopes. All live trees (dbh > 2.5 cm) within each plot were identified, tagged, and mapped. Measurements (dbh < 2.5 cm, ht < 30 cm) and seedlings were sampled in 35 sub-plots within each main plot. Thirty-six tree species were encountered within the south slope (BA = 35.5 m² ha⁻¹, D = 302 stems ha⁻¹), dominated by Fagus grandifolia, Quercus alba, and Acer saccharum. The north plot (BA = 32.5 m² ha⁻¹, D = 971 stems ha⁻¹) was dominated by A. saccharum and F. grandifolia. Stand-level diameter distributions were of the reverse-J form typical of old-growth forests; however, certain species distributions departed significantly. For example, many (40-50%) of the oldest O. alba trees are in a state of severe decline and are not regenerating. F. grandifolia and A. saccharum are well represented in all size classes. Forest health assessment based on bale damage, crown transparency and disbark, foliage characteristics, and vigor suggests that the forest is otherwise healthy.

10:15 DISTRIBUTION, ABUNDANCE, AND DYNAMICS OF COARSE WOODY DEBRIS IN DYSART WOODS, AN OHIO OLD-GROWTH FOREST. DARRIN L. RUBINO AND BRIAN C. MCCARTHY, DEPT. OF ENV. AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

COARSE woody debris (CWD), snags, and stumps serve numerous functions in the forest ecosystem, whose functions vary through stand development and succession. Due to the structure of old-growth forests, it is hypothesized that the input rate of wood volume should be increased at the lower elevations. This is due to the larger number of standing snags and dead trees at lower elevations. To test this hypothesis, we surveyed CWD abundance and distribution patterns in two plots, one at the lower elevation and one at the upper elevation. The plots were located in a 23-ha mixed-mesophytic old-growth forest in Belmont County, Ohio. The lower elevation plot was dominated by C. virginiana, C. oblonga, and F. grandifolia, while the upper elevation plot was dominated by A. saccharum and O. clayfonii. Our study plots contained only species native to the eastern U.S., and this study provides insight into the probable role of disturbance in the initiation of Dysart Woods, and provides a view of how present-day oak forests may develop in the absence of major disturbance.

SESSION 06

LAND ANIMAL ECOLOGY

01:30PM Saturday, April 4, 1998

JOHNSTON HALL 119

ALAN B. Cady - Presiding

1:30 PRELIMINARY REVIEW OF THE STATUS OF OHIO'S LAND SNAILS. MICHAEL A. HOGGART, DEPARTMENT OF LIFE AND EARTH SCIENCES, OTERBITE COLLEGE, WESTERVILLE OH 43081.

One hundred and thirty-seven species of land snails (Mollusca: Gastropoda: Pulmonata) have been recorded from Ohio. Of these, ten species are of questionable occurrence in the state and six have been introduced. The status of the remaining 121 species is the focus of this study. Over the past ten years, 319 collections, from most of Ohio's 88 counties, have yielded new county records for Ohio land snails. These collections combined with the examination of Ohio specimens at the Field Museum of Natural History (Leslie Hubricht Collection), the National Museum of Natural History, and the Ohio State University Museum of Zoology has resulted in a better understanding of the distribution of these animals in Ohio. Currently, 32 species of land snails have been recorded from five or fewer counties and 19 additional species occur in only six to ten counties. Of these 51 species, 20 occur in restricted ranges outside of Ohio. A list of rare species, along with criteria used to establish endangered, threatened and special concern status for these molluscs will be presented.

1:45 SPIDERS IN SOYBEAN FIELDS: THE IMPORTANCE OF HEDGEROWS AND EDGE PERMEABILITY ON THEIR MOVEMENTS. JURAJ R. HALLAJ, DEPT. OF ZOOLOGY, MIAMI UNIVERSITY, MIDDLETOWN OH 45042.

The significance of field margins - hedgerows - as reservoirs harboring many generalist predators migrating into adjacent crop fields has been a topic of numerous research studies. Robust species richness in soybean hedgerows has been described, and it is hypothesized that hedge density and species richness in hedgerows will be positively correlated with soybean yield. Hedgerows have also been shown to be key corridors for several species of spiders, and spiders are considered keystone predators in agricultural systems. This research will present findings from hedgerow surveys of soybean fields in southwestern Ohio, and conclusions concerning the importance of hedgerows in agricultural landscapes.
However, the role of spiders in these processes and factors modifying their movements between hedgerows and fields are much less understood. Two soybean fields were sampled for ground spiders from the stage of soy germination (May) through harvest (November) using a 6.86 m grid of pitfall traps extending from within the hedgerow, across the ecotone, into the field. One field had an abrupt ecotone and the other had a 16-m wide grassy strip between the hedgerow and the soybean field. Certain spider groups preferred the hedgerow while others were found more commonly in the field, but these relationships changed with the growing season. Our pitfall trap data indicate that spiders move through the abrupt ecotone more easily (more "permeable") compared to the edge with grassy strip, which appears to impede their dispersal from the hedgerow into the soybean field (less "permeable"). Mark-recapture experiments confirmed movements of some spider species across the ecotone. Ongoing hedgerow manipulations are testing the observed patterns of spider movement. These data suggest that hedgerows may serve as critical habitat refugia for many spider species seasonally migrating into crop field. Thus, protecting these habitats in the agricultural landscape may conserve the local spider fauna and enhance their role as agents of biological control.

2:00 A COMPARISON OF SPIDER (ARANAEAE) DIVERSITY BETWEEN SOIL/ LITTER STRATUM AND UNDERSTORY VEGETATION OF SELECTED FOREST SITES IN OHIO. Richard A. Bradley, Ohio State University, 1465 Mt. Vernon Ave., Marion OH 43302.

This study is part of a larger effort to determine the species diversity, distribution and abundance patterns of spiders in Ohio funded by the Ohio Division of Wildlife. Spider communities were sampled at Conkle’s Hollow Natural Area (Hocking Co.), Glen Helen Outdoor Education Center (Greene Co.), Fowler Woods Natural Area (Richland Co.), and Seymour Woods Natural Area (Delaware Co.) between May 1994 and October 1997. Sampling methods included visual search, beating sheet, sweep net, pitfall trap, and litter extraction. Species diversity in the soil/litter stratum was higher than in the understory vegetation at each site. Each sampling method captured a unique number of species not represented in other samples; 45% of species were captured by only one method and an additional 35% of species were captured by only two of the five methods. Visual search at ground level, litter extraction and pitfall traps captured a higher proportion of unique species than the other sampling methods. Despite a considerable sampling effort to date, species-accumulation plots indicate that many species remain to be documented from each of the study sites.


The use of generalist predators as biocontrol agents in agroecosystems has become a popular area of current integrated Pest Management research. The use of straw shelters to conserve populations of generalist predators such as spiders during the time of agricultural disturbance has been practiced by farmers in the East for over 200 years. This technique, however, has not been systematically investigated. We studied the use of straw shelters as temporary habitat refugia for ground-dwelling spiders following a major disturbance - conventional tillage. Two weeks after, 37 times as many spiders and their egg sacs were hand-collected from straw shelters as compared to the control. The diversity of spiders captured in the straw shelters was higher than in the understory vegetation at each site. Each sampling method captured a higher proportion of unique spiders than the other sampling methods. These results suggest that straw shelters may serve as critical habitat refugia for many spider species seasonally migrating into crop field. Thus, protecting these habitats in the agricultural landscape may conserve the local spider fauna and enhance their role as agents of biological control.

2:30 CAPTIVE REARING OF THE HARLEQUIN BEETLE (COLEOPTERA: CERAMBYCIDAЕ) AT THE CINCINNATI ZOO, INCLUDING USE OF AN ARTIFICIAL LARVAL DIET. Janet L. Stem Carter, Clermont College -University of Cincinnati, 4200 College Drive, Batavia OH 45103.

Harlequin beetles, Acrocinus longimanus (Linn.), were successfully reared through two generations in captivity at the Cincinnati Zoo utilizing fresh-cut mulberry logs (Morus sp.) as the host plant. It was shown that mulberry is a suitable host plant to stimulate oviposition, elaiosome, larval development, and pupation. Neither older, dried mulberry logs nor frozen-then-thawed logs are acceptable oviposition sites. Of nine first-generation larvae raised on mulberry, six reached adulthood, with four (one male and three females) producing over 100 offspring. Of these offspring, only two of the second-generation larvae were reared on mulberry, while the rest were raised on the artificial diet (Mums sp.), and the larvae were later fed on mealworms (Lepidoptera: Noctuidae) and mealworm grubs. While a number of recent studies have led to a better understanding of dragonfly flight, few studies have reported on that flight in natural situations. Studies that have been done under natural situations have typically treated only a few individuals monitored for a brief period of time. This study reports on flight segments recorded of individuals of six species near Marietta, OH, on June 16, 1997 and July 14 & 16, 1997. A Panasonic FaiLight P4-1527 18K Optical Zoom camera was used to record the dragonfly flight. The videos were taken between the times 1:45 pm. Tapes were analyzed by tracing frame-by-frame movements of specimens from a monitor to transparency. Magnification on the monitor was related to actual distances in the field by reference to a meter stick, which had been placed in the field of view while recording. The distance a specimen flew was calculated by measuring the on-screen distance and dividing by the magnification factor. The distance was multiplied by the time between frames (0.03 sec.) to determine velocities. Average flight velocity of six species was 1.40 m/s (w=0.05). The genetic relatedness theory argues that there is a genetic conflict of interest between queens and sterile workers. The resource dependent theory argues that since queens are much larger and sequester more resources, they should invest in more queen production. We used radio-labeled food to measure allocation of food among different castes, comparing elaiosomes and insect larvae. In lab colonies elaiosomes are preferentially distributed to the queen, while males and gynes (virgin queens) also receive more workers. In contrast, meal worms are not allocated preferentially among castes. Workers did not discriminate against males, even though males usually exceeded numbers predicted by the genetic relatedness theory. We conclude that Aphaenogaster rudis colonies distribute elaiosomes differently than insect food, and this might be a mechanism by which resources influence the production of reproductive castes.

3:00 EFFECT OF HABITAT SCALE ON INVENTORY OF MICHIGAN PAPAIPERMES (LEPIDOPTERA:NOCTUIDAE) Keith S. Summerville, 319 North Elm Street, Oxford OH 45056.

The Noctuid genus Papaipemis is a diverse assemblage of moths whose larvae are all borers. Adults appear from late August to mid October but are rarely found in collections due to their low activity level. Members of this genus are poorly studied, but their diversity warrants conservation. Surveys for Papaipemis were conducted using UV and mercury vapor lighting techniques during the fall of 1997. All surveys were conducted on Michigan Nature Conservancy preserves which were known to support large densities of suitable host plants. Since host plant abundance was not limiting and records included historical collections from each site, many Papaipemis were expected. However, after one month of intensive sampling, few rare moths were found. When the focus of the search shifted to an examination of microhabitat variation within a host plant patch, collection of rare species increased. This suggests that land managers and field biologists need to focus on smaller scales when considering rare moths. Lack of insect species' occurrence from one location within a community may not signify complete species absence.

3:15 FLIGHT VELOCITIES OF ODONATA MEASURED USING VIDEO TECHNIQUES. Candice Twinhorn and Dave McSweeny, Biology Department, Marietta College, Marietta OH 45750.

While a number of recent studies have led to a better understanding of dragonfly flight, few studies have reported on that flight in natural situations. Studies that have been done under natural situations have typically treated only a few individuals monitored for a brief period of time. This study reports on flight segments recorded of individuals of six species near Marietta, OH, on June 16, 1997 and July 14 & 16, 1997. A Panasonic FaiLight P4-1527 18K Optical Zoom camera was used to record the dragonfly flight. The videos were taken between the times 1:45 pm. Tapes were analyzed by tracing frame-by-frame movements of specimens from a monitor to transparency. Magnification on the monitor was related to actual distances in the field by reference to a meter stick, which had been placed in the field of view while recording. The distance a specimen flew was calculated by measuring the on-screen distance and dividing by the magnification factor. The distance was multiplied by the time between frames (0.03 sec.) to determine velocities. Average flight velocity of six species was 1.40 m/s (w=0.05). The technique described here is simple, inexpensive, and widely adaptable to behavioral studies of a wide range of animals.

3:30 A SURVEY OF THE BIRDS AT OHIO NORTHERN UNIVERSITY, ADA, OHIO. Jennifer T. Matthews (Dr. Nelson J. Moore), Dept. of Biological Sciences, Ohio Northern University, Ada OH 45810.

With the increase in suburban sprawl, human residentially-managed habitats are becoming increasingly important. An excellent example of such an environment is the campus of Ohio Northern University, Ada, Ohio. The campus was subdivided into four distinct equal-sized habitats: old campus, new campus, woodland/ponds, and playing fields. Twenty-eight transect surveys measuring species richness and diversity were conducted through all habitats between May 20 and December 21, 1997, each lasting about 1.5 hours. Data were analyzed using the Simpson Species Diversity Index. Certainty of breeding was noted using a standard nesting box. The resource dependent hypothesis (w=0.05). The technique described here is simple, inexpensive, and widely adaptable to behavioral studies of a wide range of animals.

3:45 THE FORAGING ECOLOGY OF CAPTIVE, FREE-RANGING BACTERI WAPTI (CERVUS ELAPHUS BACTRIANUS) AND RETICULATED GIRAFFE (GIRAFFA CAMELopardalis Reticulata) AT THE WILDS CONSERVATION FACILITY IN CUMBERLAND, OHIO. Krista M. Wening (Linda C. Zimmerman and Juliana M. Mulroy). Denison University, Granville OH 43023.

The foraging activities of captive, free-ranging Bactrian Wapiti (Cervus elaphus bactrianus) and reticulated giraffe (Giraffa camelopardalis reticulata) were studied at the Wilds conservation facility in Cumberland, Ohio (Muskingum county). Observing the behavior of these non-native animals in their native habitat gives insight into the evolution of foraging behavior and diet selectivity as well as provide information of pragmatic importance to conservation facilities attempting to maintain and reproduce endangered and threatened species. Study animals freely grazed or browsed upon forage available in the approximately 8 ha, enclosure containing a variety of grasses, shrubs, and trees.
of native and introduced vegetation. Direct observation was employed to study the individuals. Vegetation samples were collected from all of the forage items and analyzed according to standard methods to quantify gross energy as well as water, fiber and nitrogen content. Biomasses was estimated by systematically sampling along transects throughout the enclosure. Over the 13-week study period, giraffes were observed foraging upon a total of 30 forage items and were seen consuming 24 items. The majority of the giraffe forage items were trees or shrubs, with few vines and low-lying herbaceous plants included in the diet. The wapiti diet seemed to be more inclusive of low-lying forage material. Black locust (Robinia pseudo-acacia) appeared to be the preferred forage item for both species.

SESSION 07
PLANTS: MOLECULAR SYSTEMATICS; INVASIVE SPECIES
09:00AM SATURDAY, APRIL 4, 1998
JOHNSTON HALL 108
MICHAEL S. BARKER - PRESENTING

9:00 THE HISTORY OF AN AMERICAN ELM: VERIFICATION OF ORAL TRADITIONS USING DNA MARKERS. MICHAEL S. BARKER, DENISON UNIVERSITY, SLATTER BOX 327, GRANVILLE OH 43022.

9:15 GENETIC DIVERSITY AND GENE FLOW OF TURTLE GRASS, THALASSIA TESTUDINUM, BANKS EX KONG, IN THE LOWER FLORIDA KEYS. MARKA. SCHLIEFER AND SHIELD B. OSBORNE, MIAMI UNIVERSITY, OXON OH 45085.

Turtle grass is the dominant seagrass in the very productive and valuable coastal seagrass community. The present study investigated the genetic diversity of turtle grass collected at 18 sites in the lower Florida Keys. Fourteen allozyme loci were resolved, of which 5 (ADH-2, GPI, LAP, 6-PDG, and PGM-2) were variable. Mean heterozygosity was 0.027. The majority of genetic diversity occurred within populations (Gst = 0.35). The number of migrants each generation (Nm) was estimated, on the average, to be 16.0. This suggests that turtle grass is not genetically differentiated among the 18 collection sites. These results indicate strong gene flow for sites that were “adjacent, but not in contact.”

9:30 MOLECULAR ANALYSES REVEAL SIMILARITY OF ACER SACCHARUM AND ACER NIGRUM. ADAM P. SKEPNER & DAN E. KRANE, WRIGHT STATE UNIVERSITY, DEPT. OF BIOLOGICAL SCIENCES, DAYTON, OH 45439.

The number of species and subspecies that comprise North American sugar maples has remained in dispute since their first characterization over 100 years ago. The distinction between Acer nigra (black maples) and Acer saccharum (sugar maples) in particular has been controversial. Despite readily distinguishable morphologies and different adaptive advantages, these trees hybridize readily and their ranges extensively overlap. Extensive RAPD-PCR based analyses of A. nigrum and A. saccharum trees collected from throughout their ranges reveal that they are genetically distinguishable only on a geographical basis and not by their morphologies. The extent to which locally collected, independent populations displaying the characteristic A. nigrum and A. saccharum morphologies are genetically indistinguishable remains the basis for assigning distinguishing species names to these trees. The distinctive characteristics of these trees may be affected by a relatively small set of genes may even contrIBUTE indecisive responses on the part of trees to their local environments.


Heat shock proteins (HSPs) are involved in protecting cellular structures and processes from heat stress. Through comparisons of genomic sequence data (Kaneko, T. et al. 1996. Plant Cell Physiology, 37 (supp): 551), and conserved gene sequences of the HSPs, a putative HSP16 gene was identified and cloned from a cyanobacterium, Synechocystis sp. PCC 6803. This putative gene was isolated using PCR and cloned into the pGEM plasmid. The response of the gene to heat shock was examined by Northern blot analysis; it showed a significant increase in RNA transcription, when cells were exposed to 42°C. This data indicates that the HSP16 is a heat shock gene. To determine the role that HSP16 plays in the heat shock response, a mutant cell line that lacks a functional HSP16 was generated. Inactivation of the HSP16 gene in cyanobacteria mutants was verified through Northern blot analysis. Oxygen evolution rates have been measured in wild-type and mutant cells after heat shock. Results show a 30–40% reduction in oxygen evolution rates in the mutant cell lines after heat shock treatments. Cell growth rates between wild-type and mutant cells have been compared after exposure to heat shock. Results show about 40% decreased cell growth rates in mutants. These data indicate a major protective role for HSP16 in the heat shock response.

10:00 INVASIVE POTENTIAL OF THE NON-NATIVE PAULOWNIA TOMETOSA IN A MANAGED FOREST LANDSCAPE. A. CHRISTINA WILLIAMS AND BRIAN C. MCCARTHY, DEPT. OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO STATE UNIVERSITY, ATHENS OH 45701.

Two factors are important in non-native plant establishment in ecosystems: the susceptibility of the ecosystem to invasion and characteristics of the invader which allow it to invade. Dispersal is hypothesized to increase habitat susceptibility to invasion. It is assumed that successful non-native species are good competitors and their success may be due to a lack of natural herbivores in new habitats. We transplanted Paulownia tomentosa seedlings, a fast-growing native to China, in plots that were cleared of vegetation or left unmanipulated in replicated transects through six different 5yr old clear cuts, forest edge, and intact forest areas. In all 18 plots, 16 plants were planted in pots (pot competition) and 16 plants were planted in the ground (ground competition). We compared the growth and survival of plants over the growing season. We found 72% of all plants were top-killed by rabbits at harvest in late September. Herbivory was patchy across the six sites. Higher survival was found in forest plots with equal survival rates in edge and clear cut plots. Relative growth rates were higher in plants with pots, but cleared plots and location along transects (clear cut, edge, or forest) did not have a significant effect. We expected that disturbed sites (clear cuts and possibly edge sites) would show higher survival and growth rates of plants. However, intact forest sites showed lower growth rates. Ants, contrary to theory, did not reduce herbivores significantly decreased survival. Only below-ground competition reduced growth rates of plants.


Variation in resource availability within a habitat can influence plant survival, growth, fecundity and affect a plant's ability to colonize and spread in to new habitats. Alliaria petiolata (garlic mustard) is an invasive biennial herb that often invades floodplains and upland forests in North America. The goal of this study was to assess the effects of high, medium, and low light levels (0%, 50%, or 90% shade); high, medium, and low nutrient levels (0g, 5g, or 10g fertilizer added per 0.5m²); and high and low plant density (1 or 10 plants per 0.5m²) on the growth of Alliaria petiolata. Plants were transplanted in experimental garden plots and assigned to 1 of 18 possible treatment groups. At the end of the season, the number of leaves and primary root length were measured for each rosette plant, plants were harvested, dried, and weighed. Three-way ANOVAs showed a significant influence of density, fertilizer, and shade on all of the dependent variables measured. Low plant density, low and medium shade conditions, and high and medium fertilizer levels all positively affected plant growth. It appears that for Alliaria, increased light availability, a trait often associated with forest disturbance, may be more important than site quality in influencing plant growth.

10:30 THE POTENTIAL DANGERS FROM CULTIVATED WOODY PLANTS TO NATIVE BIODIVERSITY. MICHAEL A. VINCNET, DEPT. OF BOTANY, MIAMI UNIVERSITY, OXON OH 45085.

Hundreds of species of non-native plants invade Ohio as ornamentals. While many of these species seem to pose no threat, since they do not seem to spread, many other species may pose a threat or even spread. Burning bush (Lonicera maackii) is a species commonly cultivated which could escape and become problematic. In a managed forest landscape, A. petiolaris (garlic mustard) is an invasive biennial herb that often invades floodplains and upland forests in North America. The goal of this study was to assess the effects of high, medium, and low light levels (0%, 50%, or 90% shade); high, medium, and low nutrient levels (0g, 5g, or 10g fertilizer added per 0.5m²); and high and low plant density (1 or 10 plants per 0.5m²) on the growth of Alliaria petiolata. Plants were transplanted in experimental garden plots and assigned to 1 of 18 possible treatment groups. At the end of the season, the number of leaves and primary root length were measured for each rosette plant, plants were harvested, dried, and weighed. Three-way ANOVAs showed a significant influence of density, fertilizer, and shade on all of the dependent variables measured. Low plant density, low and medium shade conditions, and high and medium fertilizer levels all positively affected plant growth. It appears that for Alliaria, increased light availability, a trait often associated with forest disturbance, may be more important than site quality in influencing plant growth.
in a former corn field. Three plots were treated with ammonium nitrate (NH₃) fertilizer in Year 1 only (1995); three were treated with N fertilizer in Year 3 only (1997), and three were treated with N fertilizer each of the three years. Diammonium phosphate (N/P) fertilizer was applied to nine other plots using the same protocol. All treated plots had greater nitrogen content than control plots, but species composition was similar. Of the 18 treated plots, 10 were harvested two times during each growing season for a total of 36 harvested plots and 6 control plots. During the first growing season, plant species richness was significantly greater in control plots than nutrient-replete plots, while biomass was significantly greater in N and N/P plots due to the dominance of Ambrosia artemisiifolia and Raphanus raphanistrum, respectively. Plots treated in Year 1 only recovered quickly from perturbation, resembling the control plot in species composition by Year 2. Plots perturbed in Year 3 had increased biomass production relative to controls, but species composition was similar. In Year 2, raphanistrum dominated plots treated consecutively with N/P fertilizer. Although A. artemisiifolia was uncommon in any of the plots by Year 3, other annuals (e.g., Setaria faber) dominated plots treated consecutive years with N, N/P fertilizer. Our results indicate that plant community response and recovery is affected by the type and timing of perturbation and by the age of the system at the time of perturbation. We gratefully thank Dr. Bruce and Janet Johnson and the Howard Hughes Medical Institute for financial support.

2:00 PATTERNS OF GROWTH AND RESOURCE ALLOCATION AMONG PATCHES OF THE CLONAL PLANT DIPHASIASTRUM DIGITATUM (LYCOPODIACEAE), CARRIE A. BAINING AND BRIAN C. MCCARTHY, DEPT. OF ENV. AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

The ecology of clonal lycops is poorly understood. Diphasiastrum digitatum (Dillenius ex A. Braun) Holub, is a rhizomatous yuccoid distributed throughout much of Ohio. Hypotheses regarding clonal growth and development include ramet allocation and dominance. This experiment was performed over three years in a mixed deciduous forest with 3 replications at two depths: 0.5cm and 10cm. Packets were retrieved monthly and seeds that germinated were removed and counted. Remaining seeds were treated in Year 1 only recovered quickly from perturbation, resembling the control plot in species composition by Year 2. Plots perturbed in Year 3 had increased biomass production relative to controls, but species composition was similar. In Year 2, raphanistrum dominated plots treated consecutively with N/P fertilizer. Although A. artemisiifolia was uncommon in any of the plots by Year 3, other annuals (e.g., Setaria faber) dominated plots treated consecutive years with N, N/P fertilizer. Our results indicate that plant community response and recovery is affected by the type and timing of perturbation and by the age of the system at the time of perturbation. We gratefully thank Dr. Bruce and Janet Johnson and the Howard Hughes Medical Institute for financial support.


In 1996, TNC began restoration efforts on a degraded barren community near Lynx, Ohio, by removing invasive woody vegetation. A comparison of pre- and post-treatment vegetation sampling results indicated a significant decrease in percent woody vegetation cover, a significant increase in percent total vegetation coverage, a significant increase in the number of herbaceous prairie species per sampling quadrat, and a significant increase in the number of flowering individuals for six prairie species. There was no significant change in the number of prairie grass species per quadrat or the size of the prairie opening. Restoration efforts will continue with a prescribedburn in the spring of 1998.

2:30 THE EFFECTS OF PRESCRIBED FIRE ON UNDERSTORY PLANT COMMUNITIES IN MIXED-OAK FORESTS. TODD F. HUTCHINSON, LOUIS R. JERSON, AND STEVE SUTHERLAND, USDA FOREST SERVICE, NORTHEASTERN FOREST EXPERIMENT STATION, DELAWARE OH 43015.

Southern Ohio oak forests have been succeeding to more shade-tolerant tree species (e.g., Acer rubrum, A. saccharum, Nyssa sylvatica) since fire suppression began in the 1940s. However, the effects of fire suppression, or conversely, the reintroduction of fire, on understory plant communities are largely unknown in these forests. A large-scale prescribed fire study was initiated in 4 study areas (75-109 ha) in Vinton and Lawrence counties. Each study area contains a reference (no fire), annual fires, and infrequent (1 fire every 4 years) treatment unit. Our objectives were to examine the effects of prescribed fire on the richness of understory species and life forms, and on the frequency of individual species. Frequencies of understory vascular plant species were recorded in 108 (25 x 25 m) plots in 1995 (pre-burn), and in 1995 and 1997 (post-burn). After two years, average total richness per plot has increased from 65.9 to 70.4 on plots burned once, (paired t test, p < 0.001) and from 65.4 to 69.8 on plots burned twice (p < 0.02). On both reference and burn plots, forb richness has increased while graminoid and shrub richness has decreased. Tree richness has increased only on burned plots. Although the frequency of most species has not changed significantly following fire, several common species (e.g., Entilites herbertia, Lindernia capsistrata, Rubus spp., and Vitis spp.) have increased in frequency due to abundant seed germination. In general, the effects of fire on understory richness and composition have been subtle but consistent.

2:45 SEED GERMINATION PERCENTAGE IN SMALL AND LARGE POPULATIONS OF WINGSTEM (ACTINOMERUS ALTERNIFOLIA) FROM THE RIPARIAN ZONE OF THE KOKOSING RIVER. TYLER A. STUDDS, (DR. E.R. HEITHAU); KENTON COLLEGE, PO BOX 1077, GAMBER, OH 43022.
We undertook this experiment to explore the relationship between population size and four indices of fitness: average seed weight, average number of seeds per flower head, number of flower heads per plant, and percentage germination. One leaf per plant was also collected to test for morphological asymmetry within small, potentially inbreeding populations. We hypothesized that individuals from smaller populations would show reduced fitness based on the measured variables. Replicates from both populations were used to determine if inbreeding depression appears in later life cycle stages (germination and seedling survival).

4:00 SEXUAL REPRODUCTION AND SEED SET VARIATION AMONG POPULATIONS OF FEDERALLY ENDANGERED TRIFOLIUM STOLONIFERUM.

CAROLEE J. FRANKLIN AND ALLISON A. SNOW, DEPT. OF PLANT BIOLOGY, OHIO STATE UNIVERSITY, 1735 NEL AVE., COLUMBUS, OH 43210-1290.

The quantity and quality of sexual reproduction may significantly impact long-term persistence of rare, clonal species. To explore possible connections between the reproductive ecology of *Trifolium stoloniferum* and the plant's rarity, research was conducted to determine if the species is self-compatible and to evaluate the extent and quality of sexual reproduction in four Ohio populations. Flowers bagged at the bud stage in the greenhouse and the field to failed to produce seeds, while openly pollinated (field) and hand-tripped (greenhouse) flowers set seed. *T. stoloniferum* is self-compatible but not auto-fertile. In 1996 and 1997, senescence in flowers of varying sizes were collected. The following data were analyzed per inflorescence: number of florets, number of fruits, percent fruit set, seed set, and seed quality. Population measures of mean seed set per inflorescence ranged from 4.1 to 33.0 in 1996 and 7.8 to 68.6 in 1997. In both years, the largest population generated the lowest seed set, and the smallest population set the greatest number of seeds per head. Percent fruit set significantly increased from 1996 to 1997 in three of four populations, and mean seed set similarly increased in two of four populations. Potential reproductive problems for *T. stoloniferum* include low seed set and quality in large populations and dependence on pollenizer service to produce seed.

4:15 THE EFFECTS OF DEFOLIATION ON SHOOT TERMINAL MERISTEM GROWTH IN WOODY PLANTS.

DAVID O. DEPPONG AND MORGAN G. CLINE, DEPT. OF PLANT BIOLOGY, OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

Summer (para) dormancy is thought to be responsible for the inhibition of terminal meristem growth and hence the cessation of spring flushing. It has been observed that natural or manual defoliation may delay the formation of the terminal bud. Defoliation delays the termination of spring flushing and in some cases causes a second flush after the terminal bud is formed. The purpose of this study was to elucidate the mechanisms of defoliation-induced extension of the spring flush period. To determine this, twigs of mature trees of white ash (*Fraxinus americana* var. *americana* L., *Autumn* Purple), northern red oak (*Quercus borealis* Mich., 1.), green ash (*Fraxinus pennsylvanica* var. *subintegerrima*, [Vahl.] Fern, *Red Oak*), and shagbark hickory (*Carya ovata* Mill./K. Koch) were completely defoliated periodically from the beginning of spring flush through the growing season. Spring flush generally started in early May and extended into early June. The heights of the first flush after the terminal bud was formed were measured. Red oak and shagbark hickory showed a second flush. Defoliation may promote shoot meristem growth by removal of inhibitors present in leaves or of leaf competition for nutrients and/or water.

4:30 INTRODUCTION BETWEEN TRANSGENIC WILD-CROP HYBRIDS AND WILD CUCURBITA PEPO: A TEST OF FITNESS PARAMETERS.

LAWRENCE J. SPENCER & ALISON A. SNOW, DEPT. OF PLANT BIOLOGY,OHIO STATE UNIVERSITY, COLUMBUS, OH 43210.

Hybridization has been hypothesized to be important for the evolution of plants. For instance, a fitness-related gene may pass from one population to another via hybridization followed by introgression even though F1 and back-cross progeny are less fit than parents. When transgenic crops are grown near wild relatives, transgenics may move into wild populations and thus escape regulatory controls. To investigate this possibility, we Pollicinated wild *Cucurbita pepo* plants with pollen from F hybrids between wild plants and a commercial cultivar genetically engineered for virus resistance. The resultant back-cross generation (BC) were tested in Arkansas with both parental types (Wild, F). A previous field test showed that F hybrids were generally inferior in fitness to wild plants. This study was designed to test the hypothesis that the BC generation is intermediate in fitness to the two parental types, Wild and BC, plants both showed 94% survivance while F showed 69%, in both field and greenhouse tests. Survival of seeds was not determined. Male and female flowers were selfed (another (ANCOVA and Tukey tests), with BC, having intermediate numbers of each. These data support the hypothesis that although hybrids between different populations may be inferior to parental types, back-crossing can produce progeny that are closer in fitness to parents. This study suggests that introgression between transgenic crops and wild populations may produce transgenic progeny with fitness very similar to the wild plants.

4:45 COMPETITION BETWEEN SALICORNIA EURPAEA AND ATRIPLEX PROSTRATA ALONG AN EXPERIMENTAL SALINITY GRADIENT.

TODD P. EGAN AND IRWIN A. UNGAR, DEPT. OF ENVIRONMENTAL AND PLANT BIOLOGY, POTTER HALL 315, OHIO STATE UNIVERSITY, ATHENS OH 45701-2579.

Salicornia europaea and *Atriplex prostrata* are common inland salt marsh species. *Salicornia europaea* is more salt tolerant than *A. prostrata* and typically grows in the more saline areas of the marsh. This introgression experiment was performed to determine the effect of competition on the growth of these two species at varying salinity levels. Plants were grown at a density of eight plants per pot in a de Wit replacement series. Plants were treated with 85, 170, and 340 mM NaCl for two months, and then harvested, dried, and weighed. There was a significant effect of differences in the number of seeds per capsule were found among CL and CH treatments. However, CL seeds had higher seed mass (1.71 mg) than CH self-pollinated seeds (1.56 mg) and CH outcross-pollinated seeds (1.43 mg). All of these differences were significant, indicating that IBD was not apparent at the seed stage. A lack of IBD in V. canadensis may be due to population structure and a deficiency of inter-population gene flow. Research is continuing to determine if inbreeding depression appears in later life cycle stages (germination and seedling survival).
SESSION 09

Plant Physiology

09:00AM Saturday, April 4, 1998
Johnston Hall 118

Carolyn J. McQuattie - Presiding

9:00 EFFECT OF ELEVATED MANGANESE ON CELLULAR ANATOMY AND MICRODISSECTION OF ELEMENTS IN SUGAR MAPLE SEEDLINGS. Carolyn J. McQuattie and George A. Schon, USDA Forest Service, 359 Man Ro., Delaware OH 43015.

Manganese (Mn), an essential micronutrient in plants, becomes increasingly soluble as acidity increases and may injure seedlings growing in acidic forest soils. To determine the effect of elevated Mn on sugar maple (Acer saccharum), four-week-old seedlings growing in sand were irrigated for 8 weeks with nutrient solution (pH 3.8) containing 0, 5, 10, or 20 mg/L Mn. Foliar symptoms of Mn toxicity ranged from leaf margin necrosis (5 mg/L) to leaf vein chlorosis/necrosis, interveinal chlorosis and leaf puckering (10-20 mg/L). Primary roots exposed to 10 or 20 mg/L Mn displayed darkened root tips and increased loosening of the outer cortex. Root, leaf blade, and midrib tissues from all treatments were chemically-fixed and resin-embedded for transmission electron microscopy; additional tissues were frozen in liquid propane, freeze-substituted in 1% osmium tetroxide and resin-embedded for x-ray microanalysis (EDS). At 10 or 20 mg/L Mn, root meristem cells were irregular in shape, showed increased vacuolation and contained swollen mitochondria with few cristae. Leaf tissues showed dense accumulations in chloroplast thylakoid membranes (10 mg/L Mn), increased starch grain size (10-20 mg/L), and collapsed plasm in midveins (more than 20 mg/L Mn). Although no Mn was detected by EDS in root tissues, peaks of Mn were observed in root membranes (10 mg/L), increased starch grain size (10-20 mg/L), and collapsed plasm in midveins (more than 20 mg/L Mn). No Mn was detected by EDS in root tissues. These tissues showed significant effects on both plant and insect performance. Physical and chemical means were used to inhibit insect herbivory, and these methods had variable effects on insect abundance. These were mediated by chemical means and insect performance among the eleven insect taxa. These results clarify the relative importance of environmental distribution vs genetically-fixed leaf lifespans in controlling nutrient dynamics of the species.

9:30 LEAD AND ZINC UPTAKE BY PAULOWNIA TOMENTOSA SEEDLINGS UNDER ACIDIC SOIL CONDITIONS. George O. Bokonyi and Carolyn H. Keffer, Dept. of Botany, Miami University, Oxford, OH 43015.

This study examines Paulownia tomentosa to determine the potential for using phytoremediation to reclaim soils contaminated with heavy metals. P. tomentosa has been used in recent years to reclaim abandoned strip mines characterized by extremely acidic soil. Under these acidic conditions, heavy metals such as lead, cadmium, aluminum, and zinc become available for plant uptake. In addition to establishing quickly under conditions that are toxic to most other plants, P. tomentosa is a valuable timber crop species and it is used to build musical instruments and fine furniture. Although its success at reclaiming strip mines has been documented, its ability to accumulate heavy metals from the soil has not been investigated. The focus of this study was to determine if P. tomentosa could be used to reclaim acidic soils conditions, and to determine if this plant is capable of accumulating a significant amount of lead in its shoots. Fifty-day-old seedlings were transplanted into 5 gallon Skeeper pots containing 0, 5, 10, and 20 mg/L of Pb and Zn. Growth rates for all four strains were approximately equal. Approximately 8 hours after exposure to Pb and Zn, plants were harvested and the dry weight biomass was measured, and the concentration of lead and zinc in roots and shoots was determined. Preliminary results indicate that plant height and biomass were not significantly affected by treatment. The potential use of this plant for phytoremediation of metal contaminated soils will be determined following tissue analysis.

9:45 TRICHOME CONSTITUENTS OF CALAMINTHA ASHEI. Guo E. Dunn (Dr. Jeff Wesdemamier), Dep. of Chemistry, Ashland University, Ashland OH 44805.

The perennial shrub Calamintha ashei occurs in the Florida scrub along Florida’s Lake Wales ridge. While Calamintha is not endangered, many endemic scrub species are threatened by rapid habitat loss due to development. Calamintha contains novel, water-soluble menthofuran monoterpenes which inhibit germination and growth of grasses from the neighboring Florida sandhills. This study was undertaken to characterize the trichomes which dot the Calamintha leaf surface. It was presumed that these trichomes would contain the previously identified menthofurans. However, GC-MS analyses of trichomes individually removed from leaves showed no evidence of the menthofurans, but revealed three major constituens which were detected in headspace by solid phase microextraction. Mass spectra of all three compounds show a molecular ion at 204, suggesting that these may be aromatic derivatives of the menthofurans. An extract of the compounds on the leaf surface, including the trichomes, has been prepared by briefly dipping the leaves in dichromg methane. Isolation and characterization of the trichome constituents is being pursued.


Previous work in this laboratory has assayed the gravitropic response of both the roots and hypocotyls of wild type Arabidopsis thaliana and three starch deficient strains. The time course of curvature of the inflorescence stems of Arabidopsis wild type (strain Wassilewskija) one starchless mutant (ACG 21) and two reduced starch mutants (ACG 20, and ACG 27) were used to assay gravitropism. The plants were grown in rockwool cubes, a porous silica based substrate. The plants were then reoriented in the dark by rotating the rockwool cubes 90 degrees so the inflorescence stems were approximately perpendicular to the gravity vector. The plants were photographed initially after rotation and then at regular intervals for 8 hours. The short inflorescence stems (1-2.9cm) was less responsive than the long stems (3-6cm) to the gravitropism. In both cases the short type initially had the greatest response and the starchless mutant had the least response while the reduced starch mutants exhibited an intermediate response. Growth rates for all four strains were approximately the same. After 8 hours hours of reorientation all of the stems returned to a position parallel to the gravity vector. It appears that seedling's play an important initial role in gravitropism, accelerating the response of the inflorescence stem. However, after longer time intervals, the three mutant strains had a full gravitropism response similar to that of the wild type, which indicates that in flower-stalks, longer term gravitropism is independent of the total mass of the seedlings.
samples from 67 Ohio counties have yielded 49 taxa of freshwater dinoflagellate in 18 genera. The two communities to which the sensitive bacteria of the surrounding community. Microcystis may form extensive blooms and be cyanobacterium intimately associated with environmental bacteria, possessing large numbers of cell metabolism and photosynthesis which may stimulate the surrounding bacterial community by functionally very similar to their eukaryotic descendants: both are primary producers and both responsible for taste, odor, and aesthetic problems in lentic systems around the world. Some eukaryotic. Cyanobacteria, also known as the blue-green algae, are prokaryotes but are functionally very similar to their eukaryotic descendants: both are primary producers and both represent an ecological keystone species in OWC, thus altering physico-chemical conditions for other macrophyte and algal species. Water pH values consistently were higher (ca. 0.2 units) in open waters surrounding salt marshes versus beds. Conductivity varied less than 5% in open waters versus beds. The pH gradient generated by Nuphala beds appeared to be related to plant density. The data collectively offer conditional support for the keystone species concept in OWC.

The Ohio Journal of Science Vol. 98(1) A-18.
SESSION 11
Geography
09:15AM Saturday, April 4, 1998
Johnston Hall 111

JEFFREY J. GORDON - PRESIDING

9:15 UNDERGRADUATE GEOGRAPHY INSTRUCTIONAL TECHNIQUES: AN ASSESSMENT. JEFFREY J. GORDON, DEPT. OF GEOGRAPHY, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN, OH 43403. This research arose from the Department of Geography at BGSU rededicating itself to high quality undergraduate instruction as its chief strength and major emphasis. The study focused specifically on how geography is taught to undergraduate students across the U.S. It sought to find the most effective pedagogical techniques demonstrated to transmit critical understandings to students, thereby allowing the BGSU geography faculty to maximize the effectiveness of the student learning environment and, thus, the learning outcomes. Use of identified superior teaching perspectives and methods should best prepare students with those geographical skills necessary for the marketplace or graduate school. The professional geographic literature and returned questionnaires received from schools teaching undergraduate geography revealed current trends in geographic pedagogy. Some successful techniques found have been long around, although not currently widely used, such as oral presentations, poster exercises, oral history, geography clubs, and fieldwork. Other successful teaching techniques found are relatively recent innovations; these include interactive lectures, topic synthesis, structured discussion, group learning, writing groups, tutorial groups, role playing, service learning, computer and emerging technologies.

9:30 EXTREME AND PERCENTILE ENVIRONMENTAL REFERENCE TABLES (EXPERT). PATRICK M. HAYES, 88° WEATHER SQUADRON, 2409 MONANAN WAY, BLDG 91, WRIGHT-PATTERSON AFB OH 45433-7204. The Extreme and Percentile Environmental Reference Tables (EXPERT) program is designed to provide the scientist, student, educator, engineer, environmental modeler and meteorologist with a common language for discussing the exposure to, and impact of, climatic conditions on the subject of concern. To accomplish that goal, EXPERT uses new statistical analyses of climate data to provide a more realistic picture of the weather environment. EXPERT uses a detailed database for worldwide characterizations of all major land areas, ocean surfaces, and atmospheres up to 80,000 feet. Developed jointly by the 88° Weather Squadron, Air Force Research Laboratory, and the Air Force Combat Climatology Center, EXPERT contains data for nine different climatic regimes, six upper-air regions, four ocean regions, and 360 individual sites worldwide. For land regions and individual sites, durations and monthly percentiles are included for commonly observed weather elements (temperature, dew point, humidities, wind speeds, cloud cover, and weather occurrences) as well as correlations of relative humidity to temperature and diurnal temperature to daily low temperatures. Over water, monthly percentiles for pressure, temperature, dew point, sea surface temperature, and wind speed are reported. For upper-air regions, summer and winter percentiles are included for temperature, dew point, density, and wind speed at 25 levels from the surface to 80,000 feet. EXPERT is an easy-to-use, point-and-click, graphical, CD-ROM-based program that runs under Microsoft Windows. EXPERT is available to any requestor and is free of charge.

9:45 GIS: SITING ROOFTOP PHOTOVOLTAICS. AARON R. GECCKE (DR. KARL KONFRACHER), DENISON UNIVERSITY, SLAYER BOX 678, GRANVILLE OH 43023. As higher levels of air pollution and the depletion of fossil fuels from the production of electricity have become apparent, we are now faced with the need for alternative forms of generating electricity to be used on site. When installed correctly, the total or peak time electricity needs of the building can be adequately met. Finding the optimal site for rooftop photovoltaics has often been a difficult process. Applying Geographic Information Systems (GIS) to the process of siting rooftop photovoltaics can make it substantially easier to find optimal areas. This project intends to combine the knowledge of photovoltaics and GIS applications to show the benefits and limitations of using GIS to site rooftop photovoltaic systems. The use of county Digital Orthophoto Quadrangles (DOQs) from the USGS and solar radiation data from the National Renewable Energy Laboratory allow for the calculation of rooftop areas and, ultimately, an excellent estimate of the overall photovoltaic power potential of various sites.

10:00 BREAK

SESSION 12
Geology
09:00AM Saturday, April 4, 1998
Johnston Hall 015

ANN F.H. GRAETSCHE HARRIS - PRESIDING

9:00 LOOKING AT THOSE OHIO ROCKS: TEACHING THAT OHIO IS NOT THE WAY IT USED TO BE. JOSEPH T. HANNSAL, THE CLEVELAND MUSEUM OF NATURAL HISTORY, 1 WADE OVAL DR., CLEVELAND OH 44114. It is a common misconception that the landscape of Ohio, and the configuration of Lake Erie, have always been the way that they are seen today. The Cleveland Museum of Natural History has attempted to correct this misconception in an exhibit pod called “Ohio Rocks” as part of its new Reinhberger Hall of Earth & Planetary Exploration. This exhibit pod includes core material on loan from the Ohio Division of Geological Survey, a faux rock wall, touchable fossils and rocks, and an interactive station that allows visitors to discover just how different Ohio was in the geologic past. The initial screens of the interactive station include a depiction of a cave and a geologic map of Ohio. Visitors are prompted to explore Ohio’s past by selecting a segment of geologic time and an accompanying “rock video.” When a selection is made, the relevant rock layers are highlighted on the map and a “rock video” begins. The videos include clips of rock outcrops, reconstructions of paleoenvironments, and high-definition studio and field shots. The chorus of each song repeats the basic message that Ohio is not the way it used to be. Each individual song tells part of Ohio’s geologic history. Each song is done in a different style and has catchy lyrics. The Siurian selection, for instance, is called “Siurian surf,” and is meant to teach that there was a sea here in the Silurian. The interactive site was developed with Impact Communications and was supported by a National Science Foundation grant.

9:15 LAWS OF THE GEOSPHERE. GARRY MCKENZIE, GEOLOGICAL SCIENCES, OHIO STATE UNIVERSITY, COLUMBUS OH 43210. What are the laws that control the operation of the geosphere? A unifying theory that would explain everything has eluded us; however, with the rebirth of Earth system science, geologists have formulated or restated important concepts (from Thornbury’s fundamental concepts of geomorphology to Keller’s fundamental concepts of environmental science). In the 1970s Commoner gave us the “Laws of the Geosphere—important concepts and understandings for humans on spaceship Earth. These and other “laws” must be considered in any attempt to join the Physical/Chemical/...
9:30 SILURIAN DIMENSION STONE—ITS HISTORICAL USE IN WEST CENTRAL OHIO. MARK J. CAMP, DEPT. OF GEOLOGY, UNIVERSITY OF TOLEDO, TOLEDO, OH 43609.

The Silurian of west central Ohio includes a number of Silurian clastics that were quarried, mainly in the eighteenth and early nineteenth centuries, for use in foundations, bridge abutments, canal locks, curbs, and buildings. The Dayton Formation which rarely exceeds five feet in thickness was mostly quarried within its namesake city, but because of the shallowness of the pits, quarrying sites are hard to locate. Structures built of this stone are scattered throughout the city, but undoubtedly the best place to observe them is in the older part of Centerville and Washington Township where over 30 stone buildings and a water-filled quarry remain. A famous site is the water-filled McDonald quarry, south of Xenia, which supplied Ohio's contribution to the construction of the Washington Monument in 1859—a block of Dayton Formation. An older Silurian unit, the Bradshaw Formation, served local use as a building stone. It was quarried at Centerville, deeper quarries in the Dayton vicinity, Eaton, and Piqua. Older buildings in Dayton's Veterans Administration complex and canal locks near Piqua exhibit this stone. Younger units including the Euphemia, Springfield, and Cedarville dolomites, quarried at a number of sites in Clark and Greene counties and at Cowington, Greenville, Lockington, and Lebanon Falls, also served local use in building material. Lebanon Falls was a major stone center around 1900, with over six quarries in operation. Building stone was the major product in the early years, but it was gradually replaced by lime for plaster, mortar, steel flux, and sugar refining and crushed stone. In the 1940s, one of the Lewisburg quarries initiated the first underground limestone mining in this part of the state by tunneling into the quarry walls. Few of these sites are worked today and none regularly produces dimension stone, but the legacy lives on in the historic stone architecture of west central Ohio.

9:45 COAL MINE DISASTERS IN THE BROOKFIELD MINE, TRUMBULL COUNTY, OHIO. ANN H. GARRIS, DEPT. OF GEOLOGY, YOUNGSTOWN STATE UNIVERSITY, ONE UNIVERSITY PLAZA, YOUNGSTOWN OH 44555.

More than one hundred years ago the Mahoning Valley in northeastern Ohio had a thriving coal mining industry, a fact that most residents of today are not aware of. Because coal mining is a dangerous industry it is not surprising that there were major mining disasters in the Mahoning Valley. Most of the Brookfield Mine located in Trumbull County became flooded on July 21, 1865 after a severe rain storm. Only the very highest workings were above water level. Four miners were trapped in two separate locations in the mine. Two were rescued after seven days and the other two after nine days. A second disaster occurred on July 11, 1877. A new tunnel had been installed in the mine to shorten the hauling distance to the chutes on the surface. The horses used for hauling were replaced with a mine locomotive that burned coal. Provisions were made to prevent excessive smoke and gases from the mine as the new tunnel was being constructed, but none were made for the actual tunnel. Because of earlier problems with the gases and smoke, anthracite coal was substituted for the bituminous coal, on July 11th, since it was supposed to burn without smoke. It, however, filled the tunnel with CO, because of incomplete combustion and the miners began dropping. Rescuers from other mines were also overcome. A total of seven miners were killed.

10:00 BREAK

10:15 THE SALUDA FORMATION OF OHIO. GREGORY A. SCHEMMACHER, OHIO DIVISION OF GEOLOGICAL SURVEY, 4383 FOUNTAIN SQUARE DR., COLUMBUS OH 43224.

The Saluda Formation is unique in the Upper Ordovician, Cambrian Series of Indiana and Kentucky because its sparsely fossiliferous, fine-grained to microcrystalline, generally thick- to massive-bedded dolomites and dolomitic limestones contrast sharply with the diagnostic highly fossiliferous, coarser grained, thinner bedded limestones and shales that characterize the series. The Saluda was a particular body of rock having its northern outcrop in east-central Indiana and southwest Ohio. In Ohio, this investigation is the first to use regional field mapping, measured sections, and continuous core descriptions to delineate the Saluda's areal distribution and lithostratigraphic relationships. Sparsely fossiliferous, nodular, micritic limestone interbedded with shale characterize this unit in Ohio. The Saluda thins northeastward from 3.4 meters 2 kilometers west-northwest of Racine, Ohio near the Indiana-Ohio border to less than 60 centimeters in the vicinity of West Elkton, Ohio in southeastern Preble County. Overlying the Saluda is a persistent sequence of thick- to medium-bedded, planar to irregular limestones containing occasional large coral and stromatoporoid colonies. Underlying the Saluda sequence is a highly variable interval of intertonguing lithologies of the Whitewater and Liberty Formations having rare occasional large coral and stromatoporoid colonies. Underlying this is a moderately well-drained, low relief swell mapped as one of the northern crests of the London Uplift. Field studies and subsurface investigations should include an evaluation of the presence, extent, and density or subsurface joints and fractures in three dimensions. The smaller pit, located in Clark County near Tremont, covered an area of 12 feet by 20 feet. The larger scale pit, located in Madison County near London, covered an area of 33 feet by 84 feet. Both pits were designed with multiple 3-foot benches which allowed fractures and joints to be traced while meeting excavation safety requirements. Field modification during construction included removing smeared materials using hand tools and careful archeological techniques, using a portable pump for drainage, and covering pit surfaces with plastic to prevent desiccation.

10:30 A GEOCHEMICAL INVESTIGATION OF THE EXTENT OF DISPERSION OF ORE ELEMENTS ASSOCIATED WITH A ZINC-IRON MANGANESE DEPOSIT IN OGDENSBURG, NEW JERSEY. PATRICIA F. BUS, MINING ENGINEERING DEPT., UNIVERSITY OF ALASKA-FAIRBANKS, FAIRBANKS AK 99775-5800 AND KENNETH A. LACOTA, DEPT. OF NATURAL SCIENCES, ROBERT MORRIS COLLEGE, PITTSBURGH PA 15219-3059.

The Sterling Hill ore deposit of Ogdensburg, New Jersey is a zinc-iron-manganese body contained within the Franklin Marble Formation. In an attempt to determine the extent of the deposit, a series of exploratory drill holes were made extending out from the ore into the surrounding country rock at different elevations. Samples from ten of these drill holes were analyzed for ore element concentration through atomic absorption analysis. Since calcite was the primary mineral of the country rock, x-ray diffraction analysis was also performed on the samples to determine the degree the calcite had incorporated these elements into its crystal lattice. Results of the analysis indicated that each of the ore elements had migrated out from the ore body into the country rock different distances for any given drill core. Also, for any two different drill cores, a given ore element did not appear to have migrated out of the ore body to the same distance. The geometry of ore element dispersion for this ore may serve as a guide for further ore exploration of similar deposits.

10:45 PLANETS EARTH AND MARS: ANALYSIS OF THE EFFECT OF NATURAL SATELLITES ON THE ORIGIN AND EVOLUTION OF LIFE FORMS. ROBERT J. MALTUS, DEPT. OF GEOLOGY & GEOGRAPHY, DENISON UNIVERSITY, GRANVILLE, OH 43023.

Planet Earth has the only known extant biological system in the Solar System. Most concerned scientists agree that this highly developed system is the result of liquid water on the surface, an oxygenated atmosphere, an ozone layer in the atmosphere, and a greenhouse effect that keeps the surface temperature within certain limits. Planet Mars had a few of the features listed above in its early history. It had liquid water at the surface and a significant greenhouse effect from a combination of carbon dioxide from volcanic degassing of the planetary interior and water vapor in dynamic equilibrium with surface water. Planet Earth has developed, over geologic time, a very complex biological system. Mars, in contrast, may have developed a short-lived, very primitive biological system. Earth has a very large satellite (about 1/8 the mass of the planet); Mars has two very small natural satellites about 1/100,000 of the mass of the planet. The question is: Would a large (about 1/5 Mars-mass) satellite have led to more favorable conditions for the development of a life system on Mars? One physically possible process for acquiring a large satellite is gravitational capture. During the capture encounter (with a 1/50 Mars-mass planetoid) about 6 km rock tides are raised on the planet and even higher ones on the encountering planetoid. As the early post-capture Mars-centered orbit gradually circularizes, the tidal amplitudes systematically decrease. Such rock tide action would cause (1) partial destruction of the Martian crust and (2) substantial hydrothermal activity in the newly-formed, water-filled basins. These conditions would be much more conducive to the origin and development of life forms than the standard model for the evolution of Mars.
indicative of lodgement till; it was probably deposited as surface melt-out till during the Late Wisconsinan, about 17,000 years ago. Near the surface, joints formed near-vertical pedal prism boundaries. Fewer joints were encountered as depth increased. On a planar bench in the pit at 1.06 m, joints formed 4 to 7-sided irregular polygons; their largest diagonals ranged from 0.7 to 1.0 m. At the 1.86-m bench, there were fewer polygonal/area and diagonals sized from 1.0 to 2.0 m. During the four days the pit was observed, spacing between the two vertical faces of the joints widened from <0.25 to about 0.3 m. The joint faces were irregular planes having a relief of about 2 cm in the area of 0.1 sq m, with a maximum depth of 3 cm. Characteristically, a joint cut across the clayey till with a slight inclination to the flow of water. A zone of white secondary carbonate precipitate about 1 to 6 mm thick coated joint faces as well as co-mingled with the adjacent till. Characteristics of joints at this site appear to match those at other sites of Late Wisconsinan age in Ohio.


Glacial till in Ohio is usually considered to be a suitable material in which to site landfills. However, detailed examination of the till typically indicates an abundance of joints and fractures that show evidence of significant water movement. To demonstrate and identify the properties of the till that relate to deep movement of water, a large pit was excavated at the Molly Caren Agricultural Center in Deer Creek Township in Madison County. The pit was 5.6 m deep with benches at 1.06, 1.86 and 2.76 m. Fractures were visible in the walls of the pit and on the benches. Samples were taken from the pit walls for bulk density, particle size analysis, clay mineralogy, and composition of the coatings on the fracture surfaces. Hydraulic conductivity was measured using a shallow well pump-in method. One measurement was made within a ped prism defined by fractures and another measurement was made on the intersection of five fractures to quantify the relative rates of water movement within the dense till and in the fractures. The till was highly uniform with depth (loam texture) and had highly calcareous gray coatings on the fracture surfaces. Saturated hydraulic conductivity within the till was approximately 0.000 cm/hr and within the fracture was approximately 0.002 cm/hr. These observations reinforce the need for more extensive site exploration and description to characterize the potential for water movement in the glacial tills in order to make sound, informed landfill use decisions.

2:45 BREAK

3:00 BOSTON TILL IDENTIFIED AS LOWER TILL OF UPLANDS, WEST SIDE OF MAD RIVER, NORTHERN CLARK CO., OHIO. JULIE WEATHERING-RICE, BENNETT & WILLIAMS, 2700 E. DUBLIN GRAVELINE RD. SUITE 400, COLUMBUS OH 43231.

A pit was dug in uplands west of Tremont City to investigate the till unit providing the barrier between a landfill bottom and a sand and gravel aquifer. Till contains stress fractures striking N50E and N45W and polygonal fractures. Paleosol clasts and highly weathered crystalline basement rocks are incorporated in lodgement till. Till is 10YR 6/4 (brown) to 10YR 5/4 (yellowish brown), oxidized, 2 pebble counts average 7% crystalline (one pebble resembled a quartzite "Sharon egg"), 4% sandstone, 5% shale and 86% carbonate/chert. Sand/silt/clay of the loam till are 34.5%, 46%, and 19%; clays are 40-35-55, 16-15-74, 20-25-55, 10-25-55, 10-25-55, 5-10-50, 5-10-50 quartz/siltclay. Organic contents, and stratigraphic relationships of samples allow for differentiation of four lithosequences. A through D. The lithofacies tentatively may correlate to the established classical stratigraphy of the area, where A = Caesar till, B = Boston till, C = Rainsboro till, and D = pre-Rainsboro till. Two prominent sand layers run discontinuously over the site at elevations of 286.2 m and 280.4 m. Variations in hydraulic conductivity are controlled by buried weathered surfaces, joints, and vertical and horizontal spatial trends in the lithofacies due to various depositional and post-depositional processes.

EDUCATION DIVISION

Session 14

Education: Applications for Effectiveness of Instructional Delivery

01:30PM Saturday, April 4, 1998

Johnston Hall 203

Janet E. Hurn - Presiding

1:45 EXPANDING THE COLLEGE BIOLOGY LABORATORY - MAKING USE OF COLUMBUS' METRO PARKS FACILITIES. KERRY L. CHEESMAN AND TERRIL J. LONG, BIOLOGICAL SCIENCES DEPT., CAPITAL UNIVERSITY, 2199 E. MAIN ST., COLUMBUS, OH 43209.

The preparation of students for the teaching profession is a difficult task. Variations in classrooms, facilities, and resources exist in schools where they will teach. Science education for these students must therefore involve exposure to resources and ideas which can help them when they begin their teaching career. While our labs are well equipped to teach basic biological, ecological, and geological concepts, integration of these concepts often works best with an off-campus field experience. Our biology course for education majors has been designed to show prospective teachers the local resources and field experiences which can be used to integrate science with their students. Lab experiences have been adopted to make use of the Columbus Metro Parks facilities, materials, and educational programs. Regular field trips to local parks enable students to know what resources are available, and who to contact about using them. Also, by taking advantage of Metro Parks nature programs as part of the course, students are able to
study biology in context as well as to see the connection between the facilities available and the ways in which those facilities can be utilized to enhance their classrooms. The wide variety of park facilities available in the Columbus area, along with the variety of teaching programs conducted (botanical, zoological, environmental, and geological), make this resource an excellent way of training future classroom teachers.

2:00 UTILIZING THE WEB TO BOLSTER THE BASICS IN AN INTRODUCTORY PHYSICS COURSE. JANET E. HURN, MIAMI UNIVERSITY, MIDDLTON, 45042 E. UNIVERSITY BLVD., MIDDLETOWN, OH 45042.

By putting Authorware created tutorials on the Web to reinforce basic concepts, more in-class time can be spent on in-depth topics in my introductory physics course. Authorware creates interactive multimedia computer presentations. Topics such as vectors, the metric system, units, graph interpretations, and graph interpretation take up valuable time better spent on new physics topics. These tutorials cover these materials and are then delivered via the Web using Shockwave by Macromedia. More physics topics can be covered in the same amount of class time. Student learning increases. Student interest and participation is greater. Students are given more flexibility and involvement in the learning process. Students can repeat lessons that are unfamiliar to them. By including quizzes at the end of each unit, the students can immediately be aware of their proficiency on that topic. Initially the students have not all taken advantage of these tutorials. The reaction is similar to taking advantage of office hours. Some students will occasionally try the tutorials, but overall they are not using them unless a "reward" is associated with trying the activities. Those students that have tried the tutorials have found them to be helpful. Making the tutorials an assignment would make evaluating their effectiveness more accurate.

2:15 TIPS FOR PRODUCING A FIELD-BASED EDUCATIONAL VIDEO. CAROL E. LANG, LINNWITH ALTERNATIVE PROGRAM, 2075 W. DUBLIN-GRANVILLE RD., WORSTON, OH 43085 AND GARRY MCKENZIE, GEOLOGICAL SCIENCES, OHIO STATE UNIV., COLUMBUS OH 43210.

Videotape footage and other images from a field course for Bahamian teachers and officials was used to produce a 13 minute tape summarizing the efforts of BREEF (Bahamas Reef Environment Educational Foundation) to promote environmental education and sustainability in The Bahamas. Strategies can be adopted that will increase the efficiency and quality of videotape production and production, as well as the re-use of original footage. Producers must be aware of all the available imagery (fogged by minute and second) and work from an approved script and storyboard. Permissions must be obtained and credits offered. All file names should use numbers, for easy sorting. A database should be used to store information about the sources, sizes, and contents of image and other files. Audio, video, and stills or text must be coupled effectively. Access to a high-end multimedia preparation program or service allows the producers to view the layout, and to develop transitions between the segments. Temporary storage and backup on a large capacity diskette (or CD) facilitate transportation and protection of the work in progress. Preliminary productions should be viewed by nonparticipants for objective feedback. Prompt and clear communication and agreement on software and format preferences are necessities in production collaboration. Advances in software and hardware make quality educational videos possible at a reasonable cost.

2:30 CHANGING THE WORLD WITH MATH, SCIENCE AND TECHNOLOGY. FREDERICK J. THOMAS, ROBERT A. CHANEY, SUMNER JAIN AND BARBARA ADAMS, SINCLAIR COMMUNITY COLLEGE, 444 W. THIRD ST., DAYTON OH 45402-1460.

Mastery of fundamental competencies in math and science gives students-especially minority students-far greater opportunities to succeed in more advanced education or in high-paying careers. ACTS/AMC, "Advanced Competences for Technical, Scientific and Mathematical Careers," is an experimental, project-based program at Sinclair Community College which links broad technical, scientific and mathematics skills in job-related contexts. One tangible focus of the project is SAM, an inexpensive, calculation-controlled robot. Created by faculty from physics, math, electronics technology, and developmental studies, SAM is a shared tool which empowers students to apply basic principles and processes. Programming in the language of algebraic functions, students teach SAM to move, respond to stimuli, escape from a maze, and carry out other activities. They learn to use math, science and technology to make things happen.

2:45 GEOLOGY, THE BASIS OF OHIO'S BIODIVERSITY. JANE L. FORTH, GEOLOGY DEPT., BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN, OH 43403.

The geology of Ohio is remarkably simple, though it seems confusing to many because the many different geologic events occurred at so many different times. Keeping track of the sequence of all these events is as basic to a real understanding of Ohio's geologic history as it is to a study of human history. Knowledge of Ohio's geologic history is important, for this history has determined the nature of the modern landscapes and soils throughout the state, which in turn has controlled the distributions of native plants and animals, as well as the events of human history and modern land uses here. In addition, geologic history is fascinating in itself, a story of evolving seascapes and landscapes through time, each stage populated by different evolving life forms. Educating non geologists of all ages about this history is truly rewarding, if it is presented in a way that effectively communicates, it begins with what folks already know - beginning 'where they are'. Presented thusly, the geology of our state, its past and present, can truly come alive for them. How to accomplish this is the subject of this talk.

3:00 FOUNDATIONS COURSE IN SCIENCE FOR ELEMENTARY EDUCATION MAJORS. BETH L. BASISTA AND DAVID P. CANE, DEPT. OF PHYSICS, WRIGHT STATE UNIVERSITY, DAYTON OH 45435.

A foundations course forms the basis for the elementary education science program by providing entering students with a philosophical and experiemental understanding of constructivist, cooperative classroom environments. Through inquiry activities, students develop in-depth understanding of fundamental science topics and applications, science process and mathematical skills. Specific science topics covered are properties of matter, temperature and heat. Two quarter results yield pre-post-test gains of 50-70%. A constructivist learning environment survey, ranked from zero, traditional class, to 4, extreme constructivist class, was issued in three forms. These refer to student experiences in this course, in prior science courses, and to student expectations of their future practices as a teacher. Preliminary results showed that this course was ranked at 2.7 while previous science courses were ranked at 2.3, indicating this course was perceived as a constructivist course. The future teaching expectations of the students overlapped the ranking of the course, indicating the course overall matched the students' intended constructivist teaching practices.


Developing partnerships with primary and secondary education is a dominant theme for colleges and universities across the U.S. that was barely on the horizon in the early 1970s. The purpose of this paper is to present the results of a survey of over 150 school-university partnerships in a selected region of Northeast Ohio. These school-university partnerships are described in terms of their diversity and scope. Researchers also share findings relative to school-university partnership funding and evaluation results. Overall findings indicate that while diversity and effectiveness are contended, both are somewhat lacking based on available empirical evidence. This circumstance is further aggravated by the fact that evaluation designs and results are often poorly constructed, if not lacking altogether. The researchers provide recommendations related to accountability and evaluation design.

ENGINEERING & TECHNOLOGY DIVISION

SESSION 15

ENGINEERING: SIMULATION, CHEMISTRY & COMMUNICATION

03:00PM SATURDAY, APRIL 4, 1998

JOHNSTON HALL 115

Luigi Messineo - Presiding

3:00 SIDE IMPACT AUTOMOBILE COLLISIONS: SIMULATION OF VEHICLE AND OCCUPANT RESPONSE. CESAR A. GRAD AND RONALD L. HUSTON, INSTITUTE FOR APPLIED INTERDISCIPLINARY RESEARCH, PO BOX 210072, CINCINNATI OH 45221-0072.

Side impact automobile crashes are among the most common of all urban vehicle accidents. They typically occur at intersections. The proximity of the struck vehicle occupants to the striking vehicle makes the occupants particularly vulnerable to injuries. This paper presents a comprehensive simulation of the occupant and vehicle dynamics in side impacts. Several methods of validating this simulation, including analytical, numerical, and experimental techniques are also presented. The results provide a representation of the occupant movement at each instant of the accident sequence. Designs for injury reduction are suggested.

3:15 AN ANALYSIS OF THE THEORY OF THE CHEMICAL HARD DRIVE. JOHN M. JAMAL, PO BOX 12, CAMBRIDGE OH 43725.

The principle behind the chemical hard drive are actually quite simple. The hard drive stores memory by reading charges of phosphor packets on a data grid. The change is imparted to these phosphors by means of an oxygen-iodine laser. This laser beam travels through six chemical mixing trays. But the beams pass through the data grids, the beams are not used to store data, as it is in a more conventional hard drive.

3:30 MICROPROCESSOR DESIGN RELIABILITY. ARTHUR P. MESSURY, YOUNGSTOWN STATE UNIVERSITY, COLLEGE OF ENGINEERING AND TECHNOLOGY, YOUNGSTOWN OH 44555.
The higher degree of architectural complexity evolving in present-day microcomputer systems has brought an increased demand for fault tolerant features in the system design strategy. Technological advances now make it economically feasible to design and manufacture integrated circuits having a large number of gates per chip. This increased level of integration has the advantage of allowing increased complexity in design and having only a small impact on the cost. The disadvantage is that this increased complexity can result in a design where fault detection becomes extremely difficult. A microcomputer system made up of IC logic components with Very Large Scale Integration (VLSI) would allow for increased fault tolerance by placing duplicate circuitry on the same chip. Careful consideration of how the system is partitioned can avoid the pin limitation problem and allow advantageous use to be made of the available chip area. This design would improve the system's fault detection characteristics by adding significant portions of logic for such things as fault detection and fault isolation without drastically increasing manufacturing costs. In turn, greater reliability would allow for less expensive maintenance and a reduction in costly system downtime. Thus a fault tolerant design can result in a computer architecture that is affordable as well as dependable.

3:45 A METHOD FOR ARGinine, L. Messina and N. Stenger, BGES DEPT., CLEVELAND STATE UNIVERSITY, 2329 ECLiOC AVE., CLEVELAND, OH 44115.

We have found that sodium dichloro-s-triazinetrione dihydrate can substitute sodium hydrochloride in the Messinae (Archiv Biochem and Biophy, vol 117, 534, 1966) modification of the Sakaguchi reaction for free and bound arginine. Since sodium dichloro-s-triazinetrione dihydrate comes in powder, molecular solutions of it can be made easily, and both the naphthol reagent and the arginine determination becomes more reliable. The naphthol reagent is prepared by dissolving 280 mg of 2,4-dichloro-1-naphthol in 50 ml of absolute ethyl alcohol and 50 ml of 5 N KOH. This solution is then mixed with 100 ml of 0.0131 M sodium dichloro-s-triazinetrione dihydrate. Sodium potassium tartrate (2 grams) is added to stabilize the reagent that otherwise would become dark brown. Solutions of naphthol treated this way are reddish and stable. The test is done by adding to one ml of all solution containing 50 ug or less of arginine, 0.5 ml of this reagent, 0.5 ml of 0.0044 M sodium dichloro-s-triazinetrione dihydrate and 0.5 ml of 0.0047 M KI. Arginine gives a reddish color and an absorption spectrum, which peaks in 10 minutes at 520 nm. The reaction is linear, proportional to the content of arginine and stable for hours. The arginine content of bovine albumin, lysozyme and trypsin was found to be 6, 13.2 and 3 percent respectively. These values are closely reported value in the literature. This method compares favorably with other methods of determination of arginine and is easier to use and prepare.

4:00 COMMUNICATION INTENSIFICATION OF TECHNICALLY-ORIENTED COURSES: AN EXAMPLE IN OPERATIONS. Alan D. Smith, Robert Morris College, 600 PITT AVENUE, PITTSBURGH, PA 15219-3099.

Much of the current literature on industrial needs of business graduates points to the deficiency of basic communication skills in presentation, written, and report communication. Many of these skills need to be developed within the context of the subject matter of the traditional business disciplines. An example of the communication intensification within a technical subject is needed to develop within the context of the subject matter of the traditional business disciplines.

ENVIRONMENTAL SCIENCE & RESOURCE MANAGEMENT DIVISION

SESSION 16
ENVIRONMENTAL SCIENCE & RESOURCE MANAGEMENT
09:00AM SATURDAY, APRIL 4, 1998
JOHNSTON HALL 115
CHARLES A. MCClaUGHERTY - PRESIDING

9:00 ACTIVATED SLUDGE TREATMENT OF OIL REFINERY WASTEWATERS. Yung-Tse Hung and MARIO G. CORA, CIVIL ENGINEERING DEPT., CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2440.

This paper examined the application of activated sludge process in treating oil refinery wastewaters. The refinery wastewater contained high concentrations of COD, TDS, heavy metals, other compounds inhibitory to biological treatment, and toxic organics. The wastewater also had high COD/BCO ratio. Current treatment techniques include equalization, pH adjustment, flocculation/coagulation, primary settling, flotation, oil separation, and biological treatment processes, which include trickling filters, activated sludge, aerated lagoons, oxidation ponds, and anaerobic treatment processes. The most commonly used biological treatment process is the activated sludge process. For refinery wastewater with influent COD of 715 mg/L and BOD of 140 mg/L, activated sludge could remove 65.7% COD and 85% BOD and produced an effluent of 245 mg/L COD, 21 mg/L BOD, 42 mg/L TSS and 29 mg/L VSS. The NH-N was reduced from 12.6 mg/L to 0.45 mg/L. The design parameters for refinery wastewater treatment included a hydraulic detention time of 10 to 22 hours, COD loading rate of 0.16-0.40 g COD/g VSS-day, and BOD loading rate of 0.04-0.08 g BOD/g VSS-day.


Identifying those organisms most actively involved in uptake of phosphate, frequently the limiting nutrient in aquatic communities, is necessary for scientific and practical purposes. We studied this in Lake Erie and several other lakes with varying concentrations of phosphate in summer using radiotracer methods. Based on gross uptake rates, bacteria appear to dominate phosphate uptake in aquatic communities: ranging from 60 to 90% taken up per minute. By contrast, net phosphate uptake by bacteria was much slower, indicating that natural bacteria rapidly release much of the phosphate they take up. We found that 27-89% of the phosphate taken up by natural bacterioplankton assemblages was rapidly released. Because earlier studies relied only on estimates of gross uptake, our findings suggest that the importance of bacteria in phosphorus dynamics in natural waters needs to be re-examined. This study was supported by Ohio Sea Grant.

9:30 TREATMENT METHODS FOR POLLUTANT REMOVAL FROM OIL REFINERY WASTEWATERS. Yung-Tse Hung, Chatchawal Lercessophawanich, CIVIL ENGINEERING DEPT., CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2440 and RUTH Yu-Lee Yeh, CHEMICAL ENGINEERING DEPT., MING-HSIN ENGINEERING COLLEGE, HUAN, TAIWAN.

This paper examines the treatability of refinery wastewater streams by a pilot scale activated sludge plant and to develop the process design parameters for a full scale plant design. Among various treatment methods used in the removal of organic pollutants present in the oil refinery wastewaters, the activated sludge process was found to be the most feasible treatment method. A total of 6 pilot scale activated sludge reactors were used in the pilot plant study. The raw wastewaters had a COD (chemical oxygen demand) of 336 to 4069 mg/l. Experimental parameters were investigated for MLSS (mixed liquors suspended solids) and F/M (food to microorganisms) ratio, and temperature. Three MLSS levels used consisted of 1000, 2000, and 5000 mg/l. The hydraulic detention time in the pilot scale activated sludge plant was maintained at 1 day for all reactors. There was two operating temperature: 5 to 7 C and 20 C. Results showed that sludge yield coefficient and the endogenous decay coefficient was 0.74 lb MLSS/bd COD removed, and 0.016 day, respectively. The BOD (biochemical oxygen demand) and COD removal efficiencies averaged 84.5% and 78.7%, respectively, for the high temperature reactors. For the low temperature reactors, the corresponding removal efficiencies were 75% and 65.5%.

9:45 DAMMING EFFECTS CAUSED BY CONVENTIONAL ROADS WHICH CROSS A RIVER'S FLOOD CHANNEL. George L. Ophycse, 18563 Co Rd. G, BRYAN OH 43506-9404.

A conventional road which crosses a river's flood channel consists of an earthen dam with the road's surface atop. The road/dam is, purposefully, made leaky via a bridge outlet and so on. Tiffin River gauging station records have permitted the assessment of the damming effects of this kind of conventional roads, with the Ohio Turnpike, completed in 1955, and State Route 191, completed in 1957. Both roads cross the entire Tiffin River flood channel. Evaluations were made of flood height and flow changes which occurred following road completion. Evaluations were made of flood height and flow changes which occurred following road completion. Correspondingly, the Rt. 191 road/dam, near Stryker, Ohio, causes a 35% flow decrease, a one foot flood height increase, and a 740 acre flooded land increase. The discharge of extreme flood, causes a 25% flow decrease, a one foot flood height increase, and a 740 acre flooded land increase for the Tiffin River. Lesser floods provided smaller estimates.

10:00 FILAMENTOUS MICROORGANISMS IN ACTIVATED SLUDGE PROCESS. Yung-Tse Hung, MAJID ZARRINAFSAR, CIVIL ENGINEERING DEPT., HOWARD H. LO, GEOLOGY DEPT., CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2440.

This paper reviewed the sludge bulking and control of filamentous microorganisms in activated sludge process. Activated sludge bulking usually is caused by excessive growth of filamentous microorganisms which interfere with sludge settling. The objective of the study was to examine the excessive growth of filamentous microorganisms in completely mixed pilot reactors. The volume of reactors was 5 L each. The COD (chemical oxygen demand) of influent
wetland restoration on these communities. The Ohio Division of Natural Resources plans to
important to the small mammal community at Big Island as any habitat trapped.
abandoned field and along the edge of a riparian woods. This procedure was repeated in August.
period. The lines were set in agricultural fields, a field already planted to prairie plants, an
convert some recently acquired agricultural fields at Big Island to prairie and wetland environ-
D. JEFFREY OF BIG ISLAND WILDLIFE AREA, MARION COUNTY, OHIO.
results of this study aquatic plants were found to be effective in removing heavy metal from metal
B. Juncea in roots was 45.9%,
and contains heavy metals that are toxic to human even a low concentration. Experiments were
5701 DELHI ROAD, CINCINNATI OH 45233-1670.
White Oak Creek, whose flow is periodically impeded by natural and manmade physical
barriers, supports a diversity of species and serves as a source of recreation and game fishing.
My research involves stream testing at sites ranging from suburban to agricultural areas and
includes assessing microbiological, macrobiological, chemical and physical factors which reflect
the quality of the creek from the point of its origin near Sardinia to its mouth at the Ohio River. The
creek has a known source of point pollution in the form of a sewage treatment plant on Starling Creek, a small tributary which empties into White Oak Creek near Sardinia, and its nonpoint
sources of pollution are associated with local agricultural practices as well as the Ohio River. I am
assessing the stream’s physical properties with special emphasis on its seasonal and permanent
impoundments in order to determine the relative effects of the stream’s partitioning, as well as its
chemical parameters, and aquatic diversity at five sites at two-week intervals from autumn until
early spring. I hope to determine the combination of factors which most likely control this stream’s
health. Early data analyses suggest that the Ohio River has a dramatically strong impact on its
tributary’s well-being.
10:30 TREATMENT OF METAL INDUSTRIAL WASTEWATERS WITH AQUATIC
PLANTS. YUNG-TSE HUNG, SUPARA LEAUNGPATTARAWONG, CIVIL ENGINEERING DEPT.,
CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2440.
This paper examined the application of aquatic plants in the treatment of metal industrial
wastewaters. Metal industry is one of the industries that discharged a large quantity of wastewater and
contains heavy metals that are toxic to human even a low concentration. Experiments were
conducted in plastic tubs. The aquatic plants were exposed separately to the individual metal ion
solution at various concentrations. The aquatic plants were weighted and analyzed for metal
concentration at various time of experiment. Results showed that Salvinia and Spirodela removed
56-96% of soluble Cr, Ni of initial concentration of 1 to 8 mg/L in the first 2 days. The removal rate
decreased with increasing in the contact time. Five day old aqua-cultured Brassica juncea seedlings
removed 40-50% dissolved Cd for a broad range of Cd concentration of 0.18-18 micro
M, in 24 hours contact time at a biomass loading of 0.6 g/L. Using the same environmental
conditions, the live roots of B. juncea incubated in 500 mg/L Pb solution for 3 days removed Pb
equivalent to 45% of their dry weight. The recovery of heavy metal in B. Juncea’s roots was 45.9%,
55%, 50.9%, 44.9%, 97.5%, and 100% for Zn, Cd, Cr, Ni, Cu, and Pb, respectively, while the corresponding bio-accumulation coefficient was 131, 134, 179, 208, 490, and 583. Based on the results of this study aquatic plants were found to be effective in removing heavy metal from metal industrial wastewaters.
10:45 THE IMPACT OF HABITAT RESTORATION ON THE SMALL MAMMALS
OF BIG ISLAND WILDLIFE AREA, MARION COUNTY, OHIO. JEFFREY D. MCCLELLAN (Dr. CARL W. HOGSTROM), DEPT. OF BIOLOGICAL SCIENCES, OHIO NORTHERN
UNIVERSITY, Ada OH 45810.
Small mammal populations and communities were studied at the Big Island Wildlife Area, Marion County, Ohio. The survey is part of a long-term study to ascertain the impact of prairie and wetland restoration on these communities. The Ohio Division of Natural Resources plans to convert some recently acquired agricultural fields at Big Island to prairie and wetland environments. The study will continue as these restorations progress. Trapping was initiated in July 1997, when lines of 15 to 30 Sherman folding live traps were set and checked four times over a 36 hour period. The lines were set in agricultural fields, a field already planted to prairie plants, an abandoned field and along the edge of a riparian woods. This procedure was repeated in August. Preliminary results suggest that the agricultural and abandoned fields are less important to the small mammals than are the woods edge and planted prairie, and that the planted prairie is as important to the small mammal community at Big Island as any habitat trapped.
1:05:15 A BIOLOGICAL, CHEMICAL AND ENVIRONMENTAL ASSESSMENT OF A PARCIALY IMPOUNDED CREEK IN BROWN COUNTY, OHIO. GREG S.
STROOP (MARY M. RESTENBERG), DEPT. OF BIOLOGY, COLLEGE OF MT. ST. JOSEPH, 5701
DELHI ROAD, CINCINNATI OH 45233-1670.
This study evaluates the effectiveness of preventative and curative measures intended to mitigate
the impact of habitat restoration on the small mammals of a partially impounded creek in Brown County, Ohio.
11:00 STATEWIDE STUDY OF WETLAND VEGETATION. YUNG-TSE HUNG AND SUPARA LEAUNGPATTARAWONG, CIVIL ENGINEERING DEPT.,
CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2440.
The survey is part of a long-term study to ascertain the impact of prairie and wetland restora-
tion of a correlation between land use types and transportation in Portage County, Ohio in 1996.
was 700-900 mg/L. The DO (dissolved oxygen) was 4 mg/L to prevent low DO bulking. The F/M
(food to microorganisms) ratio was 0.2 to 0.3 COD/g MLVSS/day, and the sludge age was 20-30
days. The operational temperature was 20 C. The microorganisms showed a high affinity for
acetate and, as Ks=0.07 mg Hac/L, Umax =3.75/day and low decay rate Kd=0.03/day. The same
filamentous microorganisms showed high affinity for glucose and lactate (K<1). At low F/M ratio
the filamentous microorganisms grew on reduced inorganic sulfur compounds in the presence of
degradable soluble carbonaceous waste. At limited concentration of ammonium, the filamentous
microorganisms, successfully competed against the activated sludge floc forming bacteria
resulted in poor sludge settling in the settling tank. Based on the results of this study, it is
recommended that a selector, a mixing zone for primary effluent and the return activated sludge
to the activated sludge treatment system, be added in order to prevent the sludge bulking problem
in the activated sludge reactors.
1:05:15 A BIOLOGICAL, CHEMICAL AND ENVIRONMENTAL ASSESSMENT OF A PARCIALY IMPOUNDED CREEK IN BROWN COUNTY, OHIO. GREG S.
STROOP (MARY M. RESTENBERG), DEPT. OF BIOLOGY, COLLEGE OF MT. ST. JOSEPH, 5701
DELHI ROAD, CINCINNATI OH 45233-1670.
While White Oak Creek, whose flow is periodically impeded by natural and manmade physical
barriers, supports a diversity of species and serves as a source of recreation and game fishing.
My research involves stream testing at sites ranging from suburban to agricultural areas and
includes assessing microbiological, macrobiological, chemical and physical factors which reflect
the quality of the creek from the point of its origin near Sardinia to its mouth at the Ohio River. The
creek has a known source of point pollution in the form of a sewage treatment plant on Starling Creek, a small tributary which empties into White Oak Creek near Sardinia, and its nonpoint
sources of pollution are associated with local agricultural practices as well as the Ohio River. I am
assessing the stream’s physical properties with special emphasis on its seasonal and permanent
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chemical parameters, and aquatic diversity at five sites at two-week intervals from autumn until
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PLANTS. YUNG-TSE HUNG, SUPARA LEAUNGPATTARAWONG, CIVIL ENGINEERING DEPT.,
CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115-2440.
This paper examined the application of aquatic plants in the treatment of metal industrial
wastewaters. Metal industry is one of the industries that discharged a large quantity of wastewater and
contains heavy metals that are toxic to human even a low concentration. Experiments were
conducted in plastic tubs. The aquatic plants were exposed separately to the individual metal ion
solution at various concentrations. The aquatic plants were weighed and analyzed for metal
concentration at various time of experiment. Results showed that Salvinia and Spirodela removed
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55%, 50.9%, 44.9%, 97.5%, and 100% for Zn, Cd, Cr, Ni, Cu, and Pb, respectively, while the corresponding bio-accumulation coefficient was 131, 134, 179, 208, 490, and 583. Based on the results of this study aquatic plants were found to be effective in removing heavy metal from metal industrial wastewaters.
10:45 THE IMPACT OF HABITAT RESTORATION ON THE SMALL MAMMALS
OF BIG ISLAND WILDLIFE AREA, MARION COUNTY, OHIO. JEFFREY D. MCCLELLAN (Dr. CARL W. HOGSTROM), DEPT. OF BIOLOGICAL SCIENCES, OHIO NORTHERN
UNIVERSITY, Ada OH 45810.
Small mammal populations and communities were studied at the Big Island Wildlife Area, Marion County, Ohio. The survey is part of a long-term study to ascertain the impact of prairie and wetland restoration on these communities. The Ohio Division of Natural Resources plans to convert some recently acquired agricultural fields at Big Island to prairie and wetland environments. The study will continue as these restorations progress. Trapping was initiated in July 1997, when lines of 15 to 30 Sherman folding live traps were set and checked four times over a 36 hour period. The lines were set in agricultural fields, a field already planted to prairie plants, an abandoned field and along the edge of a riparian woods. This procedure was repeated in August. Preliminary results suggest that the agricultural and abandoned fields are less important to the small mammals than are the woods edge and planted prairie, and that the planted prairie is as important to the small mammal community at Big Island as any habitat trapped.
The study design is descriptive and will be given in two parts. The first part is self-report questionnaires from the thirty member varsity women’s precision skating team at Miami University. The research population has heard of the food guide pyramid, and 80% believe their diet has moderately to greatly changed since their younger years. The majority (65%) did not have physician ordered diet recommendations, and therefore could be on regular diets (no restrictions). The remainder had modified their diets per physician recommendation. Of those who had changed their diets per physician order, 33% were on a low fat/cholesterol diet.

Currently there is no biochemical diagnosis or cure for schizophrenia, a disease which incapacitates 1% of the total population. Immunological abnormalities in schizophrenic patients indicates the involvement of an autoimmune response in the pathogenesis of the disease. The purpose of this study was to determine the immune response of schizophrenic patients to a protein fragment of hsp60.

9:30 ANALYSIS AND EVALUATION OF SELECTED MAGNETIC RESONANCE IMAGING (MRI) VARIABILITY FACTORS USING A CYLINDRICAL SPINE REFERENCE PHANTOM. RANDALL L. KRUGER, MICHAEL J. DENNIS, DEPT. OF RADIOLOGY, MEDICAL COLLEGE OF OHIO, PO BOX 10008, TOLEDO OH 43699-0008.

Magnetic Resonance Imaging (MRI) is the clinical imaging modality of choice in many diagnostic imaging studies, including the spine. Diagnostic cervical spine MRI image quality depends on both scanner and patient variability factors. The source of poor image quality is important information and very useful during clinical evaluation. Using a cylindrical spine reference phantom and modified MRI protocols, spine images are analyzed to that scanner and patient factors can be identified and isolated. A cylindrical spine reference phantom was designed and fabricated at the Medical College of Ohio for use with a clinical GE Signa 1.5 Tesla whole-body MRI scanner and a spine surface coil. Over one hundred clinical patients were imaged using the reference phantom. More than one thousand clinical MRI spine images were collected, evaluated, and analyzed. The performance of the reference phantom was evaluated by a team of neuroradiologist. The reference phantom successfully identified and isolated a selected set of scanner and patient variability factors providing useful information during clinical interpretation of spine images.

9:45 HISTOLOGICAL STUDY OF THE EFFECTS OF STRESS INDUCED HYPERTENSION IN NORMOTENSIVE WKY RATS. ELLEN ANDREWS, DARCE SMITH AND DANIEL ELIY, DEPT. OF BIOLOGY, UNIVERSITY OF AARON, AARON OH 44325-3908.

Chronic stress has been correlated with an increase in cardiovascular disease and hypertension in animal models with a genetic predisposition for hypertension or heart disease. The hypothesis of this study was to show that cardiovascular disease and hypertension would develop in a stepwise fashion after graded chronic stress in the normotensive Wistar Kyoto (WKY) rat. Blood pressures (BP) were taken biweekly using the tail cuff method and retroorbital blood samples were taken in the alternate weeks. Plasma catecholamines were measured by HPLC. Myocardial fibrosis and cortical coronary were studied by staining collagen with Sirius red. Three groups of WKY rats were used from 3 weeks to 30 weeks of age: caged controls = normal stress (n=9); territorial stress = moderate stress (n=12); early social isolation followed by territorial stress = high stress (n=11). The BP of the three groups was elevated in a graded fashion: controls, 124 mmHg; moderate stress, 139 mmHg; high stress, 145 mmHg. Norepinephrine levels increased from 572 pg/ml in controls to 897 pg/ml in high stress. Epinephrine increased from 457 pg/ml in controls to 1181 pg/ml in high stress. There was a dose response relationship between the stress level and the extent of cardiovascular pathology. High stress showed a 37% increase in myocardial fibrosis, a 34% increase in cortical coronary and a 167x increase in the wall to lumen ratio over the controls. In conclusion, chronic stress showed both physiologic and pathologic risk factors for coronary heart disease and cardiovascular pathology (Supported by HL 48372-4).

10:00 THE EFFECTS OF THE DENTAL MERCURY AMALGAM DISPERSALLOY AND HYDROGEN PEROXIDE ON HUMAN GINGIVAL FIBROBLASTS IN VITRO. ELIZABETH C. CARVER, SIMON K. LAWRENCE, PH.D.; OTTERBEIN COLLEGE, BOX 10316, WESTERVILLE, OH 43081-2006.

Over the years there has been increasing concern of the toxic effects of mercury amalgam as a restorative material in dentistry. Recently, the effects of hydrogen peroxide, a bleaching agent, on mercury amalgam has been examined as well. Determining whether or not these two reagents have a synergistic effect on human gingival fibroblasts is the goal of my research. The effects of hydrogen peroxide on the reactions of mercury amalgam in human cells will be studied, by comparing cells treated with mercury amalgam, cells treated with hydrogen peroxide, and cells treated with both amalgam and hydrogen peroxide. Each of the specimen will be added to the cells in culture and left to react for varying amounts of time. The cytotoxic effects of the reagents in each varied situation will be determined by an MTT (3-(4,5-dimethylthiazol-2-yl)-2,5- diphenyl tetra-zolium bromide) technique, and then the absorbancy will be measured using a spectrophotometer. Through this research I hope to provide the dental pro-fession with an increased knowledge of the effects of amalgam and H2O2 as they are used in dentistry.

10:15 HEAT SHOCK PROTEINS IN THE PATHOGENESIS OF SCHIZOPHRENIA. SARAH HANSEN, EARLHAM COLLEGE, EC DRAWER 837, RICHMOND IN 47374-4095 (UNITED STATES) AND KATHERINE JONES (ENGLAND), IGD LEEYN (ISRAEL), WEIZMANN INSTITUTE OF SCIENCE DEPARTMENT OF IMMUNOLOGY, REHOVOT, ISRAEL.

The objective of this study was to determine the effects of a heightened SNS and its possible mechanism of action on catecholamine, testosterone and blood pressure levels using two strains of rats: normotensive Wistar Kyoto (WKY) and a congenic strain genetically similar to WKY but having a Y chromosome from a genetically hypertensive father (SHR). To increase SNS activity, nerve growth factor (1.34mg/ml of NGF) 7g of body weight) was injected daily into neonatal WKY (n=8) and SHR (n=8) pups days 1-21. The control groups, WKY (n=7) and SHR (n=8), were injected daily with isotonic saline. Body weight, bp (tail cuff), serum corticosterone (HPLC) and serum testosterone (RIA) levels were monitored weekly. A significant increase in bp was seen in the SHR pups in weeks 5-7 (33mmHg, P < .0001). The opposite effect was seen in the SHR pups showing a significant decrease in bp over a three week span (30.5mmHg, P < .0166). Testosterone decreased in all weeks (5-11) in WKY strain and also decreased in all but week 8 in the SHR strain. No consistent differences in corticosterone levels were observed between schizophrenic samples in comparison to control subjects. The findings in this study support the autoimmune hypothesis for schizophrenia linked to the binding of the IgG and IgM to the protein fragment of hsp60.
SESSION 19
EXPERIMENTAL PHYSIOLOGY I
02:00PM SATURDAY, APRIL 4, 1998
JOHNSTON HALL 018
JUDY ADAMS - PRESIDING

SESSION 20
EXPERIMENTAL PHYSIOLOGY II
02:00PM SATURDAY, APRIL 4, 1998
JOHNSTON HALL 017
MARY D. GAHBAUER - PRESIDING
**Program Abstracts**

**SESSION 21**

**Gestational & Neonatal Development**
09:00 AM Saturday, April 4, 1998
Johnston Hall 017
Lee A. Meserve - Presiding

**9:00 THE ROLE OF ESTROGEN IN ZEBRAFISH (DANIO RERIO) NEURODEVELOPMENT.**
Alison M. Aldrich, PO Box 539, Hiram, OH 44234.

Teleost fish exhibit high levels of aromatase (estrogen synthetase) coupled with estrogen receptors in the brain. Environmental estrogens disrupt the endocrine systems of fish and other organisms, leading to abnormalities in reproductive system development. We hypothesize that estrogen also plays a key role in nervous system development, and that exposure to environmental estrogen during embryogenesis can lead to neurodevelopmental defects. Zebrafish (Danio rerio) embryos were exposed to different concentrations of estrogen and/or estrogen blocking substances in the rearing water for the first five days of development. Mortality, time-to-hatching, and abnormal characteristics were recorded. Results indicate a possible connection to a previously identified genetic mutant, which has a curved tail, impaired circulation, and defective retinotectal pathfinding.

**9:15 THE EFFECTS OF CASTRATION ON BLOOD PRESSURE AND CLOSE RELATIONSHIP TO THE HYPERTENSIVE Y CHROMOSOME.**
Thomas J. Pesarchick and Amy Milsted, Dept. of Biology, University of Akron, OH 44325-3098.

The development of hypertension has been shown to be influenced by the presence of androgens. The objective of this study was to investigate whether removal of androgens reveals any Y chromosome effects on body weight (BW) and blood pressure (BP). Rats used were the hypertensive SHR, a nontensive WKY and 2 conscious strains SHR/ly and SHR/y. Each strain was divided into two groups, control (n=20) and castrated (n=20). At three weeks of age, rats in the control groups were sham operated and rats in the castrated group had their testes removed. BWs were taken and measured by tail cuff at 10 weeks of age. At termination, blood and tissue samples were collected and frozen at -70°C for future molecular analysis. Two way ANOVA showed BW of castrated rats was significantly lower than the control animals (p<0.05) in all strains. BW differed between groups and strains, with BW of WKY rats significantly lower than SHR, SHR/ly and SHR/y (p<0.05). Castration decreased BP in all strains, compared to the controls (SHR, 16.8%, WKY, 20.1%, SHR/ly, 14.9%, SHR/y, 8.5, p<0.05). These results indicate that castration effects on BW and BP are not affected by the hypertensive focus on the SHR Y chromosome during the developmental period. Our results further confirm the requirement for testosterone for development of normal BW and BP in the rat.
9:30 GESTATIONAL EXPOSURE TO 250 PPM POLYCHLORINATED BIPHENYL (PCB) IN COMPLETE PUP MORTALITY. Beth B. Pritts and Lee A. Messer. Dept. of Biology, Le Moyne College, Syracuse, NY 13211 and Dept. of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Previously we have reported increased sympathetic activity (SA) indices in the SHR, suggesting that the SHR is a model for the human hypertension syndrome. The studies reported here were designed to examine the effects of gestational exposure to PCB 250 ppm on hypertension, behavior and learning in SHR. Seven days after birth, the pups were divided into 2 groups: Controls (n=5) and PCB (n=5). Surviving pups were maintained to 15 weeks of age and received daily injections of guanethidine or saline. Euthanasia was performed on all animals and blood pressure was measured by the tail cuff method. The results indicate that gestational exposure to PCB at 250 ppm does not affect blood pressure, body weight, or SA. However, SA measured 2, 7, 12 weeks after birth was significantly elevated in PCB exposed animals compared to controls. These results suggest that prenatal exposure to PCB at 250 ppm may have a long-term effect on SA and that further studies should be conducted to determine if neonatal sympathoexcitatory (symp) reduces adult blood pressure (BP) and cardiovascular pathology. Guanethidine (GD) a sympatholytic drug, and an antibiotic to nerve growth factor (anti-NGF) were administered to WKY (n=20) and SHR (n=19) male rats the first three weeks of age to decrease SA. WKY (n=20) and SHR (n=19) control groups were administered saline for these three weeks. BP was measured by the tail cuff method, and tissue norpinephrine (NE) by HPLC. Kidney and hearts were stored at +60°C red and scored for pathological changes. Symp significantly reduced BP in the SHR and WKY rats as compared to controls at week 15 (p<0.01) and significantly reduced tissue NE levels and myocardioc and cutaneous collagen and renal glomerular damage in SHR. In conclusion, the SA and the SHR Y chromosome in borotone hypertensive rats promotes increased BP and heart and renal damage. (Supported by HL-4072-4).

10:30 STEROID SULFATASE LEVELS ARE A SECONDARY RESPONSE TO INCREASED BLOOD PRESSURE. Vicki Snyder, Daniel Ely, Monte Turner, University of Akron, Dept. Biology, Akron OH 44325.

The objective of this study was to examine the effects of tissue steroid sulfatase (STS) levels when BP is lowered at an early age. If STS activities are a secondary effect of increased BP, there should be a significant linear regression of BP vs. STS in the control animals and the hydroxylase treatment should reduce levels in all strains comparable to the reduction of BP. A 4 x 4 factorial design was used in which males from all 4 strains were randomly assigned to 3 treatment groups (hydroxylase 80mg/Kg added to drinking water, castastion at 4 weeks, and control), BP, measured by tail cuff technique, was alternated weekly with retro-orbital blood draws from which testoster- ones levels were analyzed. At 8 wk., BP demonstrated strain differences in which castrate and hydroxylase groups were reduced (SHR by 60%; SHRs by 18%; and SHR by 10%) compared to control groups and SHR or SHRs showed a significant difference for serum testosterone levels (mg/ml): WKY vs. SHR (p<001); and SHRs vs. SHRs (p<01). At 12 weeks, animals were sacrificed and heart, kidney, testes, adrenal glands, and liver were assayed for STS levels. Hydroxylase produced strain and tissue specific changes in STS levels. In conclusion, these results support the hypothesis that a Y chromosome effects both BP and the regulative STS which can accelerate hypertension. (Supported by HL-4072-4).

10:45 THE EFFECTS OF HYDROSTATIC VS. ENDOCRINE FACTORS ON CARDIOVASCULAR AND RENAL PATHOLOGY IN SPONTANEOTY HYPERTENSIVE RATS (SHR). Changying Li, Darice Smith, Daniel Ely, Department of Biology, The University of Akron, Akron OH 44325-3908.

Hypertension can cause pathological changes in the cardiovascular and renal systems, such as increased myocardioc fibrillations, coronary collagen deposition and renal glomerular degradation. The objective of this study was to examine the effects of hydrostatic vs. endocrine factors upon cardiovascular pathology in SHR male rats. Spontaneously hypertensive male rats (SHR) bred at The University of Akron were studied from 5 to 15 weeks of age. There were 10 SHR male rats in each of three groups: controls, colony-stress and colony-stress-hydroxyzine-treated. Colony-stress was created with a SHR male and 10 SHR female rats in one colony box (441). The colony-stress-hydroxyzine-treated group was set up the same as the colony-stress group except hydroxyzine (vasodilator) was administered in the drinking water (100mg/l). Blood pressure was measured by tail cuff method every other week from 5 to 15 weeks of age. Blood samples were obtained by retro-orbital technique for norpinephrine (NE) by HPLC, testosterone (T) and angiotensin II (AngII) by RIA in the same weeks of BP measurement. Body weight gains were not significantly different between groups. The Sbp of the colony-stress group reached 160mmHg at 16 weeks of age, the control group was 153mmHg and the hydroxyzine-treated group was 156mmHg. There was a statistically significant difference (~P<001) between these groups. T and NE were not affected by hydroxyzine treatment but NE and AngII were elevated by stress. Heart and renal pathology were reduced compared to controls at week 15 (p<0.01) and significantly reduced tissue NE levels and myocardial and cutaneous collagen and renal glomerular damage in SHR. In conclusion, the SA and the SHR Y chromosome in borotone hypertensive rats promotes increased BP and heart and renal damage. (Supported by HL-4072-4).

SOCIAL & BEHAVIORAL SCIENCES DIVISION

SESSION 22

Social & Behavioral Science

09:00AM Saturday, April 4, 1998

Johnston Hall 203

Alinde J. Moore - Presiding

9:00 PUSHING THE PARAMETERS: CONSIDERATIONS IN SELECTING A SAMPLE IN AN OLDER POPULATION. Alinde J. Moore and Dorothy C. Stratton, Dept. of Psychology, Ashland University, Ashland, OH 44805.

The setting and testing of population parameters in a qualitative research project entitled "Resilience in Elderly Widowers," is examined. The project is based on the "grounded theory" approach devised by Glaser and Strauss (1967) wherein theory is developed on the basis of early...
the question of what causes some individuals to consume alcohol more frequently and in greater quantities than others is very popular and has been considered for decades. Certain personality traits in individuals often correlate with alcohol use, these specific traits are greatly unknown. Personality traits, as measured by the Sixteen Personality Factor Questionnaire, are compared to data gathered via the Core Instrument. Hypotheses determined that athletic participation and the traits labeled superego/control, anxiety, independence, and tough-pose positively correlate with alcohol use. The sample consist of 100 subjects, 41 males and 59 females. A multivariate analysis of variance is used to determine between and within group differences among the variables. A discriminate analysis is utilized to determine which dependent variables differentiate between high and low alcohol use scores. Results show that athletic participation does not correlate with alcohol use. The named personality characteristic(s) do correlate with alcohol use. The findings of this study provide direction for which students should be targeted for prevention and intervention efforts on campuses.

9:15 THE RELATIONSHIP OF PERSONALITY CHARACTERISTICS AND ALCOHOL USE AMONG A COLLEGE POPULATION. SARA J. CRAWFORD 2218 CHALMESTE DR., TOLEDO OH 43611.

The trend for health care is moving towards improving patient care by using information systems (IS) as a resource in data collection. Hospitals are upgrading their systems to meet the needs of these demanding trends. Assessment of the uses of these systems is necessary to predict the impact these new systems will have on health care. Nurses have traditionally been the center of patient care and data collection for patient records. The purpose of this study was to determine the factors which played a role in nurses responses to change when a new information system is implemented. Three factors are hypothesized to determine nursing responses to this change: nurses past experience with computers, response to training classes on the new system, and overall satisfaction with the system. We hypoth-

15 questions; five on each of the three aspects. Once hospitals understand how nurses respond to the change of a new computer system, and the factors that influence that change, they will more capable of preparing for these responses. The feedback that hospitals receive with computers; 2. Nurses who felt the training classes were helpful; 3. Nurses who are more trained classes on the new system, and overall satisfaction with the system. We hypoth-

RATCHESON, PH.D., ASSISTANT CURATOR. THE CLEVELAND ASSOCIATE CURATOR; PEGGY (ELIZABETH MADIGAN; CHRISTINE HUDAK), GLASEN 310B 11900 CARLTON RD. CLEVELAND OH 44106.

The trend for health care is moving towards improving patient care by using information systems (IS) as a resource in data collection. Hospitals are upgrading their systems to meet the needs of these demanding trends. Assessment of the uses of these systems is necessary to predict the impact these new systems will have on health care. Nurses have traditionally been the center of patient care and data collection for patient records. The purpose of this study was to determine the factors which played a role in nurses responses to change when a new information system is implemented. Three factors are hypothesized to determine nursing responses to this change: nurses past experience with computers, response to training classes on the new system, and overall satisfaction with the system. We hypothe-

sized: More positive attitudes to an IS will be found in: 1. Nurses who are more comfortable with computers; 2. Nurses who felt the training classes were helpful; 3. Nurses who are more satisfied with the IS. The study is being done in a large Midwestern teaching hospital. Data are being collected in a variety of nursing units via a questionnaire using a Likert scale with 15 questions; five on each of the three aspects. Once hospitals understand how nurses respond to the change of a new computer system, and the factors that influence that change, they will more capable of preparing for these responses. The feedback that hospitals receive from these surveys can gear the future of computer implementation and the effects on its users.

9:30 ASSESSMENT OF NURSES RESPONSES TO THE INTRODUCTION OF A NEW COMPUTER SYSTEM. MARA-NELA E. ZYTKOWSKI (ELIZABETH MADIGAN; CHRISTINE HUDAK), GLASEN 310B 11900 CARLTON RD. CLEVELAND OH 44106.

The trend for health care is moving towards improving patient care by using information systems (IS) as a resource in data collection. Hospitals are upgrading their systems to meet the needs of these demanding trends. Assessment of the uses of these systems is necessary to predict the impact these new systems will have on health care. Nurses have traditionally been the center of patient care and data collection for patient records. The purpose of this study was to determine the factors which played a role in nurses responses to change when a new information system is implemented. Three factors are hypothesized to determine nursing responses to this change: nurses past experience with computers, response to training classes on the new system, and overall satisfaction with the system. We hypothe-

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each strain were given hydralazine treatment. Tail EP by sphygmomanometry was alternated with retro orbital blood samples each week. All animals were sacrificed after 28-32 weeks, and the heart, left kidney, adrenal glands, and a section of the liver were assayed for protein and STS levels. ANOVA results (p = 0.055), found that lowered blood pressure had an effect on the amount of STS, but hydralazine did not influence testosterone levels in any strain. In conclusion, the differences which are strain and tissue specific, support the hypothesis that a Y chromosome affects EP and the BP regulates STS levels which can accelerate hypertension. (Supported by HL-48072-4).

9:45 WHAT ARE THE EFFECTS OF RIGHT-LEFT BRAIN DOMINANCE ON SHORT TERM MEMORY AND LEARNING STYLES? John James Kellen 6431 Highland Drive Columbus OH 43229.

The current hypothesis of the right-left brain develops sometime between the age of live and puberty. The purpose of this study is to determine the effects of short term memory learning styles in students who are right brain dominant (creative) versus students who are left brain (logical) dominant. From a review of pertinent literature, a hypothesis was formed that the test group will be more left-brain dominant. Fifty students between the ages of 11 and 15 participated in the study. Each subject was excluded from the group during the testing. Each subject completed a HCP (Hemispheric Consensus Prediction) survey then were introduced to short term memory test words. Subjects were given a timed right brain dominant test then asked to recall the memory test words. The results of the study indicated most subjects exhibited left brain dominance. Learning styles observed from the left brain dominant group were as Kobo’s Postulate (1973) described—reflective observation or Type II, which was reinforced by the test times recorded. Results also indicated that subjects with the most accuracy and the shortest recall times were the right brain dominant types.

10:00 SINGLE AND CO-INFECTION OF TEMPERATURE SENSITIVE MOUSE HEPATITIS VIRUS MUTANTS FOR THE PURPOSE OF MEASURING COMPLEMENTATION, RECOMBINATION, AND REVERSION PROCESSES. Shannon Lee Marie Bowerden, 827 Fox Valley Ct., Cincinnati OH 45230.

The need to understand sub-genomic levels of the cell led to this study of viruses to observe different aspects of viral mutations. The following viruses were selected from the Mouse Hepatitis Virus Temperature-Sensitive (MHV/TS) Mutants: Albany 22 (Abl22), LA 6 (La6), and Albany 16 (Abl16). As controls were conducted in duplicate at 30°C. A complementation experiment between La6 and Abl16 was conducted in triplicate at 30°C at 10% CO2, to generate samples which were harvested at 2 and 9 hours post infection (hpi). The samples were then titrated at dilutions between 1:1 to 104. A second complementation experiment with Abl22, Abl La6, and La6, titrated samples with dilutions between 1:1 and 10-5. The titration of the individual viruses (based on growth curve analyses of Abl59-MHV) was performed at 37°C at 1.5% CO2, from the original samples. Finally, a recombination experiment between La6, Abl-16, and Abl22 was conducted in duplicate at 30°C. Dilutions were stored at -80°C, rapidly thawed, and centrifuged for clarifying before titrating at 37°C at 1.5% CO2. They were then titrated again at both permissive and non-permissive temperatures of 30°C and 35.5°C, respectively. From these findings, it was established that the mutants Abl-16 and La-6 did not complement, that the complementation between Abl22 and La6 showed the highest complementation and that Abl22 and Abl showed questionable complementation. The recombination study indicated that the recombination frequency between Abl2- and Abl-16 was the highest. Abl22 and La6 obtained the highest recombination frequency (3.2%) as shown in the above findings. The full recombination studies, limited mapping of where the mutants lie in relation to one another at the sub-genomic level can be suggested. Further studies are warranted to analyze the processes of complementation, recombination, and reversion to understand more about viral replication and viral gene mutations for the ultimate purpose of controlling viruses.


The purpose of this experiment was to link the learning process with environment. It was hypothesized that mice will learn at a faster rate when stimulated by their environment. Five mice were introduced to an enriched environment, a plastic cage with platforms, tunnels, and toys, at an age of two weeks. Another five mice were placed in a sustained environment (without toys, tunnels, etc.). After four weeks of inhabiting their separate environments mice were individually placed in a maze once every day for a course of twenty-two days. The amount of time spent searching for the end of the maze and the mistakes made (wrong turns in the maze) were recorded and graphed. Results indicated that there was a significant difference between the rate of learning and the quantity of fungi growing, but fungi were still isolated on the cleaned vent. The results were repeatable for three trials. A control proved that fungi and bacteria could grow in another vent outside the school. One vent was cleared to learn whether lung could be easily eliminated or if the whole ventilation system was contaminated. The cleaning reduced the quantity of lung growing, but fungus were still isolated on the cleaned vent. This investigation confirmed the hypothesis because infectious organisms were found in the soil.

10:30 EXPRESSION OF THE ORNITINE DECARBOXYLASE GENE IN HEAD AND NECK CANCER. Kris R. Jatana, 2235 Sandover Rd. Columbus OH 43220.

The ornithine decarboxylase (ODC) gene is the first and rate limiting enzymes in the synthesis of polyamines; cells require polyamines to progress through the cell cycle. This investigation measured the expression of ODC in both normal and cancerous head and neck tissue samples taken from twenty-eight patients. The RNA was isolated from the tissue samples, and then a reverse transcriptase (RT) reaction was used to synthesize DNA. Using polymerase chain reaction (PCR), the ODC gene was amplified, and the expression of the ODC gene was measured. A statistically significant higher level of the ODC gene was found in the head and neck cancer tissue relative to the normal head and neck tissue from the same patient; the t test had a p-value of 0.0005. Future directions include investigating the ODC enzyme activity and the polyamine levels in these tissue samples. Due to its critical role in the cell cycle, ODC is a possible target for therapeutic intervention.

10:45 ABNORMALITIES OF TUMOR SUPPRESSOR GENE P16 IN SQUAMOUS CELL CARCINOMA OF ORAL AND LARYNGEAL-PHARYNGEAL TISSUES. Daniel G. Stover, 2140 Lake Rd., Columbus OH 43220.

The p16 gene is considered a tumor suppressor, or gene that has the capability to inhibit or partially inhibit the growth of cells. Mutations in the p16 gene have been found to prevent the p16 gene from functioning as a cell growth inhibitor. The purpose of this research was to determine whether the quantity of mutations of the p16 tumor suppressor gene products differed between carcinogenic oral tissue (tongue) and carcinogenic larynx-pharynx tissue. Squamous cell carcinoma can develop in either type of tissue. Twenty eight samples of RNA from patients at the James Cancer Hospital were used. Each sample underwent RT-PCR (reverse transcription - polymerase chain reaction), in order to amplify a target gene. Three mutations of the twenty eight samples were found. There were zero mutations from the oral region, yet there were three from the larynx-pharynx region. Of those samples with base pair deletions, two had large and deletions (one full exon), from the same position in the DNA. These results as a whole seem to point to an increased susceptibility of the laryngeal-pharyngeal tissue to environmentally caused (e.g. alcohol or tobacco smoke) p16 mutations, thus cancer. After RNA is copied from DNA, the parts which are not translated for use in protein synthesis are removed/spliced out (introns), leaving a shorter mRNA containing only exons which will be translated into a protein. The two samples with identical mutations either have a mechanism removing an entire exon at some point during the above sequence, or there is a mutation at the end of the deleted exon, causing an entire exon-exon junction sequence to be spliced out.

11:00 AN INVESTIGATION INTO THE PRESENCE OF FUNGI IN A SCHOOL VENTILATION SYSTEM. Nicholas J. Donville, 3741 Westwode Dr, Dayton OH 45440-3531.

Sick building syndrome is the condition of a building where more than 20 percent of its occupants experience adverse health effects with onset during work hours. Although sick or sick from poor air quality in a building school vents should not contain infectious organisms, which may make students sick. Recent studies have also shown that metabolic gases from organisms, such as fungi, may even be a source of air borne volatile organic compounds. The purpose of this project was to sample a local school building for organisms that may cause uncomfortable symptoms or allergies in students. It was hypothesized that the school would contain infectious organisms. After a preliminary test, which sampled various locations for fungi or bacteria, five school vents were tested for fungi and identified the fungi to see if they could be associated with Sick Building Syndrome. Alternaria, Penicillium, Aspergillus, Aureobasidium, and Fusarium were always found in the sampled vents. Scoepulosporus, Paecilomyces, and Cladosporium were found only in one trial. The results were repeatable for three trials. A control proved that fungi and bacteria could grow in another vent outside the school. One vent was cleaned to learn whether fungi could be easily eliminated or if the whole ventilation system was contaminated. The cleaning reduced the quantity of lung growing, but fungus were still isolated on the cleaned vent. This investigation confirmed the hypothesis because infectious organisms were found in the soil.

11:15 HERBS ANDERSONT ANTIBIOTICS. Amy M. Decker, 101 Split Rail Ct., Bellefontaine OH 43311.

Although healing herbs have been around for centuries, do they really have any medical significance? Will they be used to fight drug-resistant strains of bacteria? A study was conducted using several herb and antibiotic combinations to determine which were effective. The results of this study suggest that different strains of organisms respond differently to susceptibility tests. Plate cultures of E. coli, Micrococcus, Pseudomonas putida, and Bacillus cereus were grown. Then a disk of each of the following were placed in the plates: Nalidixic Acid, Ampicillin, Streptomycin, gacil, clove, Una De Gato, B-Complex, Spirulina, L-Formula Lysine, Beta-Carotene, and Calcium. Zones of inhibition were measured and compared. The antibiotics had the most consistent rate of susceptibility. Some herbs had large zones but others showed no susceptibility at all. Antibiotics have a higher susceptibility rate than herbs but future study may show that herbs work with bacteria to make substances that then in turn fight off the bacteria.


The purpose of this project is to determine the microbial biodiversity of the soil by determining the antibiotics-producing actinomycetes, and by determining the bacteria that show antibiotic activity. In addition, the factors influencing the soil microbial biodiversity were determined, antibiotic-producing actinomycetes were isolated, and the factors influencing the distribution of these antibiotic-producing soil microbes were determined. Soil samples were obtained from varying locations. Serial dilutions were run, and the dilutions were plated out onto Actinomycetes Isolation Agar and incubated. Current results reveal that particular actinomycetex colonies have inhibited the growth of fungi, thus revealing the presence of antibiotic synthesized by the actinomycetes. Results indicate optimal conditions for locating new antibiotic producers to aid in the search for new antibiotics.

SESSION 24

PRE-COLLEGE AFTERNOON

02:30PM SESSION 24 SATURDAY, APRIL 4, 1998

JOHNSTON HALL 201

AMY M. DAVIS - PRESDING
2:30 THE EFFECTS OF VARIABLE GRAVITY ON THE LIFE CYCLE OF TENEBRO MOLITOR. AM M. DAVID, 2172 LINDOY RD., BEDFORD OH 44122.

A comparative study to elucidate the effects of low, normal, and high gravity on the life cycle of Tenebrio molitor was performed. Tenebrio molitor in their larval stage were exposed to approximately 1.5 G and 2.0 G at High Inertial Rotation Behemoth (HIBB) centrifuge at Clarkson University. Tenebrio molitor in their larval stage experienced short duration exposure to approximately 0.0 G on NASA’s DC-9 performing parabolic flight trajectories. Tenebrio molitor exposed respectively to 1.5 G and 1.5 G first reproduced 97 days after exposure to gravity. A high gravity control group that stayed at NASA and a transportation control group that traveled to Clarkson University, but was not centrifuged first reproduced one day later. In a small sample of Tenebrio molitor that experienced parabolic flight trajectories, after 16 days, 60% reached their adult stage of metamorphosis, compared with 80% of the control group. A prolonged period of high gravity seemed to have had little effect on the life cycle of the Tenebrio molitor. However, the decreased maturation of larvae exposed to low gravity for short intervals of time warrants further investigation.

2:45 DOES AIR CIRCULATION SPEED DECOMPOSITION IN LANDFILLS? JULIANNE W. NEFF, 1360 SR 314 M., MANFESLED OH 44903.

The purpose of this project was to see if pumping air through a landfill would make the wastes decompose more quickly. Data was acquired by assembling two controlled landfills, in tanks, following the design of an actual landfill, plastic lining, clay, gravel and other materials that add to the integrity of the site. Measured variables were weight and volume changes which were then used to quantify landfills. Weekly samples of waste from each model. Also discovered were higher levels of nitrogen and pH levels for the same amount.

3:00 FACTORS AFFECTING GERMINATION RATES OF LUPINUS PERENNIS. KATIE CABELL, DR. H. MICHAELS, MR. S. KELLY, 51 DAVIN DR, BOWLING GREE OH 43402.

L. perennis, a food source for the endangered Kameri Blue butterfly, is a vital part of a vanishing ecosystem, the Ouk Savannah. This two year research explores one of the steps needed to recover this butterfly’s habitat. The hypothesis that the germination rates of L. perennis would be different under different temperatures and that the germination rates would be different under different light conditions. The experiment was a split-plot design with two levels of temperature and multiple conditions. Phase 1 identified the best method of heat-treating seeds and exposed procedural.

3:15 ELEVATED CO2 AND THE GROWTH OF BEAN PLANTS. MELINDA SCHOTTENSTEIN, 6260 PARK RD., INDIAN HILL OH 45243.

The purpose of this project was to determine if an elevated CO2 environment would increase the growth of bean plants. It was thought that since CO2 is crucial to photosynthesis, and photosynthesis is what drives plant growth, then increasing the amount of CO2 should increase plant growth. It was hypothesized that bean plants grown at twice ambient CO2 levels would grow taller and have more mass than bean plants grown at ambient CO2 levels for the same amount of time. Two groups of bean plants were grown in a greenhouse for a period of 18 days each. The control group was grown at ambient CO2 levels, while the experimental group was grown at double ambient CO2 levels. The two groups received identical lighting, heating and food. Measurements were taken at various areas around the greenhouse in order to determine normal ambient CO2 levels. The average of the various measurements was 459 PPM. The experimental group received 901 PPM, which is double ambient CO2 for the area surrounding the greenhouse. The average of mass measurements for the ambient group is 1.40 g, and for the elevated group, 2.02 g. This is a 44% increase in mass. The average of height measurements for the ambient group is 15.5 cm, and for the elevated group, 20.5 cm. This is a 28% increase in height. It is reasonable to conclude the elevated CO2 had a positive effect on the bean plants. The information gained by this project can be used to increase plant yields for greenhouse gardeners. It can also help horticulturists prepare for a new kind of farming as they learn to adapt to potentially increasing CO2 levels in Earth’s atmosphere.

3:30 A STUDY OF DIEFFENBACHIA IDIOBLASTS. ERIC P. BISHOP, WESTLAKE HIGH SCHOOL, 3180 OAKWOOD LN., WESTLAKE OH 44145.

Idioblasts are specialized, spindle-shaped structure found in leaves and stems of the decorative plant Dieffenbachia and parts of some other plants. An idioblast shoots needle-like crystals called raphides from each end when perturbed. The goal of this research was to determine the variability of idioblasts in different species/varieties of Dieffenbachia and note the effect of solutes on their firing rate. The hypotheses were that idioblasts vary in size and shape between species/varieties, 2) solute addition and concentration cause a difference in firing rate, and 3) physical pressure causes a difference in firing rate. Samples of Dieffenbachia were prepared for examination by courtesy, etch, and straining. Observations were made with an optical microscope at 10X. Physical pressure was exerted on idioblasts of different species/varieties with a tip of sharpened pencil. Dimensions and density of idioblasts were found to vary with species/varieties. Data support the conclusion that the idioblast firing mechanism is unrelated to addition of different solutes, such as sugar and sodium chloride. The sole stimulus which appears to initiate firing is physical pressure applied to the idioblast.
4:45 HOW DOES THE CORIOLIS EFFECT IMPACT DYNAMIC EXPERIMENTATION IN SIMULATED GRAVITY ON A SPACE STATION? JENNIFER F. HOPPE, 8902 SADYCREK DR., CENTERVILLE OH 45319.

In order to investigate the impact of the Coriolis Effect on dynamic experimentation in a simulated gravity environment, its impact on the path of a sphere released on a rotating centrifuge was studied. After constructing a centrifuge using a 30 cm diameter circular table, a matal sphere was released and its path was traced as it rolled over a sheet of carbon and typing paper several times using multiple spin rates. The Coriolis Effect predicts the sphere will follow a curved path when released in the direction perpendicular to the path of the revolution. The measured path of the sphere in polar coordinates was extracted from the carbon paper and compared to the predicted path. In most cases, the measured data fit the predicted path within the estimated uncertainties. The path deviated most for the slower spin rates. Based upon the consistency of the data with the predicted path, it is possible to predict and measure the deflection which will occur due to the Coriolis Effect in this experiment and in a simulated gravity environment on a space station.

SESSION 25
Poster Session
9:00 - 11:00 AM
SATURDAY, APRIL 4, 1998
JOHNSTON HALL COMMONS

BOARD 01 RESPONSES OF PROCAMBARUS CLARKII AND ORCONECTES RUSTICUS CRAYFISHES TO FOOD ODOR: POTENTIAL IMPORTANCE OF Olfactory Mechanisms in a SPECIFIC TACTILE RESPONSE. CAROL CROWTHER, CYNTHIA STEELE, CANDICE MATHESON AND PHILIP ALBERSTADT, DEPT. OF BIOLOGY & HEALTH SERVICES, EDINBORO UNIVERSITY, EDINBORO PA 16444.

Individual crayfish were presented with intuitions of 10 ml of a feeding stimulant as either the undiluted filtrate, “Max” concentration (100%), or one of five other concentrations: 75%; 50%; 25%; 10%; or 0% (controls) of “Max”. The feeding stimulant was presented to crayfish the day after regular feeding and after one week of food deprivation. Three components of food search behavior were analyzed: detection; probing (near-field search) and locomotion (distant search). Rank order of occurrence and its latency to initiation were recorded for each behavior. For Procambarus clarkii and Orconectes rusticus following regular feeding, high concentrations (≥50% “Max”) of the stimulant induced probing (near-field search) prior to locomotion, while low concentrations (<50% “Max”) induced locomotion prior to or even in the absence of probing. Detection always occurred first. These results indicate that chemical stimuli preferentially activate distant food search in both species and that a behavioral dichotomy exists between food search and feeding behavior. One week of food deprivation had no effect on the organization of food search behavior in P. clarki. One week of food deprivation, however, did affect the organization of food search behavior in O. rusticus for those groups presented with 25% and 10% of “Max” concentrations: They probed prior to locomotion, which would not seem adaptive for natural populations. Procambarus clarkii appear to be more responsive to food odors than O. rusticus, which may give P. clarki the ability to locate food more quickly and increase its feeding rate compared to O. rusticus.

BOARD 02 SHORE-FLY (DIPTERA: EPHYDRAEAE) COMMUNITIES IN RESTOR-ED WETLANDS. Bruce A. Steenly, ZOOLOGY DEPT., MIA University, OXFORD OH 45056.

This investigation is the first study that documents changes in shore-fly (Diptera: Ephydridae) populations in restored wetlands and changes in shore-fly communities in restored wetlands of different ages. Wetlands are subdivided into habitats that are characterized by vegetation types (Scheiring and Foote 1973, Regensburg 1976, Stellly 1978, 1986). In the midwest, restoration projects have been initiated to provide habitat for endangered vertebrate populations that are dependent on wetland resources. Ultimately, successful restoration of wetlands and colonization by diverse vertebrate communities is dependent on the variety and abundance of primary resources. Ultimately, successful restoration of wetlands and colonization by diverse vertebrate communities is dependent on the variety and abundance of primary resources. Restoration of wetlands and colonization by diverse vertebrate communities is dependent on the variety and abundance of primary resources.

BOARD 03 COMPARATIVE STUDY OF THE CENTRAL NERVOUS SYSTEM OF DROSOPHILA MELANOGASTER AND OCHTHERA MANTIS. Jennifer P. Eyzon and Bruce A. Steenly, ZOOLOGY DEPT., MIA University, OXFORD OH 45056.

The central nervous systems (CNS) of the sister families, Ephyridae (shore flies) and Drosophilidae (fruit flies), are examined. A comparative study of the CNS anatomy and morphology of Drosophila melanogaster (Diptera: Drosophilidae) and Ochthera mantis (Diptera: Ephydridae) is reported. Histological preparations are compared to determine gross CNS structural differences and similarities. Holm’s silver-gold stain and Delafield’s Hematoxylin and Eosin protocols were used to stain the CNS and associated nerve tracts. Differences in the structure of fruit-fly and shore-fly central nervous systems may be associated with reported differences in resource utilization and behavior. Significantly, Drosophilidae contains species that utilize the by-products of fermentation while species of Ephydridae exploit a diverse resource base. The Ephydridae includes predators (Ochthera mantis), parasites, leaf miners, herbivores, saprophages, and bacterial feeders. The development of diverse external morphologies and the utilization of a broad research base suggests that structural and life strategy changes are accompanied by CNS modification.


This study concentrates on viewing the surface structures of the wetleafy (Bemisia) during stages of its life history by means of scanning electron microscopy. The first instar displays six functional taping, jointed, appendages extending from the under-side of the body. This instar stage was seen actually moving on the leaf while being viewed under the scanning microscope. In the later instars, the legs are seen as being retracted and non functional. On the dorsal side of all the instars there can be seen a Y-shaped orifice which structurally resembles the male reproductive organ in mammals. Its function has not been truly determined. On the ventral side of the instars can be observed a very thin, sinuous, hair-like, extension originating from a short, finger-like, process located just below the mid-section of the body. This tube is so slender that it cannot be seen under a light microscopec. Documentation of this structure has not appeared in the literature. We propose that it is a feeding tube for the instars. In the adult fly the feeding stylet is seen as a slit-like tube extending from the underside of the head. Research on this organism is to continue, focusing primarily on the structure and function of the elongated hair-like extension.

BOARD 05 CHARACTERIZATION OF THE RHODOBACTER SPHAEROIDES DNAKJ OPERON. Anna H. Dreier (W. Theodore Lee); KENYON COLLEGE, DEPT. OF BIOLOGY, GAMBER OH 43062-9623.

The dnaKj operon from Rhodobacter sphaeroides has been cloned. R. sphaeroides is a metabolically versatile bacterium capable of growing under both photosynthetic and chemoheterotrophic conditions. The dnaKj genes encode proteins that function as molecular chaperones in cells. Previous observations have indicated an involvement of the DnaKj proteins with the folding of newly synthesized proteins from the ribosome. The three high molecular weight proteins are encoded by dnaKj operon (Lee and Tabata, unpublished observations). The characterization of the dnaKj operon is interest to investigate the regulation of these genes and the role of the DnaKj proteins in photosynthetic growth. Initial sequencing of the dnaKj operon indicates that it may be regulated differently from the gcsE operon. The R. sphaeroides gcsE operon contains a hairpin loop sequence, conserved in many other bacterial gcsE operons, present at the start of the mRNA transcript. The dnaKj operon does not appear to contain this conserved inverted repeat.

BOARD 06 EFFECTS OF ETHANOL ON BLOOD GLUCOSE RESPONSE TO INSULIN. Caroline H. Kim, James R. Hartness, (Kathryn T. Knecht), OHIO NORTHERN UNIVERSITY, ADA OH 43510.

Ethanol exposure affects blood glucose, but the nature of this interaction is not clear. Studies have shown both increases and decreases in blood glucose after ethanol administration, but no consistent effects across studies have been identified. Factors such as species, age, nutrition, and manner of ethanol dosing may influence the net effect of ethanol on blood glucose. The purpose of these experiments is to elucidate the effect of the above factors on insulin response in conjuction with ethanol. The hypothesis is that ethanol administration will produce a consistent increase in insulin resistance once confounding factors are taken into account. Insulin response in mice (Mus musculus and Peromyscus maniculatus) will be measured after injecting insulin (1 mU/kg, i.p.) and analyzing influential blood samples at subsequent hourly intervals with a One Touch glucometer. Preliminary results show that insulin response decreases with age and with chronic ethanol administration, and that basal glucose levels and insulin response differ in the two species studied.


The cox2I gene, present in most higher plants, encodes the cytochrome c oxidase subunit II. In most flowering plants, the coding region of this gene is interrupted by two introns (cox2I_1, one intron near the 5' end; cox2I_2, the other near the 3' end). In a broad survey, we determined, by Southern Blotting, that cox2I_2 is absent in at least seventeen lineages. By investigating the sequences of the cox2I genes from these lineages, we will test the hypothesis, that the loss of cox2I involving a cDNA intermediate. This hypothesis involves the removal of the intron from the RNA, the reverse transcription, and recombination between the cDNA and its parent gene. Associated with these events is RNA editing, which modifies some bases in the RNA, e.g. the conversion of specific cytosine (C) residues into uracil (U) residues. Thus, the cDNA produced from a mature mRNA will contain Ts in place of Cs at those sites. Through recombination, the loss of cox2I may be accompanied by the deletion of the intron.

BOARD 08 ASSESSMENT OF CIGARETTE SMOKE EXTRACTS TO EXAMINE THE EFFECTS OF TYPICAL CONCENTRATION LEVELS ON INSULAR MAMMALS. J. A. SPENCER, S. H. DUNN, AND M. L. WATTS, DEPT. OF ZOOLOGY, UNIVERSITY OF SASKATCHEWAN, SASKATCHEWAN, CANADA.

Cigarette smoke extracts (CSE) were used to investigate the effects of typical concentration levels of cigarette smoke on insular mammals. The CSE was used to determine the effects of cigarette smoke on the respiration of insular mammals. The CSE was used to determine the effects of cigarette smoke on the respiration of insular mammals. The CSE was used to determine the effects of cigarette smoke on the respiration of insular mammals. The CSE was used to determine the effects of cigarette smoke on the respiration of insular mammals. The CSE was used to determine the effects of cigarette smoke on the respiration of insular mammals.
This study provides important data on a population where revascularization could be performed shorter and less costly for PTCA. However, medium term follow-up revealed a greater need for OH 44304.

Dramatic changes in patient demographics have occurred in this study (1986-52 pt, 1996-309 pt, p<0.5). The percent of women has increased (1986-23%, 1991-27%, 1996-29%, p<0.5), as has the percentage of patients who are older, at higher risk, and have different clinical profiles. Chart reviews and analyses using chi-square and t-test formulas. There has been a dramatic change in pt demographics. Pt volume has increased (1986-52 pt, 1991-144 pt, 1996-309 pt, p<0.5). The % of women has increased (1986-23%, 1991-27%, 1996-29%, p<0.5), as has the number of patients who are older, at higher risk, and have different clinical features than in previous years. The importance of this data is evident for the effective administration of rehabilitation programs.

Cardiac rehabilitation (rehab) is a comprehensive therapeutic exercise and patient (pt) education program for people with coronary artery disease (CAD), who have undergone revascularization surgery, coronary angioplasty, survived myocardial infarctions or pts with stable angina pectoris. Treatment of CAD has evolved from limited medical interventions and coronary artery bypass grafting (CABG) to less invasive procedures including thrombolytic therapy, and angioplasty. Pt profiles have also changed in a way similar to the elderly population. Therefore, we studied to determine how the history of revascularization affected the pt demographics of our cardiac rehab Phase II program. Data were prospectively acquired and retrospectively analyzed from 1986-96. Charts were reviewed and analyzed using chi-square and t-test formulas. There has been a dramatic change in pt demographics. Pt volume has increased (1986-52 pt, 1991-144 pt, 1996-309 pt, p<0.5). The % of women has increased (1986-23%, 1991-27%, 1996-29%, p<0.5), as has the number of patients who are older, at higher risk, and have different clinical features than in previous years. The importance of this data is evident for the effective administration of rehabilitation programs.

Revascularization of the left anterior descending coronary artery (LAD) is an important, evolving, and controversial topic. Previous options included balloon angioplasty (PTCA) and standard coronary artery bypass grafting (CABG). New techniques have evolved including intracoronary stents, which may improve the results of PTCA, and minimally invasive direct coronary artery bypass (MiCAB). A new minimally invasive surgical procedure with faster recovery. The purpose of this prospective study was to evaluate our initial experience with 198 patients who have undergone LAD revascularization. There were important baseline differences between 55 patients undergoing surgical procedures vs. 155 undergoing PTCA. PTCA based patients were more often female, diabetics, and less often had congestive heart failure. Initial hospital stay was shorter and less costly for PTCA. However, medium term follow-up revealed a greater need for repeat cardiac hospitalizations (43% vs. 6%), and follow-up costs were higher in the PTCA group. Thus, the lower initial cost and resource utilization demonstrated by PTCA diminishes with time. This study provides important data on a population where revascularization could be performed by multiple techniques and is currently guided by clinical judgement. Multivariate analysis is in progress to determine if the ultimate outcomes are driven more by baseline patient related factors or by choice of revascularization strategy.

This study examined the distribution of the three color morphologies of Plethodon cinereus, their possible toxic or nocuous natures, and related environmental factors that could explain these color variations. The most commonly published explanation for the different color morphologies is mimicry of the strongly toxic red eft, Notophthalamus viridescens, and the less toxic red salamander, Pseudotriton ruber. However, it has not been determined whether P. cinereus is noxious or toxic itself. Alternative explanations for the color morphologies include genetic polymorphism and geographic variation. We conducted a local population study, measuring size, stripe length, and coloration of individuals. In addition, tail breaks were noted as indicators of predation. Skin secretions were obtained in the field by swabbing individuals to acquire potential toxins. These samples were then analyzed using thin layer chromatography (TLC) to separate compounds. The TLC yielded no detectable bands, indicating that none of the secretions were obtained from the swabbing technique or if the secretions did not contain detectable compounds. To determine this, infrared spectroscopy was used to test the samples with higher sensitivity or to confirm the initial negative results. Further tests into the toxicity of P. cinereus are warranted.

The etiologic opioid peptides (EOP) are a family of morphine-like peptides that participate in the regulation of Prolactin (Prl) and Growth Hormone (GH) secretion. While previous studies using beta-endorphin demonstrated that it is a potent stimulator of Prl release, the GH response was not as robust. The purpose of this work was to investigate the effect of a different etiologic opioid, met-enkephalin on Prolactin and GH release in male and female rats.

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This study is an evaluation of American dog ticks (Acarina: Ixodidae) adults at low temperature. Matthew J. Brunelle (R. L. Stewart and G. R. Needham), The Ohio State University, Department of Entomology, 211 Biological Sciences, 484 W. 12th Ave., Columbus OH 43210.

We are evaluating the ability of American dog ticks, Dermacentor variabilis, to actively uptake water at various low temperatures. The survival of ticks likely depends heavily on their ability to actively take up water. This will aid in our understanding of how ticks endure periods of harsh temperatures during winter. We hypothesize that there is a lower temperature threshold, near freezing, where ticks can no longer uptake water. Pre-desiccated ticks were placed under saturated conditions at low temperatures and re-weighed daily to determine their ability to re-hydrate. Thus far, all ticks have regained water lost during desiccation at temperatures higher than 10°C. Future studies will evaluate re-hydration ability at temperatures near freezing. This study is an evaluation of American dog ticks (Acarina: Ixodidae) adults at low temperature. Matthew J. Brunelle (R. L. Stewart and G. R. Needham), The Ohio State University, Department of Entomology, 211 Biological Sciences, 484 W. 12th Ave., Columbus OH 43210.

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The objective of this study was to compare the vocal responses of male red-winged blackbirds to analog and digital versions of the same male conspecific display song. The original analog version was digitized using Canary software (Cornell Bioacoustic Workstation, v. 1.2.1, 1995) and a Macintosh 7200/120 computer equipped with a math coprocessor. In this between-subjects design experiment, ten male red-winged blackbirds were observed in their natural breeding habitats. Observations were conducted during May and June of 1997 in various locations throughout northwestern Pennsylvania. The ten male red-winged blackbirds were assigned to two groups. The five males in Group 1 were exposed to the analog version of the male conspecific display song, while the five males in Group 2 were exposed to a digitized version of the same male conspecific display song. The 5 min stimulus Playback period, the terminal segment of the analog stimulus, while the remaining nine red-winged birds were sequentially assigned to either the analog or digital stimuli. The stimuli was presented using a modified cassette tape recorder and a powered field speaker. The vocal response patterns of each bird were recorded with an additional tape recorder, an external microphone, and a parabolic recording dish. The initial observation period for each bird consisted of a 5 min Pre-playback, a 5 min stimulus Playback, and a 5 min Post-playback period. All vocal response patterns were recorded during the 15 min continuous display song period. During the 5 min stimulus Playback period, the birds were exposed to either the analog version of the display song while the birds in Group 2 were exposed to the digitized version of the same conspecific display song. During the stimulus Playback period, the stimuli was presented once every 10 sec for 5 min for a total of 30 presentations. The major goal of this study was to determine whether male red-winged blackbirds respond differently to the analog and digital versions of the same vocalization. Initial analysis indicates that the vocal response patterns are not significantly different between Group 1 and Group 2. Therefore, digital stimuli can be used to further evaluate behavioral and species-specific significance of vocalizations of male red-winged blackbirds.

**BOARD 15 VOCAL RESPONSE PATTERNS OF MALE RED WINGED BLACKBIRDS (AGELAIUS PHOENICEUS) TO DIFFERENT SEGMENTS OF A DIGITALLY MANIPULATED MALE CONSPECIFIC INTRUDER’S DISPLAY SONG.**

LAUREN MURPHY, ROBERT BEARFIELD, CHRISTINA BOARD 17 MALE RED-WINGED BLACKBIRD (AGELAIUS PHOENICEUS) VOCAL RESPONSE PATTERNS TO DIFFERENT PRESENTATION RATES OF CONSPECIFIC Playback Stimuli. LAUREN MURPHY, ROBERT BEARFIELD, CHRISTINA BEAM, BRENDA TELES, and GRANT MCLAREN, PH.D., BIOACOUSTIC RESEARCH PROGRAM, DEPT. OF PSYCHOLOGY, EDINBORO UNIVERSITY OF PENNSYLVANIA, EDINBORO, PA 16444.

The objective of this study was to determine whether or not the male red-winged blackbird would produce significantly different vocal patterns in response to individual, but acoustically different segments of a digitally manipulated song of a conspecific male intruder. If the male red-winged provides a significantly different vocal pattern to one segment of a conspecific male intruder’s display song, while providing little or no vocal response to the additional segment of the intruder’s display song, the song is likely to contain important species-specific information. Fifteen free-living male red-winged blackbirds were observed in various natural breeding habitats in northwestern Pennsylvania from June through July, 1997. The fifteen male birds were assigned to three groups in this between-subjects design experiment. The five birds that were assigned to Group 1 were exposed to a digital version of a complete conspecific male intruder’s display song. The additional ten birds were assigned to Group 2 or Group 3 and were exposed to either a digital version of the initial segment or the terminal segment of the conspecific male intruder’s display song, respectively. Each bird was observed for 15 consecutive min during a 5 min Pre-playback, a 5 min Playback, and a 5 min Post-playback period. In each stimulus Playback period the males were exposed to the stimulus signal every 10 sec for a total of 30 presentations during the 5 min Playback period. The original analog version was digitized using a Cassette tape recorder (Canary Software, v. 1.2.1, 1996) and a Macintosh 7200/120 computer equipped with a math coprocessor. The stimuli were generated using Canary software and a Macintosh 7200/120 computer equipped with a math coprocessor. The vocal response patterns were recorded during the presentation of the full display song and the terminal segment of the display song in comparison to the initial portions of the display song. The data from this study will be used to further evaluate the potential significance of vocalization patterns in the transfer of species-specific information, territorial, and reproductive behaviors of red-winged blackbirds in habitats South of Lake Erie in Southern Erie county.

**BOARD 16 VOCAL RESPONSE PATTERNS OF MALE RED WINGED BLACKBIRDS (AGELAIUS PHOENICEUS) TO DIFFERENT SEGMENTS OF A DIGITALLY MANIPULATED MALE CONSPECIFIC INTRUDER’S DISPLAY SONG.**

LAUREN MURPHY, ROBERT BEARFIELD, CHRISTINA BEAM, BRENDA TELES, and GRANT MCLAREN, PH.D., BIOACOUSTIC RESEARCH PROGRAM, DEPT. OF PSYCHOLOGY, EDINBORO UNIVERSITY OF PENNSYLVANIA, EDINBORO, PA 16444.

The vocal repertoire responses of male red-winged blackbirds to conspecific display song presentations were observed in this between-subjects design experiment. The objective was to measure whether a faster presentation rate of a stimulus would elicit a higher response rate from the male red-winged blackbirds. Free-living male red-winged blackbirds were observed within their natural breeding habitats in Northwestern Pennsylvania from May 5 through June 9, 1997. Female red-winged blackbirds were present in the breeding habitats during the observations in this experiment. The ten male birds were randomly assigned to two groups. Each of the 10 birds were individually exposed to a 5 min pre-playback, a 5 min post-playback period for the original conspecific display song. In Group 1, the stimulus was presented approximately at 10 sec intervals during the 5 min playback period. In Group 2, the stimulus was presented at 5 sec intervals during the 5 min playback period. In summary, the birds in Group 1 received 30 presentations of the stimuli, while those in Group 2 received 60 stimulus presentations giving Group 2 more presentations at a faster presentation rate. A modified cassette tape recorder and a powered field speaker were placed in the territory of each bird to conduct the playback sessions. An additional tape recorder, microphone, and a parabolic recording dish were used to record the vocal responses of the male birds. The original analog male display song used as the stimulus in this experiment was digitized via Canary (The Cornell Bioacoustic Workstation 1.2.1, 1995) bioacoustic software and a Macintosh 7200/120 computer equipped with a math coprocessor. The preliminary analog stimuli was digitized with a digitizer that had a higher frequency range, male whistle. A modified cassette tape recorder and a powered field speaker were placed in the territory of each bird to present the playback stimulus. An additional tape recorder, microphones, and a parabolic recording dish were used to record the vocal responses of the male red-winged birds observed in this playback study. Five male red-winged birds were assigned to Group 1 and were presented with a one-syllable stimulus. The remaining five males were assigned to Group 2 and were presented with a two-syllable stimulus. The observation periods for each group consisted of a 5 min Pre-playback, a 5 min stimulus Playback, and a 5 min Post-playback period. Each bird was observed for a three minute continuous period. During the Playback period, the red-winged birds in Group 1 and Group 2 were presented with their respective digital stimuli every ten seconds for five minutes. Therefore, each bird received 30 discrete stimulus presentations during the 5 min Playback period. The one and two syllable conspecific digital playback stimuli signals used in this study were generated from two original analog recordings collected during the summer of 1996. These original analog signals were digitized with a Macintosh 7200/120 computer equipped with a math coprocessor and Canary software. (v. 1.2.1, 1995). The preliminary data analysis indicates that the male red-winged birds increased their vocalizations in response to the one-syllable and two-syllable stimulus presentations. However, it is not clear whether or not the male red-winged distinguishes between the two different vocal stimuli with different vocal response rates.

**BOARD 19 PATTERNS OF PHYLOGENETIC DISTRIBUTION OF DIGESTIVE PROTEASES AMONG BEETLES (COLEOPTERA).**

DA RABSDAY AND KELLY S. KENNARD, DEPT. OF BIOLOGICAL SCIENCES, OHIO UNIVERSITY, ATHENS, OH 45701.

As part of an ongoing survey examining the phylogenetic distribution of cysteine (thiol) type proteases among the Coleoptera (insects), the presence or absence of cysteine proteases was determined in 37 previously uncharacterized species. Whole gut homogenates were assayed in the presence and absence of E64, a powerful cysteine protease inhibitor, to determine the contribution of cysteine type proteases to overall proteolytic activity towards a model protein (azoacase). The survey extended the known distribution of cysteine proteases to the superfamily Ceridae, with the hypothesis that cysteine proteases are highly conserved and limited to the Cucujiformia. Additionally, examination of 3 species within the Cerambycidae confirms a pattern of secondary loss of cysteine proteases in this group. Although factors associated with gain or loss of cysteine proteases are not well understood, the two protease classes differ in the physicochemical conditions necessary for optimal proteolytic activity. The relationship between protease types present and optimal gut pH for total proteolytic activity was examined in 5 species over a pH range of 5.5-10.5. In general, a reasonable correlation between pH optima and predominant protease type was noted. In species that utilize both cysteine and serine proteases, the gut appears to be differentiated into various functional regions defined by protease type and pH.
BOARD 21 THE INCIDENCE AND ETIOLOGY OF CONGENITAL DIAPHRAGMATIC HERNIA (CDH) IN FIVE COUNTIES OF NORTHEASTERN OHIO: JEB M. BUTLER, ALBERTA HUMAN, CANTON OH 44710, MATTHIAS MAGACDON, MICHAEL KREIN, CLAIRE BRODGERT, JANE REYNOLDS, MYRIA DE LA ROSA, SIU-JIN HU, MIKUL MARK, MAIHA LING, NORTHEASTERN OHIO UNIVERSITY COLLEGE OF MEDICINE.

Congenital Diaphragmatic Hernia causes about 10% of birth defects in the U.S. Birth defects have now surpassed prematurity as the leading cause of perinatal mortality. The average cost of care for a neonate with a CDH is $107,000. The area around Stark County has a reputation in the medical community as having a high rate of CDH. This preliminary case-control study examined hospital birth and death records from 1960 - 1987 for CDH cases, retrospectively. The study was conducted in 5 Counties. Perinatal, maternal and paternal data were collected for a total of 38 variables provided. A total of 13 cases was found with sufficient data to analyze. Twenty-eight controls were appropriately matched for comparison with the CDH group. The incidence of CDH in the study area was 4,310,000 live births. Odds ratios and 95% confidence intervals were calculated around the odds ratio for each variable. Preliminary analyses of CDH with maternal age, ethnicity of parents, gestational weight, birth weight, and birth weight gender did not include 1.0. Results obtained for this study were compared with larger studies elsewhere. Future studies will include more years in order to increase the number of CDH cases examined.

BOARD 22 ANALYSIS OF POLYMORPHIC DNA FRAGMENTS (RAPD) FROM STONEROLLER FOR USE AS PROBES FOR THE MEASUREMENT OF GENETIC DIVERSITY: LORIANN GANNON, JULE MERCER, HEALTHA SHARIS, DERISE GORDON, "GHEH TOH" and DAVID J. BURRIS, DEPT. OF BIOLOGY, 251 LUDOWI ST., WILLIAMSBURG COLLEGE, WILMINGTON, OHIO 45177 and 2 ECOLOGICAL EXPOSURE RESEARCH DIVISION-MD62, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, CINCINNATI OH 45268.

RAPD (Randomly Amplified Polymorphic DNA) analysis of the genetic diversity of stoneroller (Campostoma anomalum) populations was undertaken. RAPD analysis of genetic variation is limited because RAPD polymorphic bands are considered co-dominant markers in that one either sees a band or does not see an individual DNA band in the analysis of an individual fish. Heterozygous individuals are not identified by this method. All of the general goal of the present study is to identify allele families from polymorphisms identified by our RAPD analysis. By cloning polymorphic DNA fragments we should be able to identify all the alleles for each polymorphic band identified by RAPD analysis. This information new primer probes can be developed to assess the genetic variation in stoneroller populations using PCR which will allow a more robust measurement of genetic variation. We call this approach of developing primers to study heterozygosity at specific random loci SCAP analysis. (Sequence Characterized Anonymous Length Polymorphisms). Polymorphic DNA bands from stoneroller will be cloned into plasmid vectors for analysis. Approximately 60 to 90 clones will be analyzed by Southern analysis and DNA sequencing to identify alleles from the same loci. From loci with multiple alleles we will be cloned for SCAP's analysis of population studies. The specific goal of the present project is to develop the clones for the development of SCAP probes and to identify polymorphic loci within the clones using dot slot and Southern analysis.

BOARD 23 MOLECULAR AND BIOCHEMICAL ANALYSIS OF GLY 195 OF THE NIFM IN AZOTOBACTER. TIFFANY CHANDLER, RYAN SCHEINER, DEETER KNOWL, EXEEN EKERT, LAKSHMI PULAKAT AND NARA GAVINI, DEPT. OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

Nitrogenase is a complex enzymatic system which is involved in the reduction of atmospheric nitrogen. Nitrogenase is biochemically utilized as a form of ammonia fixation by many bacteria. Two proteins designated the Fe-protein and the MoFe protein. Since the numerous genes involved in the nitrogenase system utilizes over 20 OH 43403.

Agarose gel electrophoresis analysis of the chromosomal DNA isolated from the oocytes treated with cycloheximide or rifampicin did not show the characteristic chromosomal DNA fragmentation and ladder formation apoptotic specific cells. Since Bcl2 is known to prevent apoptosis in many cell lines, we analyzed to see if Bcl2 has a role in preventing induction of apoptosis in stage V oocytes. Thresholding of the oocytes microinjected with anti-Bcl2 antibody and subjected to a control experiment was performed by microinjecting oocytes with saline. Within four hours of injection, the oocytes microinjected with anti-Bcl2 antibody were dead, whereas the oocytes microinjected with saline were not affected. The implications of these observations and the possible role of Bcl2 in preventing the induction of apoptosis in stage V oocytes of Xenopus will be discussed.

BOARD 25 ROLE OF THIRD INTRACELLULAR LOOP IN DETERMINING THE BINDING PROPERTIES OF RAT ANGIOTENSIN II RECEPTOR TYPE AT2: JASON J. DITTMER, NARA GAVINI AND LAKSHMI PULAKAT, DEPARTMENT OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

The Ang II receptor subtype AT2 is a 7-transmembrane domain protein that shares only 34% homology with the Ang II receptor subtype AT1. Unlike AT1 receptor, AT2 receptor does not demonstrate the GTPγS-induced shift to a low affinity form and does not activate the Gq-protein-mediated phospholipase C pathway. The AT2 receptor has a single transmembrane segment in relation to its lowest homology located is in the C-terminal region suggesting that this portion of the protein may be involved in the regulation and maturation of the nitrogenase remains poorly understood. The nitrogenase system utilizes over 20 OH 43403.

Azotobacter vinelandii mutants that are defective in the NifM function and subjected them to nucleotide sequence analysis. EFUET, LAKSHMI PULAKAT AND NARA GAVINI, DEPT. OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY. BOWLING GREEN OH 43403.

The nitrogenase system utilizes over 20 OH 43403.

Our results demonstrated if other known apoptotic agents could induce cell death in these oocytes. Although oocytes were microinjected with cRNA encoding rat AT2 receptor, we have generated a chimeric protein (AT2:AT1A3rd ICL) that AT2 in the 3rd ICL of the rat AT2 receptor is replaced by the 3rd ICL of the rat AT1 receptor. The ligand binding and G-protein coupling properties of this chimeric receptor were analyzed by using Xenopus oocytes as an expression system. The chimeric receptor has a very reduced affinity to Ang II and the peptide antagonist 125I-[Sar1 lle8]Ang II. Currently we are also analyzing if the chimeric receptor binds isoxatrin, the AT1 receptor specific ligand.

BOARD 26 MOLECULAR AND GENETIC ANALYSIS OF FLUIDITY IN BACTERIA. EXEEN EKERT, NARA GAVINI, AND LAKSHMI PULAKAT, DEPT. OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

Biomechanical analysis on the DNA content of Azoto bacter vinelandii cells indicated that they contain about 80 copies of their chromosome per cell. In contrast, the fact that many recessive mutants can be isolated from A. vinelandii without the constraints expected for a cell that has 80 copies of its chromosomes argued against this organism being highly polyploid. In an attempt to explain this apparent discrepancy, we have investigated the following: a) The segregation of a kanamyacin resistant selectable marker and genotypic condition in Azotobacter vinelandii. Pasmid DNA was used to introduce the kanamycin resistance gene onto the A. vinelandii chromosome at the nifL locus by homologous recombination. The transformants were identified from non-transformants with the aid of replica plating, and hence the colonies examined for segregation of the genetic marker were never subjected to kanamycin selection. In spite of growing the transformants in the absence of selection pressure, no segregant that lacked the kanamycin resistance gene was scored. These analyses suggested that the segregation of the kanamycin maker in A. vinelandii did not exhibit any constraints expected in a high polyploid bacterium. b) The number of copies of chromosone per A. vinelandii cell. We have developed a technique that we refer to as the "in vivo Method for Chromosome Counting." The safest feature of this technique is to introduce an identical genetic marker on the chromosome of the organism and also on an extrachromosomal element (plasmid) of known copy number as an indicator. We have used this technique successfully to estimate the chromosome copy number in A. vinelandii. The significance this new data on the ploidy nature of A. vinelandii will be discussed.

BOARD 27 MOLECULAR AND GENETIC ANALYSIS OF THE RBF-GENE CLUSTER FROM AZOTOBACTER VINELANDII. BRYAN HUSSMAN, LAKSHMI PULAKAT, RYAN SCHEINER AND JEFFREY WILLIAMSON, NARA GAVINI, DEPT. OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

We have identified the rbf genes from a non-symbiotic and non-pathogenic soil bacterium, Azotobacter vinelandii. The random nucleotide sequence analysis of the rbf revealed an open reading frame that encodes a peptide of 360 amino acids. This deduced peptide shares 57% homology with the Rbf of Synecocystis and 47% homology with the Rbf of Yersinia pseudotuberculosis. The previously identified short-chain dehydrogenases/reductases family (SDR) signature sequence was conserved in the sequence of the Rbf of A. vinelandii. Southern blotting analysis of A. vinelandii chromosome probed with 1.1kb PstI DNA fragment corresponding to rbf revealed that it is present in a single copy in A. vinelandii genome. A. vinelandii genome present on the rbf as a single copy of rbf gene, by insertion of kanamycin resistance marker via homologous recombination, resulted in drastic changes in the growth characteristics. The rbf-negative A. vinelandii grown in liquid medium exhibited agglutination that is characteristic of rbf mutants of other bacteria, suggesting that we have cloned the functional copy of the rbf of A. vinelandii.

BOARD 28 A POSSIBLE FUNCTION FOR THE NIFM IN BIOLOGICAL NITROGEN FIXATION. DETER KNOWL, RYAN SCHEINER, TIFFANY CHANDLER, EXEEN EKERT, LAKSHMI PULAKAT AND NARA GAVINI, DEPT. OF BIOLOGICAL SCIENCES, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

The nitrogenase is one of the intriguing, complex metalloenzymes and is composed of two separate proteins designated the Fe-protein and the MoFe protein. Since the numerous genes involved in the synthesis and assembly of this enzyme have already been cloned and sequenced, this enzyme is probably one of the first completely defined example of metalloenzymes. In order to gain insight into the mechanism of the Fe-protein assembly process, we are investigating the role of the NIF protein in conferring stability and activity to the Fe-protein of Azotobacter vinelandii. However, the nature of such
a catalytic event is unclear. Our comparison studies indicated that one of the possible functions of the NIF protein is to assist in the proper folding of the Fe-protein by catalyzing the conformational interconversions by the citrains isomerization of the peptide bond N-terminal to the proline residues present in this peptide. We have constructed a plasmid that overexpresses NIF in E. coli and have purified recombinant protein to obtain pure NIF protein. We observed that this recombinant NIF exhibited pepstatin PPI-cis-trans isomerase activity when Sucyclot-

**Board 23 Structure/Function of the Fe-Protein of Nitrogenase: Isolation of A. Vinelandii D54 Revertants. Sh Li, Laxmi Pulakat and Nara Gayvin, Dept. of Biological Sciences, Bowling Green State University, Bowling Green OH 43403.**

We have isolated a group of novel type of revertants that are capable of utilizing atmospheric nitrogen to support their growth. The unusual thing about these revertants is that they are isolated from the strain A. vinelandii D54, which contained a defined deletion in the nif gene present on its chromosome. The strain A. vinelandii D54 is unable to grow on nitrogen free growth medium due to this deletion in the nif gene. Spontaneous revertants were isolated by growing the strain A. vinelandii D54 on nitrogen free medium at 30°C for a period of 3 days. The revertants appeared at a frequency of 5x10^-6. PCR analysis of the chromosom isolated from A. vinelandii D54 revertants showed that they maintained the Δnif genotype of their parental strain. Further investigation by genetic and biochemical methods to understand the genetic basis for the Δnif phenotype of A. vinelandii D54 revertants indicated that in these revertants, the nifH gene belonging to an alternative nif system is activated. This is because, even though the conventional nif system is deleted in the strain A. vinelandii D54, the nifH protein is still able to be synthesized for its corresponding Fe-protein upon demand. However, normally nifH is not activated when Molybdenum is present in the growth medium.

For nitrogen fixation to occur, the Fe-protein must function as a one-electron donor to the MoFe-protein. This electron transfer is thermodynamically unfavorable and requires the hydrolysis of 2MgATP per electron transferred. Because of the ATP hydrolysis, this is a very specific reaction. Our studies suggest that in A. vinelandii D54 revertants, the nifH is activated even in the presence of Molybdenum in the growth medium and the Nrf protein is carrying out the functions of the conventional Fe-protein in these cells.

**Board 30 Multimodal Biological Analysis of the Chl from Chlamydomonas. Laura Sigworth, Ryan Schreiner, Laxmi Pulakat and Nara Gayvin, Department of Biological Sciences, Bowling Green State University, Bowling Green OH 43403.**

The Chl is a pigment, which is a protochlorophyllide reductase and shares significant homology to the consensus sequence of the nif gene that encodes the Fe-protein component of nitrogenase. This homology is in the amino acid residues known to be important for the Fe-protein functions. These include: a) the cysteine ligands for the [4Fe-4S] cluster; b) Regions identified by cross-linking studies to be involved in binding to the MoFe-protein; c) The MgATP binding site and d). Regions involved in MgATP induced conformational change necessary for productive electron transfer to the MoFe-protein. The greatest conservation between the chlorophyll Fe-protein and the nitrogenase Fe-protein is found in the sites known to be involved in forming a [4Fe-4S] cluster. Our investigations are directed to understand the existence of mechanistic similarities between these two proteins. As a first step we have converted the conserved cysteine residues to serine by site-directed mutagenesis. These residues correspond to the cysteine residues in the Fe-protein which are shown to serve as ligands for the [4Fe-4S] cluster. Once the mutations were identified, the Chlamydomonas cDNA were transformed using the Particle Inflow Gun (PIG). Expression of these proteins results in the formation of the Fe-protein, these cysteine residues serve as ligands for the [4Fe-4S] cluster in the Chl. Moreover, when plants of CytoS555or CytoS5555 lost the light-independent greening ability, further supporting that the critical role these amino acids play in structure/function of the Chl and the Fe-protein.

**Board 31 Application of Yeast Two-Hybrid System in Assigning Possible Roles for Various Nif Genes: Genetic Analysis on the Interactions of NifW, NifZ, and NifD. Shung Lee, Laxmi Pulakat, Kenneth Parker, Stacie Mcgrew and Nara Gayvin, Department of Biological Sciences, Bowling Green State University, Bowling Green OH 43403.**

Nitrogenase is composed of two separately purified proteins, both of which are extremely oxygen sensitive. The smaller of the two proteins, designated the Fe-protein, has a molecular weight of about 60,000 daltons and is a dimer of identical subunits encoded by the nifH gene. The larger of the two proteins, designated the MoFe-protein, has a molecular weight of 230,000 daltons. The MoFe-protein is a tetramer in its biologically active form and is composed of two identical halves, each containing a subunit and a b-subunit encoded by the nifH and nifD genes, respectively. Besides the structural genes of nitrogenase, there are a number of nif-specific genes and their protein products - twenty identified to date - that comprise a part of the nif regulon. Even though experimental evidence suggests that these accessory proteins are required for nitrogenase activity, the exact roles played by many of these proteins in the functions of nitrogenase are unclear. Our studies were directed to understand the role of two of these accessory proteins, the NIFW and the NIIZ in the biological nitrogen fixation. To accomplish this, we utilized a genetic method, the Yeast based Two-Hybrid protein-protein interaction assay. This analysis showed that the NIFW could interact with itself to make a multimeric complex. In contrast, the NIIZ could not interact with itself. However, the NIIZ could interact with the NIFW. Previously it was shown that mutating either the NIIZ or the NIIF have similar effects on the activity of nitrogenase. This observation indicated that both these proteins may exert their regulation on the nitrogenase by a common pathway. Furthermore, it was suggested that the NIIF plays a role in the oxygen-protection of the MoFe-protein by direct physical interaction. Our observation that the NIIF can interact with itself as well as with the NIIZ, suggests that the NIIF and the NIIZ may form a higher order complex and such a complex may be needed to exert the effects of the NIIF or the NIIZ on the nitrogenase activity.

**Board 32 Polymorphisms in HLA-DMA Regulatory Sequences. Albert R. Wheeler III, Andrew J. Fabich (Dr. Simon K. Lawrence), Otterbein College, Life Science Dept., Westerville OH 43081.**

The major histocompatibility complex (MHC) class II molecules are responsible for presenting foreign antigens, through the extracellular domain of the immune system. Polymorphisms in HLA class II genes are significant in many autoimmune diseases. HLA-DMA is an MHC class II like molecule that catalyzes the removal of class II associated invariant chain peptides (CLIP) and the binding of antigens to MHC class II molecules. The purpose of this research is to investigate the possibility of polymorphisms in the regulatory portion of the HLA-DMA molecule. To conduct this investigation, DNA was isolated from ten volunteers. The HLA-DMA regulatory sequences were amplified by polymerase chain reaction. The amplified products are currently being examined using the TESS ScanScope Detection and Localization program. This procedure functions by incorporating a limited number of dUTP into the PCR product. The PCR product is then treated with Endonuclease IV and electrophoresis in a polyacrylamide gel. Shifts or changes in intensity of the banding pattern allowed identification of the location of polymorphic nucleotides. Polymorphisms detected may have significance for cell development, antigen presentation, and autoimmune disease.

**Board 33 The Effects of Varying Doses of Ethanol in a Learning Task. Jennifer C. Motter, Cathly L. Pederson, Wittenberg University, Biology Dept., PO Box 720, Springfield OH 45501.**

The dose-dependent effects of ethanol as a function of time was studied on rats completing an alley maze. Sprague-Dawley rats were implanted with a stainless steel cannula in the third ventricle. After one week of recovery, animals were restricted in their food intake and trained to complete an alley maze. Training sessions continued until the rats could complete 85% of the trials in 60 seconds. Data were collected in a series of three technologies. The procedure functions by incorporating a limited number of dUTP into the PCR product. The PCR product is then treated with Endonuclease IV and electrophoresis in a polyacrylamide gel. Shifts or changes in intensity of the banding pattern allowed identification of the location of polymorphic nucleotides. Polymorphisms detected may have significance for cell development, antigen presentation, and autoimmune disease.

**Board 34 Collection and Analysis of Selected Minerals Found in Sweat, Perspired by Wrestlers During Exercise. Todd E. Coleman III, (Dr. Susan), 209 Haney Hall, Miami University, 5357 Burnham Rd, Oxford OH 45056.**

Wrestlers lose several pounds of sweat per exercise session. Therefore, they will be used in this research. The hypothesis it that this research will conclude selected body areas perspire different amounts of minerals: By determining the amount of minerals perspired many doors of opportunity may be opened and create a new hope for individuals suffering from mineral deficiencies. By knowing the amounts of minerals lost through perspiration, it will be possible to alter diets of patients, athletes, accident victims, birthing mothers, and mineral deficient individuals. We have chosen to focus on the body's requirement for mineral deficiencies. Our studies suggest that in A. vinelandii DJ54 revertants, the NIFH is activated even in the presence of Molybdenum in the growth medium and the Nrf protein is carrying out the functions of the conventional Fe-protein in these cells.


The data used for this analysis were obtained from the University of Cincinnati First-Episode Psychosis Project. The study explores, using post-hoc methods, sexual, physical, and psychological abuse as reported by patients that experienced a psychotic break and had no previous psychiatric admission. The purpose of this study is to determine the frequency with which abuse occurred among participants to ascertain the possibility that abuse contributes to First-Episode Psychosis. It was hypothesized that patients in this population would report abuse in higher frequency as compared to the normal population. 2) 82 males and 75 females who had been diagnosed with schizophrenia (n=33), manic depression (n=122), psychotic disorder (n=4), or delusional disorder (n=1) were given the Traumatic events Screening Inventory (TESI). The TESI was used to determine reported abuse and was derived from the DSM-II-R. 3) Preliminary data analysis suggests that 73% of the patients having a diagnosis of schizophrenia along with 77% of the patients diagnosed with manic depression reported one or more abuses (sexual, physical, and psychological) on the TESI. Descriptive statistics will be done on populations whose n=4. The incidence of reported abuse among these patients is substantially higher than that reported in the general population. 4) The preliminary results found in this analysis are striking and suggest that psychiatric institutions need to explore patient histories more thoroughly.
Herbal Phen-fen is an herbal supplement that claims to be a safe method of weight-loss. The main ingredient in herbal phen-fen is ephedrine, an amphetamine-like substance, also known as Ma Huang extract. Recent studies show ephedrine may increase the risk of myocardial infarction (MI). The herbal phen-fen being used in this study is a combination of ephedrine and St. John's Wort (Hypericum extract). St. John's Wort in recent studies has been shown to inhibit monoamine oxidase which may potentiate the negative effects of ephedrine on the heart. We are administering herbal phen-fen to white mice and will analyze its effects on the cardiac function. Furthermore, we also decreased the level of plasma CPK(MB) and LDH. All three enzymes are shown to increase significantly after a myocardial infarction. Preliminary studies have shown a significant increase of cardiac enzymes in white mice after dosages of 1.5 mg/kg of amphetamine, suggesting significant damage to the heart. Amphetamine causes effects very similar to that of ephedrine including vasoconstriction, positive inotropic, and positive chronotropic effects on the heart. The effects of Herbal Phen-fen will be compared to see if the herbal combination increases the chance for a myocardial infarction as compared to administering alone St. John's Wort. Another Herbal Phen-fen combination replaces St. John's Wort with Ginseng. Ginseng in recent studies has been shown to act as an antioxidant and reduce damage to the heart after an MI. Weight loss will also be monitored in the mice to determine the value of the herbal supplement as a weight-loss agent, and measure the potential risks against the benefits.

**BOARD 37**

**EFFECT OF DIRECT PRIMING OF TRAIT LABELS ON CHILDREN'S PERCEPTIONS OF AMBIGUOUS BEHAVIOR. TERRI LEE KASMODI (DR. FRANK BERNIERI) UNIVERSITY OF TOLEDO, BANCROFT ST., UNIVERSITY HALL RM. 6524, TOLEDO OH 43606.**

Do labels bias children’s perceptions of other children? An experiment compared labeling biases in children aged 7-10 years. One hundred twenty-eight third and fourth grade children (67 boys and 61 girls) viewed a five minute audio-video tape of a 7-year-old girl interacting in a first grade classroom. After viewing the video segment, children were asked to rate the target child according to 4 school rules, then on desirability of target as a playmate. Preliminary analyses revealed a main effect for labeling on children’s reports of “desirability” as a playmate for the target child (F(2, 122)=5.472, p<0.01). Females were more likely than males to desire the target girl as a playmate when labeled as “smart” (M=750 for females and M=300 for males). The results demonstrate that girls in this age group respond more than boys to both negative and positive labels. Both boys and girls in the no label condition rated the desirability of the target child as a playmate similarly (M=316 for boys and M=333 for girls) which indicates that the own-sex favoritism phenomenon was not at work in this study.

**BOARD 38**

**EFFECTS OF HERBAL PHEN-FEN ON THE RISK OF MYOCARDIAL INFARCTION. KEVIN A. Koons, TRAVIS R. KAISER, (KATHRYN T. KNECHT), RAABE COLLEGE OF PHARMACY, OHIO NORTHERN UNIVERSITY, AURORA, OH 44519.**

Herbal Phen-fen is an herbal supplement that claims to be a safe method of weight-loss. The main ingredient in herbal phen-fen is ephedrine, an amphetamine-like substance, also known as Ma Huang extract. Recent studies show ephedrine may increase the risk of myocardial infarction (MI). The herbal phen-fen being used in this study is a combination of ephedrine and St. John’s Wort (Hypericum extract). St. John’s Wort in recent studies has been shown to inhibit monoamine oxidase which may potentiate the negative effects of ephedrine on the heart. We are administering herbal phen-fen to white mice and will analyze its effects on the cardiac function. Furthermore, we also decreased the level of plasma CPK(MB) and LDH. All three enzymes are shown to increase significantly after a myocardial infarction. Preliminary studies have shown a significant increase of cardiac enzymes in white mice after dosages of 1.5 mg/kg of amphetamine, suggesting significant damage to the heart. Amphetamine causes effects very similar to that of ephedrine including vasoconstriction, positive inotropic, and positive chronotropic effects on the heart. The effects of Herbal Phen-fen will be compared to see if the herbal combination increases the chance for a myocardial infarction as compared to administering alone St. John’s Wort. Another Herbal Phen-fen combination replaces St. John’s Wort with Ginseng. Ginseng in recent studies has been shown to act as an antioxidant and reduce damage to the heart after an MI. Weight loss will also be monitored in the mice to determine the value of the herbal supplement as a weight-loss agent, and measure the potential risks against the benefits.

**BOARD 39**

**DETERMINING PESTICIDE TOLERANCES FOR THE STRAWBERRY PLANT BUG (TPB), (P. de B.)and the meadow spittlebug (MSB), (Philaenus spumarius) (L). Pesticides utilized were the standard Thiodan (endosulfan), Aroclor 1254 or a mixture of polychlorinated biphenyl, Aroclor 1254 (3,3',4,4' tetrachlorobiphenyl, PCB77) on the same mouse.**

These studies with Thiodan, Aroclor 1254 and the mixture of PCB77 were taken and compared at 0, 15, 30 seconds, and 30 seconds after the maneuver was completed. The Q-G maneuver, it was discovered, was not as effective as the L-1 maneuver in raising systolic blood pressure, but the Q-G produced a lower pulse rate than the L-1. Inflating the Q-G suit initially raised systolic blood pressure at rest, but as the maneuvers progressed, the inflated Q-G suit produced a lower systolic blood pressure than when the maneuvers were performed without the Q-G inflated suit. The Q-G maneuver is not as effective as the L-1 in raising systolic blood pressure and pulse and may have a negative effect on oxygen saturation of blood. The Q-G suit does raise systolic blood pressure at rest but would appear to be less important than the anti-G maneuvers themselves in protecting pilots against the negative effects of +Gz acceleration.

**SESSION 26**

**Pre-College Poster Session**

1:00-2:15 PM

**SATURDAY, APRIL 4, 1998**

**JOHNSTON HALL COMMONS**

**BOARD 01 A COMPARISON OF TWO MANEUVERS PILOTS CAN USE TO TOLERATE G-FORCES. STEPHEN L. WILSON, 6500 ATTERBURY CT, DAYTON OH 45459 (WILLIAM C.M. WILSON, M.D., SUPERVISOR).**

Fighter pilots face circulatory problems when exposed to gravitational forces possibly leading to blackouts and loss of consciousness. To counteract this, the effectiveness of the L-1 and Q-G training maneuvers in altering systolic blood pressure, oxygen saturation and pulse rate were tested with and without an inflated anti-G suit to see which of the two maneuvers could better provide protection for pilots. After informed consent, four healthy 14 year old male subjects were taught the two maneuvers, and measurements of oxygen saturation, systolic blood pressure and pulse were taken. The maneuvers were performed for 30 seconds and readings were taken and compared at 0, 15, 30 seconds, and 30 seconds after the maneuver was completed. The Q-G maneuver, it was discovered, was not as effective as the L-1 maneuver in raising systolic blood pressure, but the Q-G produced a lower pulse rate than the L-1. Inflating the Q-G suit initially raised systolic blood pressure at rest, but as the maneuvers progressed, the inflated Q-G suit produced a lower systolic blood pressure than when the maneuvers were performed without the Q-G inflated suit. The Q-G maneuver is not as effective as the L-1 in raising systolic blood pressure and pulse and may have a negative effect on oxygen saturation of blood. The Q-G suit does raise systolic blood pressure at rest but would appear to be less important than the anti-G maneuvers themselves in protecting pilots against the negative effects of +Gz acceleration.
Mountains. The white flowers prove that the plants tested evolved on the Appalachian foothills. There were four test groups of five plants each. Group D received 30°C water, Group C 20°C water, Group B 15°C water, and Group A 5°C water. The test ran from Oct. 9 to Jan. 2. The plants were watered every four to five days. Every other watering, the height of branches over 10 cm. were counted, and the number of flowers were counted. The plants receiving the 30°C water grew the tallest. However, the plants getting the 5°C water grew more branches and flowers than any other group. The group receiving the 30°C did not grow any flowers. The hypothesis is that the 5°C water improved the growth of the snapdragons because it was closest to the temperature of the water that the snapdragons absorbed when they were growing on the foothills of the Appalachian Mountains during springtime. This, along with temperatures close to springtime in the Appalachians, caused the snapdragons to go into its springtime growth.

BOARD 05 ANALYSIS OF BROWNFIELD BUILDING CONTAMINATION IN THE CLEVELAND AREA. LAVANYA KONDAPALLI, 17396 OLDE SURFLE CT, STRONGSVILLE OH 44136.

Brownfields are defined by the Environmental Protection Agency as “abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.” Stays of this caliper plague a vast expanse of the Cleveland area, as well as other cities throughout the country. The focus of this research was to determine the effect that an industrial environment has had on the masonry used in structural walls and floors from various brownfield sites in Cleveland. The hypothesis was: Due to the porous nature of masonry, heavy metal contaminants settle into the structural materials of industrial sites over time. The portion of a masonry sample that was directly exposed to industrial activity will show the highest levels of contamination and successive sections of the samples show a steady decrease in contaminant levels. The research involved the analysis of each masonry sample section to show the pattern of contamination, crushed, and sieved. Extractions were performed in order to render metals that had been previously adsorbed by the samples. The extractions were filtered and extractions were analyzed for percent hydrogen and heavy metals: cadmium, chromium, copper, iron, lead, and zinc using an atomic absorption spectrophotometer instrument.

SARAH R. WYSE, BOARD 12 SUBLETHAL INJURY OF MICROORGANISMS.

The object of this research was to investigate the effects of unique fibers in conjunction with recycled newspaper to create a stronger more efficient sheet of paper. My hypothesis is that the five materials tested, (hemp, hesperiose, kenaf, milwheat, and alfalfa) the paper made of hemp and newspaper will have the strongest TAPPI Tear resistance and the strongest Wet Pick resistance. This was tested as follows: first pulped 25g. fiber and 25g. newspaper, the pulped materials were poured into a tub containing warm water, a hand mold was taken through the mixture and a sheet formed. The sheets were removed from the mold by pressing it with a sheet of cotton filter paper. The recycled paper and additive sheet was then dried in a convolvent oven until the sheet pulled from the cotton filter paper. The sheets were then cut in three sections, the middle section was tested on the Elemendorf Tappi Tear Tester, the edge sheets were compared and the number of the two were tested using the Wet Pick Test. The results of these tests for each of the five batches of paper were recorded then averaged and compared. The tests showed that the paper made of hemp and newspaper had the strongest TAPPI Tear average and the paper made of hesperiose and newspaper had the strongest Wet Pick average.

BOARD 07 DURING WHICH SEASON DO LOCAL CREEKS CONTRIBUTE THE MOST E. COIL TO THE OHIO RIVER? ANTHONY J. PARASON (MRS., JAYSHREE SHAH), 9741 SR 7, PROCTORVILLE OH 45669.

This project seeks to discover in which season our local creeks contribute the most Escherichia coli to the Ohio River. My previous study in April 1997 supported the premise that the Ohio River below the Symmes creek (Sample 7). From the Magellan GPS 2000 unit, the longitude and latitude coordinates are as follows: Sample 1 had the highest concentration of cadmium and Sample J of zinc. These sample were not seen. The object of this research was to investigate the effects of unique fibers in conjunction with recycled newspaper to create a stronger more efficient sheet of paper. My hypothesis is that the five materials tested, (hemp, hesperiose, kenaf, milwheat, and alfalfa) the paper made of hemp and newspaper will have the strongest TAPPI Tear resistance and the strongest Wet Pick resistance. This was tested as follows: first pulped 25g. fiber and 25g. newspaper, the pulped materials were poured into a tub containing warm water, a hand mold was taken through the mixture and a sheet formed. The sheets were removed from the mold by pressing it with a sheet of cotton filter paper. The recycled paper and additive sheet was then dried in a convolvent oven until the sheet pulled from the cotton filter paper. The sheets were then cut in three sections, the middle section was tested on the Elemendorf Tappi Tear Tester, the edge sheets were compared and the number of the two were tested using the Wet Pick Test. The results of these tests for each of the five batches of paper were recorded then averaged and compared. The tests showed that the paper made of hemp and newspaper had the strongest TAPPI Tear average and the paper made of hesperiose and newspaper had the strongest Wet Pick average.

BOARD 08 SHIELDING RADIATION. RYAN P. SULLIVAN, 148 WOODLAND WAY, CHILLICOTHE OH 45601.

Radiation in several forms and from several sources is all around us. This research was conducted to determine how effective common household materials could be in shielding radiation emissions. The hypothesis was common household materials could be used as an effective shield against low level radiation emissions. To determine if the material was an effective shield against radiation, it had to block at least 90% of the emission. Using a Geiger Counter to detect emission levels, several types of common household materials were tested. Each item was exposed to the radiation source. The highest reading recorded during that period was selected as the test result and was recorded on the log. Before each test, an unshielded reading was taken and used as a control. Fifteen different materials were tested, 5 that were 6.4mm thick, 5 that were 3.2mm thick, and 5 that were 1.0mm thick. The 6.4mm thick materials included ceramic tile, Formica, oak, foam rubber, and Syrofoam. The 3.2mm thick materials included an asbestos shingle, glass, cardboard, Plexiglas, and vinyl. The 1.0mm thick materials included aluminum, cloth, plastic, wax paper, and binder paper. Each material was tested at 0, 5, and 10 cm from the radiation source. Each material was also tested at double and triple the original thickness. The entire test was repeated one week after the original test in order to verify the original test results. A few materials shielded beyond the 90% threshold, which reinforced the hypothesis. Triple thick ceramic tile shielded 94% of the emission and was the most effective shielding material. Density of the material, rather than thickness, proved to have a larger impact on a materials ability to act as a shield. Layering the material also enhanced the materials ability to shield radiation.

BOARD 09 EQUINE DNA LIBRARY. GREG S. MAEDER, RACHMEL E. MARGO, (SIMON K. LAWRENCE, PH.D), 633 TIMBERLAKE DR, WESTERVILLE OH 43081.

The objective of this investigation is the creation of an equine DNA library. This library will enable students to explore specific sites within the equine genome and to contribute to the equine genome project. The results of the study to date include the purification of high molecular weight DNA from the white blood cells of fresh horse blood, the partial digestion of the DNA into restriction fragments, and the analysis of each of the DNA restriction fragments by gel electrophoresis. The plasmid vector pSK (Strategene) was cut with Bam HI and dephosphorylated with shrimp alkaline phosphatase. DNA bands of the partially Sau 3A-digested equine DNA was inserted into the Bam HI cut dephosphorylated pSK+ plasmid. The resulting recombinant plasmids were transformed into competent E. coli cells and grown on agar plates containing antibiotic. A color selection test with X-gal was employed to confirm the presence of the DNA inserts. The recombinant plasmids are currently being investigated further to identify the equine DNA sequences they contain.

BOARD 10 AGE-RELATED CHANGES IN BRAIN RESPIRATORY ENZYMES FOR NORMOTENSIVE AND HYPERTENSIVE RATS: A HISTOCHEMICAL STUDY. OSMONO C. WU, 3845 LYTHAM CT, UPPER ARLINGTON OH 43220.

The object of this investigation was to study cerebral mitochondrial respiratory enzymes in normotensive and hypertensive rats. The data were gathered from five brain regions. Preliminary results show similar developmental profiles in all structures for both strains in the two groups. Following an interval of increasing enzyme activity, a plateau is reached at approximately 30 days and maintained into adulthood. For succinate dehydrogenase (SDH), the developmental increase for the two strains can be superimposed. In contrast, for cytochrome oxidase (COX), while the profiles are similar, the WKY strain achieves a greater value. Reduced efficiency of ATP synthesis secondary to lower COX activity may contribute to increased stroke risk. Histochromic assays have been used to study Complex II (succinate dehydrogenase) and Complex IV (cytochrome oxidase) of the ETC. Data were gathered from five brain regions. Preliminary results show similar developmental profiles in all structures for both strains in the two groups. Following an interval of increasing enzyme activity, a plateau is reached at approximately 30 days and maintained into adulthood. For succinate dehydrogenase (SDH), the developmental increase for the two strains can be superimposed. In contrast, for cytochrome oxidase (COX), while the profiles are similar, the WKY strain achieves a greater value. Reduced efficiency of ATP synthesis secondary to lower COX activity may contribute to increased stroke risk. Statistical analysis shows that a significant augmentation of mitochondrial energy metabolism occurs during the postnatal period and is crucial to neuronal development and maturation. Alteration in the mitochondrial energy metabolism contribute to enhanced stroke risk. Histochromic assays have been used to study Complex II (succinate dehydrogenase) and Complex IV (cytochrome oxidase) of the ETC. Data were gathered from five brain regions. Preliminary results show similar developmental profiles in all structures for both strains in the two groups. Following an interval of increasing enzyme activity, a plateau is reached at approximately 30 days and maintained into adulthood. For succinate dehydrogenase (SDH), the developmental increase for the two strains can be superimposed. In contrast, for cytochrome oxidase (COX), while the profiles are similar, the WKY strain achieves a greater value. Reduced efficiency of ATP synthesis secondary to lower COX activity may contribute to increased stroke risk. Statistical analysis shows that a significant augmentation of mitochondrial energy metabolism occurs during the postnatal period and is crucial to neuronal development and maturation. Alteration in the mitochondrial energy metabolism contribute to enhanced stroke risk. Histochromic assays have been used to study Complex II (succinate dehydrogenase) and Complex IV (cytochrome oxidase) of the ETC. Data were gathered from five brain regions. Preliminary results show similar developmental profiles in all structures for both strains in the two groups. Following an interval of increasing enzyme activity, a plateau is reached at approximately 30 days and maintained into adulthood. For succinate dehydrogenase (SDH), the developmental increase for the two strains can be superimposed. In contrast, for cytochrome oxidase (COX), while the profiles are similar, the WKY strain achieves a greater value. Reduced efficiency of ATP synthesis secondary to lower COX activity may contribute to increased stroke risk. Statistical analysis shows that a significant augmentation of mitochondrial energy metabolism occurs during the postnatal period and is crucial to neuronal development and maturation. Alteration in the mitochondrial energy metabolism contribute to enhanced stroke risk.
heating or freezing, would be the most damaging to bacterial cells and which treatment would permit cells to repair after refrigerated storage. The two hypotheses were that the heat treatment would be the most damaging to the bacterial cells and that the freezing treatment would permit the cells to repair after refrigerated storage. Different concentrations of Escherichia coli were tested in milk and saline with a heat and freeze treatment. Colony forming units were counted for the results. The results of each hypothesis proved to be correct. The saline freeze group had 5,865 more CFUs than the saline heat group. The milk 2 freeze group had 12,245 more CFUs than milk 2 heat group. The milk 4 freeze group had 8,060 more CFUs than the milk 4 heat group. ANOVA results showed a significant difference, p < .05, between the heat and freeze treatments. Some additional trends were also noted. A milk 2 group took longer to heat to 60°C than a saline 2 group, and the lower the E. coli content of a milk group, the longer it took to reach 60°C.

BOARD 13 POSSIBLE USES FOR INDUSTRIAL WASTES AS ALTERNATIVE INSULATIONS. MATTHEW E. MONTER, 67610 AIRPORT RD., ST. CLARITY OH 43550.

The purpose of this research is to determine if there is a practical application of several industries, such as industrial waste, to alternative insulation. Selected were 60 counts (125 cubic meters of industrial waste) and a 150 cubic meter of industrial sludge. The purpose of this research was to determine if the industrial waste could be used as alternative insulation. The results showed that the industrial waste could be used as alternative insulation. The conclusion was that the industrial waste could be used as alternative insulation.

BOARD 14 WHAT ARE FACTORS THAT AFFECT COLIFORM GROWTH OF BIOFILM IN A MUNICIPAL WATER LINE? ERIN F. SCHULTZ, 1900 ATWOOD TERRACE, COSHOCTON OH 43812.

The objective of this project was to determine if the potential hazard of biofilm in dental unit water lines truly exists or is just a false fear to force untrained dentists to pay for unneeded equipment. Chlorine is a disinfectant. Then factors that may affect coliform growth of biofilm (such as diameter and type of tube, contamination of water source, the temperature of water being used, and the length of time in the tube) should not be significant. Eight different water sources were obtained: Evian (control) lake water, well, Brita, municipal, dental handpiece, dental cuspidor, and dental water syringe. These samples were tested with 4 different groups of biofilms: Amacron's World, Coshocton County Memorial Hospital Memorial (CMCM) test 1 (without refrigeration), Carolina Biological and CMCM test 2 with refrigeration. Results showed that bacteria grow in all waters including the control. Inclusion, chloride is an effective disinfectant that helps to eliminate some but not all harmful biofilm contaminates. Test demonstrated that variables of the sample were gathered, temperature, time, growth media, light, and the plate count was determined do effect the results.

BOARD 15 THE EFFECT OF LOW TEMPERATURES ON ARTHROPODS. CLEB R. SEMMONS, 704 E. COLUMBUS AVE., BELLEFONTAINE OH 43311.

A number of factors play important roles in an organism's ability to overwinter. These factors can include supercooling, entrainment into diapause, and the production of cryoprotectants. The ability to supercool is regarded as an important factor in the process of overwintering. The research was directed at looking at how temperatures affect respiration rate, by employing the use of micro-respirometers, in order to adjust the control and a fly ash. To determine the efficiency of each, double-walled testing chambers were built. Each chamber consists of a six-inch cube in which is suspended a four-inch cube equally spaced from the walls of the larger cube. In the four-inch cube a light bulb acts as a heat source. The cavity formed between the walls of the cubes is filled with the material to be tested. As the heat source warms the inner cube to a thermostatically controlled 37°C (98.6°F) the heat energy flows toward the outer wall of the chamber. The insulating materials restrict this movement. The less restrictive the material, the more the heat source is, maintaining the set temperature, and using energy, which is measured in Watt-Seconds. The efficiency of each material is then calculated by comparing the energy used by the control chamber over a set amount of time to the energy consumed by the individual testing chamber in the same amount of time. After several test sequences, the fly ash has shown to be the most efficient of the materials tested.

BOARD 16 THE TRUE COMPLEXITY OF THE COCKROACH IMMUNE RESPONSE. RYAN A. GINES, PO BOX 300, WEST UNITY OH 43570.

The purpose of this experiment was to determine if an intracutaneous immune system in cockroaches could explain the constant reports of falling insects in today's environment. Three hundred American cockroaches were divided into experimental groups that were injected with inactivated honey bee venom in a Tris Buffered Saline solution, and controls that were injected only with the Tris solution. Two immunizations were administered, and then a final challenge of activated venom was administered to all groups to find if the experimental groups showed any immune responses to the venom. The hypothesis in the project was that the rate of survival would be dramatically higher in the species of brown planaria used in the study. The results showed that the rate of survival was dramatically higher in the species of brown planaria used in the study. The conclusion was that the species of brown planaria used in the study was the most resistant to the venom.

BOARD 17 THE EFFECT OF NUTRITION ON GROWTH RATE. LAURA M. MANN, 704 E. CHURCH ST., WEST UNITY OH 43570.

The purpose of this project was to investigate nutrition and its effect on health. The hypothesis for the project was that the group of mice that were fed a diet of only vegetables and protein would have a higher growth rate than the mice whose diet consisted of either store bought mice food (control), meat, vegetables, or meat and vegetables both. The reason for this hypothesis is that the animal species are believed to be healthier than diets with meat in them. The experiment included two procedures. The first of these was the procedure for feeding the mice. On a daily basis, each group of mice were fed 35 grams of their specific diet. The second procedure was for weighing the mice. First, the experimenters took the mice out of the cage and put them into a paper sack and got them into the scale. Next, the weighing was taken. This was done three times for accuracy. This was repeated for the other groups of mice every week for a total of five weighings. The initial weighing occurred when the twenty-four mice were three weeks old. In doing this experiment the hypothesis was proven correct. The meat group gained 32 grams. The meat and vegetable group gained 41 grams. The control group gained 51 grams. The vegetable group gained 54.5 grams. The vegetable group did gain the most weight.

BOARD 18 COMPARISON OF SPECIES IN REGENERATED PLANARIA'S MEMORY. KIM M. SATTS, 22906 CR M, WEST UNITY OH 43570.

This experiment on memory retention in regenerated planarians used brown planaria and their regenerated parts, the head and the tail. The hypothesis was that the species of brown regeneration planaria would require the same amount of time to learn from the trained parent planaria as black regeneration planaria took from learning the trained black planaria. During the weeks of experimentation the planarians were separated into a left and right group. Each planarian was trained to go in the direction opposite the bias. The planarians were considered to be trained when they went 90% of the time in the correct direction. Next the planaria were cut just below the feeding tube. Once heads and tails were fully regenerated they were trained to go in the same direction as the parent. The hypothesis was proven correct. The average for original planaria being trained to go right was 67 initial trials and the average going left was 54 initial trials. These trials were averaged and the average trials going to the right was 65 initial trials and 20 initial trials for the head and 27 initial trials for the tails. During ANOVA it was statistically proven that there was a significant difference in training trials (p < .01). The comparison of these results to the black planaria showed no significant difference between the two species of planaria in their memory retention ratios.

BOARD 19 THE REGENERATION OF LUMBRICUS VARIEGATUS. ALYSON D. BRADLEY, 3421 TPW. RD. 165, WEST LIBERTY OH 43357.

Lumbricus variegatus has become a model for regeneration. This segmented aquatic worm live throughout the world in wet, marsh habitats where they reproduce both sexually and asexually. In previous research it was found that after the loss of the anterior end an eight head segment regeneration. The purpose of this study is to test and identify the proteins involved in the regeneration of the eight head segments. After running an electrophoresis polyacrylamide denaturing gradient gel, differences in banding during the regeneration and non regeneration heads were found. These differences were then run again with a higher percentage of polyacrylamide to differentiate the banding with more clarity. In the regenerating sample one band was prevalent that was absent in the non-regenerating sample. Additionally, one band was absent in the regenerating sample that appeared in the non-regenerating sample. These differences can then be used to do future research. mRNA isolated from regenerating and non regenerating heads will be used to build a cDNA library. The cDNA library can be searched to identify the proteins of interest. This work should lead to a better understanding of gene regulation during regeneration.

BOARD 20 TRAINING ORIENTAL CHICKENS. MEGAN A. CARPENTER, 60941 WARNER DR., BARNSVILLE, OH 43713-9662.

The purpose of this research project was to determine which breed of chicken would learn tricks the fastest. Three chickens (two roosters and one hen) were tested for each breed: Crested Polish, White Faced Black Spanish, Black-Tailed White Japanese, Chinese Silkie, Belguin D'Ararios, Gaman Silver Spangled Hamburgs, and Asian Cochin. The chickens were full-grown and untamed when purchased. They were from similar backgrounds (previously used for showing purposes; well cared for, but never had extensive personal contact with any human). The learning abilities of males and females of the same breed and of different breeds were also observed. Another question was what type of music would be the favorite of the flock and if music can stimulate egg production. The chickens were tested by being taught to sit and ride quietly in a toy school bus, to tap the piano, and to take a treat. They were released with treats and food at the end of each day, regardless of their performance. Their tolerance was tested by dressing them in special outfits and using them as part of an illustrated talk in order to educate people about poultry. They were also part of a pet therapy program for the elderly. The conclusion was that after one hundred nineteen days, hens were tamer than roosters; however, the Polish rooster was the smartest.

BOARD 21 THE EFFECT OF HARD BISCUITS ON CANINE SUPRAGINGIVAL PLAQUE. MELISSA O'BRIEN, 520 GEMINI DR., MARION OH 43302.

The purpose of this experiment is to determine the effect of hard biscuits on canine supragingival plaque. The mechanical action of hard biscuits should reduce the amount of bacteria found on the surface of the tooth. Using sterile pet dishes set with nutrient agar, saliva samples taken from the right upper fourth premolar and the lower left fourth premolar from each of five dogs of different breeds were used to contaminate. Each dog was then fed one Millionth dog biscuit and the sample process was repeated. The method was continued for seven
consecutive days. After three days, using a grid with a microscope for consistent location, the number of bacteria was counted and recorded for each sample. Overall, the range of the bacteria was very slightly but erratically in rest samples. In conclusion, it was found that the mechanical abrasion by the hard brush upon the surface supragingival plaque on the canine teeth caused significantly less bacteria growth.

SESSION 27
Poster Session
2:45 - 4:45 PM
Saturday, April 4, 1998
Johnston Hall Commons

BOARD 01 WHITE WHEAT: A NEW CROP FOR OHIO FARMERS, STEVEN C. PROCHASKA, OHIO STATE UNIVERSITY EXTENSION, 117 E. MANSHIELD ST., BECYNUS OH 44820.

To address the issue of farm profitability, crop biodiversity, and environmental protection, white wheat production (a new crop for Ohio farmers) was studied. The northwest region of Ohio is noted for its production of high-quality soft red winter wheat. Red wheat grown for grain only is not as profitable as alternative crops (corn and soybeans) and thus acreage shifts to other crops are likely. Further, a significant wheat milling industry is located in northeast Ohio. The milling industry presently uses significant quantities of white wheat (from Michigan, Ontario or New York) in the production of various flours and cake mixes. If white wheat could be grown at high production levels in Ohio, then both the producer and miller would benefit economically. A descriptive study was conducted to measure agronomic traits of yield and winter hardiness of white wheat in northwest Ohio. Two year white wheat yields over three varieties (66.2 bushels/acre) were not significantly different from red wheat varieties (56.4 bushels/acre). Winter hardiness of white wheat was equal to red wheat.

BOARD 02 THE BIOLOGICALLY ACTIVE COMPOUNDS OF DAUCUS CAROTA L. SARA J.R. HANSEN, EC DRAWER #537, RICHMOND IN 47374-4056.

Medicinal plants are medicines found in areas that are competition for food and water is common among plants. Medicinal plants are almost always higher plants. Higher plants which are those which contain function which aid in competition and are not necessary for the plant's basic survival. Alkaloids and poisons are very useful in modern medicine because often these chemicals that overload our system in large amounts can sedate or aid in healing when administered in small amounts. The World Health Organization estimates that only 1% of the plants on this planet have been exhaustively investigated for their biologically active compounds. A biologically active compound will either aid or hinder the function of our bodies. Daucus carota L. has been used medicinally for hundreds of years by Native Americans to reduce fevers, as an expectorant and for other uses. Partitioning, Bioassays and Thin Layer Chromatography it may be possible to isolate the biologically active compounds of Daucus carota L. and identify them.

BOARD 03 GROUND BEETLE BIODIVERSITY IN SOUTHERN OHIO's MIXED-OAK FOREST, R.C. STANTON, F.F. PERRINGTON AND D.J. HORN, OHIO STATE UNIVERSITY, DEPT. OF ENTOMOLOGY, 103 BOTANY AND ZOOLOGY BLDG., 1735 NEIL AVE., COLUMBUS OH 43210.

The oak-hickory forests of southern Ohio are currently succeeding to more mesic forest types. Because the reduction of oak as a major component of Ohio's forests will likely lead to a decrease in shoot apical organization over a one-year period. Results from these two studies were used to prepare a multi-media presentation which allowed students to make observations and generate hypoth-

BOARD 04 ANGIOSPERM SEASONAL STUDIES USED TO ENHANCE CRITICAL THINKING SKILLS, JOHN L. FROLA AND DAVID J. STRoup, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON, AKRON OH 44325-3900.

A seasonal study of two plant species (Podophyllum peltatum and Arisaema triphyllum) was carried out. Observations of the shoot apices are described based on an analysis of the theories on shoot apical organization. Measurements and descriptions of apical dome height and width of the species were obtained to serve as a basis for classroom discussions concerning the changes in apical organization over a one-year period. Results from these two studies were used to prepare a multi-media presentation which allowed students to make observations and generate hypoth-

BOARD 05 EFFECTS OF SEWAGE SLUDGE ON PLANT AND SOIL HEAVY METAL CONTENT, DENNIS J. HAMREY, EMILY MAGEN, EDDY COBBINS AND ALFRED J. HUERTA, MIAMI UNIVERSITY, BOTANY DEPT., PEARLSON HALL, OXFORD OH 45056.

Concentrations of Cd, Zn, Mn and Pb in the tissues of several plant species (Barbara vulgaris, Galium asperrum, Solidago gramiroida, and Poa spp.), and, in the top 15 cm of soil samples from either sludge treated (1977-1988) or control plots at the Ecology Research Center at Miami University. Our goal was to determine whether heavy metal concentrations in the plant and soil samples from sludge treated plots was higher than in those from untreated plots, even though those plots had not received sludge treatment since 1987. We found that of the four species tested, the studied higher heavy metals concentrations in the sludge treated plots for al-

BOARD 06 INVESTIGATIONS OF INVASIONS OF NON-NATIVE PLANT SPECIES IN LOCAL WOODLOTS, KARL M. SHOCKEY AND MICHAEL A. VINCENT, DEPT. OF BOTANY, MIAMI UNIVERSITY, OXFORD OH 45056.

Introduced plant species have been widely used as ornamentals in North America since the advent of European settlement. Sometimes these ornamental species have escaped from cultivation and become invasive. In the cases of Amur honeysuckle (Lonicera maackii), privet (Ligustrum vulgare), and Norway maple (Acer platanoides), and others, invasion into disturbed or natural habitats has resulted in significant change to the species composition of the invaded area. In southwestern Ohio, hundreds of European and Asian plant species are cultivated as ornamentals. Many of these, especially the woody species, may have fruits or seeds which may easily be dispersed by wind or water. Some of these species have begun to spread from cultivation. In this study, we examined 5 disturbed woodlots in the Oxford area, and conducted a survey of the extent to which non-native species have invaded. Woodlots were surveyed for all woody species, and the extent to which this invasion has occurred was assessed. In the woodlots studied, a total of 90 woody plant species were found, 32 of which were aliens. Percentages of aliens ranged from 13% to 42% in the study sites. Aliens most commonly found were Amur and Morrow's honeysuckle. White mulberry, European buckthorn, Oriental bittersweet, and Multiflora rose. Several previously unreported escapes were found for the state of Ohio, including species of Magnolia, Malus, Pyrus, and Viburnum.

BOARD 07 LIMINATION AND THE FORMATION AND DISTRIBUTION OF WOOD RAYS IN PLATANUS OCCIDENTALIS, L. MATTHEW DULLEY AND ROGER D. MUSCHENMIEER, DEPT. OF BOTANY, MIAMI UNIV., OXFORD OH 45056.

As some of the most popular species of trees in North America, planting of P. occidentalis L. in the northern USA has resulted in significant change to the species composition of the invaded area. In southwestern Ohio, hundreds of European and Asian plant species are cultivated as ornamentals. The root systems of these species have been found to spread from cultivation. In this study, we examined 5 disturbed woodlots in the Oxford area, and conducted a survey of the extent to which non-native species have invaded. Woodlots were surveyed for all woody species, and the extent to which this invasion has occurred was assessed. In the woodlots studied, a total of 90 woody plant species were found, 32 of which were aliens. Percentages of aliens ranged from 13% to 42% in the study sites. Aliens most commonly found were Amur and Morrow's honeysuckle. White mulberry, European buckthorn, Oriental bittersweet, and Multiflora rose. Several previously unreported escapes were found for the state of Ohio, including species of Magnolia, Malus, Pyrus, and Viburnum.

BOARD 08 NEURITE GROWTH INHIBITED BY TAXOL IN PC-12 CELLS STIMULATED BY NERVE GROWTH FACTOR. JULIE A. DAVIS, HEATHER N. SMITH AND KARL J. ROMSTEDT, BIOL. DEPT., CAPITAL UNIVERSITY, 2199 E. MAIN ST., COLUMBUS OH 43209.

PC-12 cells are immortalized line of rat chromaffin cells which exhibit enhanced neurite growth when treated with nerve growth factor (NGF) in vitro. Since axons are rich in cytoskeletal microtubules, this study investigated the effects of a microtubule-stabilizing drug, taxol, on neurite growth. Taxol, a widely used anticancer drug, binds tightly to microtubules, stabilizes them and prevents their disassembly. Since axons are rich in cytoskeletal microtubules, this study investigated the effect of a microtubule-stabilizing drug, taxol, on neurite growth. Taxol, a widely used anticancer drug, binds tightly to microtubules, stabilizes them and prevents their disassembly. Since axons are rich in cytoskeletal microtubules, this study investigated the effect of a microtubule-stabilizing drug, taxol, on neurite growth. Taxol, a widely used anticancer drug, binds tightly to microtubules, stabilizes them and prevents their disassembly. Since axons are rich in cytoskeletal microtubules, this study investigated the effect of a microtubule-stabilizing drug, taxol, on neurite growth. Taxol, a widely used anticancer drug, binds tightly to microtubules, stabilizes them and prevents their disassembly.
untreated controls (t-test, p < 0.003). In the presence of 1 mM taxol, NGF-stimulated neurite outgrowth was inhibited by 95% (p = 0.013). The data supports the hypothesis that microtubule function is required for axonal growth.

**BOARD 09 CELLULAR PROLIFERATION INHIBITED IN CULTURED ADRENAL CHROMAFFIN CELLS BY LOW DOSE VINBLASTINE AND NERVE GROWTH FACTOR.** HEATHER N. SMITH and KARI J. ROMSTEAD, BIOLOGY DEPT., CAPITAL UNIVERSITY, 2199 E. MAIN ST., COLUMBUS, OH 43209.

PC-12 cells are derived from a pheochromocytoma of rat adrenal chromaffin cells. They have been shown to differentiate in culture by exhibiting axonal and dendritic growth. This differentiation is stimulated by nerve growth factor (NGF, 50 ng/ml). Our previous work indicated that NGF-stimulated neurite growth can be inhibited by low doses of the anti-microtubule drug, vinblastine sulfate (IC50 = 4.4 x 10-8 M). To examine if this concentration is sufficient for interaction with microtubules, the effect of vinblastine on PC-12 cell mitosis was quantified following 4 days of incubation. The IC50 for inhibition of PC-12 mitosis was 7.9 x 10-9 M. NGF stimulation of neuronal maturation also inhibited mitosis by 41%. The IC50 of vinblastine for inhibition of NGF-treated cell mitosis was 5.4 x 10-9 M which is a close match for the effect on neurite growth. Since the anti-mitotic mechanism of vinblastine involves inhibition of microtubule function, this suggests an additional role for microtubules in neurite development. To further examine the termination of mitotic division we examined vinblastine in PC-12 culture. Mitotic division was shown to be depressed without cytotoxic effects at a concentration of 3 x 10-9 M. The cells were allowed to incubate in the presence of the drug for varying times (0 to 5 days). The treated cells showed little or no division in number over this time period. When compared to untreated control, 4 days after treatment the cells showed a maximum inhibition of 17.4% of cell number. These data suggest that mitotic division can be terminated without eliciting cytotoxic effects. These cells are known to exhibit functions similar to post ganglionic sympathetic ganglia, releasing epinephrine and norepinephrine.

**BOARD 10 AN EVALUATION OF ARABIDOPSIS THALIANA ROOT MERISTEMS AND MITOTIC ACTIVITY IN BOTH WILD-TYPE AND A SLOW GROWING MUTANT (PMM1).** JOY E. ALBRECHT, W. JOHN Z. KOS, AND DR. CHRISTOPHER A. MAKAROFF, MIAMI UNIVERSITY, DEPT. OF BOTANY, OXFORD, OH 45056.

Arabidopsis thaliana roots provide an ideal system to study mitosis and cytokinesis. The root itself is small and the cells are nearly transparent. Mitotic activity in the root tip region provides numerous nuclei in various stages of mitosis and cytokinesis. A mutant (PMM1) has been identified in Arabidopsis thaliana with slower than usual growth. Mutant plants take about 10 weeks longer to mature than wild type plants. Mitosis and cytokinesis will be compared between the mutant and wild type using immunofluorescence and propidium iodide. The propidium iodide will stain chromosomes to fluoresce red. Microtubule arrays and chromosomes will be photographed at all stages of mitosis and cell division. Differences between mutant and wild-type plants will be documented and described. How detected differences in mitotic activity and cell division relate to stages of mitosis and cell division are known to exhibit functions similar to post ganglionic sympathetic ganglia, releasing epinephrine when stimulated. It is known that nerve cells cease mitotic division as they differentiate.

**BOARD 11 SUBSURFACE VIEWING OF TEKTITES-A NON-DESTRUCTIVE TECHNIQUE.** CLYDE S. BARNHART, 13367 ANGELL RD., ATHENS, OH 45701-9617.

To study internal features of black-appearing tektites, cutting and polishing thin sections is useful but time-consuming, destroys much material, and often obscures the orientation of the object to the tektite surface. My non-destructive technique allows viewing up to several mm beneath a tektite's surface area using surface acoustic waves and interference and most of the surface image is scattered. A dissecting microscope with zoom to 65x is used. The tektite and fiber optic light guides are immersed in a dish of water and the room darkened. The tektite is held in place by alligator clips on adjustable arms. Boiled water minimizes bubble formation and detergent enhances wetting. Streaks and swirls are seen. All could be clues to the thermal history of tektite formation.

**BOARD 12 THE EFFECTS OF DEER OVERPOPULATION ON FOREST UNDERSTORY PLANTS IN DAYTON, OH.** JAMES W. VOGEL, OHIO STATE UNIVERSITY, DAYTON, OH 45469-2320.

Many parks with forest areas are facing overpopulation of deer communities as urban sprawl encroaches upon them. The overpopulation of deer is thought to be a large contributor to the loss of herbaceous plants in forest understory. Cox Arboretum and Taylorsville Reserve, both part of the University of Dayton Biological Reserve, are located in the Dayton area. The plots were marked with wooden stakes and will be divided into four quadrants for percent cover, herbaceous and non-herbaceous plant species richness, and woody structure. The plots were sampled for nutrient analysis from five selected sites of the lake. I targeted my sampling before and after major holidays. I also sampled phytoplankton and zooplankton to determine the structure of the food chain in the lake. Lake usage information was obtained from the State Park. My results indicated that Findley Lake in the summer of 1987 can differ from a relatively clear lake (Secchi = 5 m) to a turbid lake (Secchi = 0.5 m). Dissolved phosphorus concentration in the lake decreased after Memorial Day and changed very little during the summer.


In streams, many aquatic organisms release from substrates and drift to new downstream habitats, while terrestrial organisms are swept into the drift. Most studies ignore terrestrial drift and there are no drift studies on Hawaiian streams. The objectives of this study were to compare aquatic and terrestrial drift components of two Hawaiian streams. Terrestrial drift density (N/m²) can be >50% of total stream drift ranging from 6.5-70,000 (mean = 370% over 12mo). Over three months, the terrestrial component of a larger and smaller stream ranged from 13.6-59.8% (X = 23.5%) and 20-87.5% (X = 51.1%), respectively; suggesting that smaller streams have a higher relative terrestrial input. This probably reflects channel morphology and gradient of two streams of different drainage basin size. Furthermore, based on basin size and discharge, larger streams have higher total drift density stream flow. The results of this study have implications for estimating food quality and quantity available to Hawaiian fish populations.

**BOARD 14 THE EFFECT OF HUMAN USAGE ON FINDLEY STATE PARK LAKE’S WATER QUALITY.** ROGER NKFOROLOW, MOUNT UNION COLLEGE BOX 1176, 1972 CLARK AVE., ALLIANCE, OHIO 44601.

Findley State Park Lake is located in a forested area surrounded by agricultural fields in Northern Ohio. The lake is relatively unique in the Spring for camping, swimming, fishing, boating, and picnicking. This study, therefore, can provide an excellent period of turbidity appearance and algal bloom during the summer. In this study I examined the relationship between human usage and water quality of the lake. Through the summer of 1997, I collected water samples for nutrient analysis from five selected sites of the lake. I targeted my sampling before and after major holidays. I also sampled phytoplankton and zooplankton to determine the structure of the food chain in the lake. Lake usage information was obtained from the State Park. My results indicated that Findley Lake in the summer of 1987 can differ from a relatively clear lake (Secchi = 5 m) to a turbid lake (Secchi = 0.5 m). Dissolved phosphorus concentration in the lake decreased after Memorial Day and changed very little during the summer.

**BOARD 15 FOREST PRODUCTIVITY IN THREE PRIOR AGRICULTURAL LAND-USE LEGACIES IN A NEW ENGLAND TEMPERATE FOREST.** HEATHER L. FRANKLAND, MOUNT UNION COLLEGE BOX #950, ALLIANCE, OHIO 44601.

The effects of past land use on productivity of forests. Research was conducted at the Harvard Forest in Massachusetts, to estimate productivity among 6 previously plowed, pastured, and woodland sites and to test the hypothesis that rates of annual above ground biomass and annual litter fall in recovering forests would decline in the order of logged-plasterxed-plowed. Twenty five trees, of various diameters and species, were cored in each of the six stands. Two cores from each tree were analyzed and radial growth was calculated for the most recent 5 and 10 year intervals. Biomass increments were determined for the same time spans using published equations. Productivity was calculated for diameter classes within species and sem-log relationships of productivity per diameter were estimated. The productivity of the trees in the stand which were not cored. Site specific equations and species specific equations were used. Red oaks and red maples were the major contributors of biomass and litter fall in all six of the stands, accounting for about 70% of the total aboveground biomass. Although woods had a higher total biomass, there was not a significant difference in aboveground biomass or litterfall across the six sites. The range of productivity was from 7324 - 9014 KftgA. These results indicate that the range in the amount of growing stock in the three sites. Production per unit biomass was greatest in the plowed stand and least in the woodlots.

**BOARD 16 SEEDLING AND HERBACEOUS PATTERNS IN RELATIONSHIP TO SOIL CONDITIONS.** JESSICA L. GRAHAM, 58 W. OXFORD ST., ALLIANCE OHIO 44601.

An investigation was conducted on seedling and herbaceous patterns in using a multi-variate approach to soil conditions in three prior agricultural land uses sites. It was hoped that knowledge of plant preferences in their habitat would be improved. The was compared between themselves and the land uses. The sites were examined for correlation between the prominent vegetation populations and the chosen soil conditions. It was found that species was significantly more common in areas with relatively less nitrogen. The woodlot sites were found to have statistically greater forest floor depths, at 72 mm. The forest floor depth in the plowed sites was lower than in the other land uses at 41 mm, while pastured was 57 mm. The plowed sites had average amounts of available nitrogen at 48.87 mg N/g soil available to them, while the other sites had significantly lower amounts, pastured had 2.13 mg N/g soil and woodlots had 30.89 mg N/g soil. The plowed sites had less soil moisture, 2.59 g H2O/g soil, while the pastured site had 3.15 g H2O/g soil and the woodlot site had 3.34 g H2O/g soil. The pastured sites were statistically lower in all categories than the woodlot sites.

**BOARD 17 EFFECT OF NUTRIENT CONCENTRATION ON ALGAL BLOOM AT LAKE MOHAWK.** MARK W. MILLER, 895 S. HANES AVE., APT. #2, ALLIANCE OHIO 44601.

Lake Mohawk is a man-made lake located in Mahoning, Ohio. During the past few years the lake has experienced a blue-green algae problem which has worsened tremendously in 1995 and 1996. In this study I examined nutrient concentrations to see if they had an influence on the algal bloom. In 1997, I collected water samples from several sites of the lake biweekly from May to September to determine phosphorus and nitrogen concentrations. I also measured dissolved oxygen, pH, and conductivity at each site. The summer dynamics of the nutrient concentrations was studied in relation to the algal bloom.
of the Palisade parenchyma thickness and fertility leaves significantly increased due to elevated CO
2 was investigated. Mature upper (high light) and lower canopy (low light) leaves were embedded in both fertility treatments. Abaxial epidermis, palisade parenchyma, and spongy mesophyll thickness. Whole leaf thickness of high and low light leaves was significantly different. High light leaves had significantly greater thickness than low light leaves. Abaxial epidermis, palisade parenchyma, and spongy mesophyll thickness. Whole leaf thickness of high and low light leaves was significantly different. High light leaves had significantly greater thickness than low light leaves.

Transportation of Sand Run upstream and downstream of the ford proved inconclusive, however, faunal analysis indicated a 44% decrease in species abundance and a 61% decrease in PTI downstream of the ford. One tributary contributed to elevated nitrate and total phosphorus levels, and a second tributary significantly increased phosphates. Water chemistry downstream of Mingo Pavillion bridge showed an increase in iron and slightly elevated levels of chlorine. The PTI decreased 67%, and the number of species present decreased 80% downstream from the bridge. Our data analysis suggests the ford, tributaries, and bridge have a significant impact on Sand Run Creek water quality and macroinvertebrate populations.

We are evaluating the ability of white-tailed deer to acquire pathogen and develop antibodies to the sporozoan, Toxoplasma gondii. This pathogen is cosmopolitan, negatively affecting fetuses and immunocompromised individuals. Information concerning the ability of this parasite to be harbored in deer flesh should illuminate potential health risks associated with the consumption of wild meats and the aid in our understanding of herbivore associated infection. We hypothesize that a significant percentage of hunter-killed deer in central Ohio have or had this pathogen and that a potential risk of human infection exists. Such samples are being obtained from hunter-killed deer during the 1997-98 hunting season. An indirect hemagglutination assay is being performed to ascertain antibody levels. Studies completed in other states have established the ability of this parasite to infect a variety of herbivores including the white-tailed deer.

This study examines the effect of prior land use on soil N mineralization and nitrification at sites used until the 1830’s for agriculture. Net mineralization was measured using a buried bag technique with one month (June-July) in field incubation. Paired fields had been plowed, pastured, or left as woodland. Samples were extracted and then analyzed using a Lachat Auto-analyzer. Our results indicate soil continues to demonstrate the impact of historical land use. In mineral soil, we found the highest rates of net mineralization in woodlots, and a close correlation between the amount of organic matter and net mineralization. Net mineralization showed no pattern in the forest. Mineralization rates were between 17.6 and 42.5 kg N/ha/month, where as nitrification rates fell between 0.029 to 0.385 kgN/ha/month. The correlation between organic matter and net mineralization had an r² of 0.1649. The same comparison with net nitrification had an r² of 0.3639. This data leads us to believe that the forest floor has recovered from the 19th century land use. In mineral soil, a distinct pattern in line with disturbance history forms. When net mineralization and net nitrification was compared to the disturbance history, a linear relationship was found between the values of 0.8071 and 0.7424. This correlation indicates that the time organic carbon took to filter down to mineral soil has allowed effects of the disturbance to linger.

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arg182 was replaced with glutamic acid or alanine. The mutated receptors were expressed in
AT2 receptor does not seem to couple to any G-proteins. The amino acid residue Arg167 located
shown that for peptidic ligands to bind this receptor they must interact via their carboxylate
decreasing the affinity of this receptor to CGP42112A considerably. This indicates that arg182 of
CGP42112A (AT2 receptor specific) and the non-peptidic ligand PD123319 (AT2 receptor
Xenopus affinity to the ligands of AT2 receptor, we have generated AT2 receptor mutants in which the
I-CGP42112A (AT2 receptor specific) and the non-peptidic ligand PD123319 (AT2 receptor
type), [Sar8 lle18]Ang II (non-specific for AT2 receptor type), [Sar8 lle18]Ang II receptor subtype AT1 and AT2 share only 34% homology at
acid level. These two receptors are different from each other in their ligand selectivity, sensitivity to non-hydrolyzable GTP analogues and in their biological functions. While the AT1 receptor is known to be coupled to Gq protein that mediates activation of phospholipase C, the AT2 receptor does not seem to couple to any G-proteins. The amino acid residue arg167 located in the second extracellular loop of rat AT1 receptor type AT1 is conserved in all in vivo AT1 receptor subtypes, other organisms and various isoforms of the same receptor. These results suggest that the His273 residue of AT1 receptor is conserved in the sixth transmembrane domain of rat AT1 receptor at position 273. To analyze the role His273 in ligand binding, expressed in oocytes and Xenopus oocytes. Binding assays were performed in the presence of a variety of ligands, including synthetic agonists and antagonists. The results confirmed that the His273 residue is critical for high-affinity binding of both peptidic and non-peptidic ligands by the AT1 receptor. This conserved arg167 of the AT2 receptor may play a role similar to the Arg167 of the AT1 receptor in determining the receptor's binding affinity to its specific ligands.  

**Board 29 Studies on the Role of His273 in the Agonist Binding and Activation of Rat Angiotensin Ii Receptor Subtype At2**

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Previous studies have shown that binding of Ang II to the rat Angiotensin II (II) receptor subtype AT1 results in Phospholipase C (PLC) activation mediated by the Gq protein. The His273 residues located in the 5th transmembrane domain of rat AT1 receptor is essential for its interaction with Ang II and agonist activation of this receptor. Unlike the AT1 receptor, the Ang II receptor subtype AT2 does not seem to couple with Gq protein or activate PLC in any of the cell types studied to date. However, the His273 residue of rat AT2 receptor at position 273. To analyze the role His273 in ligand binding and agonist activation of rat AT2 receptor we have replaced this residue with glutamine and arginine. Previously, we have generated a chimeric receptor in which the 3rd intracellular loop (ICL) of rat AT2 receptor was replaced with the 3rd ICL of rat AT1 receptor. Although this chimeric receptor has reduced affinity to Ang II, it has demonstrated ability to couple with Gq protein and activate PLC. To elucidate further the role of His273 in agonist activation of rat AT2 receptor, we have also generated mutants of chimeric receptor in which His273 is conserved in both the wild and arginine. The effects of those mutations on the wild type and chimeric AT2 receptors were studied by expressing these receptors in Xenopus oocytes. Ligand-binding experiments using the AT2 receptor specific ligands CGP42112A and PD123319 suggested that the His273Arg mutant of the chimeric receptor retained the affinity to the CGP42112A, however, this binding could not be blocked with PD123319.

**Board 30 Integrin Beta-4 Transcriptional Regulatory Elements.**

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The purpose of this study is to explore the sequences which encode the regulatory elements of integrin-beta-4. Five cosmid clones containing human integrin-beta-4 have been isolated with a full length integrin-beta-4 cDNA. Amplification of DNA isolated from these cosmids with primers corresponding to the 5′ end of integrin-beta-4 shows that there is a sequence within the 50-kb cosmids sequence that is specific for integrin-beta-4. Primers flanking the promoter will be synthesized and a panel of human DNAs will be examined for polymorphisms. Polymorphisms in the regulatory elements may affect the expression of integrin-beta-4. Variations in expression may be responsible for certain diseases. For example, integrin-beta-4 is inappropriately expressed in psoriatic keratinocytes. The next phase of this study will be to explore whether mutations and/or polymorphisms in the transcriptional regulatory elements of integrin-beta-4 play a role in familial and/or acquired forms of diseases such as psoriasis.
BOARD 33 LEAF NITRATE REDUCTASE ACTIVITY IN DAucus CAROTA IS ELEVATED IN LEMON-TREATED FIELD PLOTS. Michael D. Wilson and Sheryl L. Petersen, (Prudence J. Hall), DEPT. OF BIOLOGY, Hiram College, Hiram OH 44234.

Leaf nitrate reductase activity is typically induced in greenhouse-grown plants by irrigation with nitrate solutions. Some data suggest a similar response to applied nitrate fertilizer in field-grown plants. We have hypothesized that applied ammonium nitrate or ammonium phosphate fertilizers should induce leaf nitrate reductase activity in Daucus carota growing in old-field succession plots. A qualitative colorimetric test-disk assay for nitrate reductase activity was used to compare leaf enzyme activities of plants in nutrient-amended and control plots. Assay results showed consistently elevated nitrate reductase activity in plants from treated plots at 6 to 8 weeks after fertilizer application. No significant changes in chlorophyll content were observed. The financial support of Dr. Bruce and Janet Johnson is gratefully acknowledged.

BOARD 34 ROOT ACID PHOSPHATASE ACTIVITY DECREASES AND ISOZYMENGE PATTERNS CHANGE IN FIELD-GROWN BARABARA VULGARIS IN RESPONSE TO FERTILIZER TREATMENT. Kelly L. Dillon, Michael D. Wilson, Sheryl L. Petersen; (Prudence J. Hall); Department of Biology, Hiram College, Hiram OH 44234.

Acid phosphatases of plant roots are thought to aid in phosphate assimilation of plants growing in phosphate-deficient soils. We have hypothesized that acid phosphatase activity should increase in crude root extracts prepared from Barbarea vulgaris harvested from unfertilized field plots. Alternatively, activity in root extracts of plants from plots fertilized with ammonium phosphate should be decreased. We further hypothesized that expression of acid phosphatase isozymes should change in response to phosphate treatment. Acid phosphatase activity in root extracts from unincubated control plants was measured on native polyacrylamide gels and stained to show acid phosphatase activity. Preliminary analysis of enzyme specific activity showed increased activity in unfertilized plots. Different bands of acid phosphatase activity can be observed in extracts of roots from control and phosphate-treated plots. The financial support of Dr. Bruce and Janet Johnson is gratefully acknowledged.

BOARD 35 CHANGES IN VIRULENCE DIVERSITY AMONG POPULATIONS OF Puccinia Recondita FOLLOWING SELECTION. Jeffrey S. Lehman and Carl D. Gelius, DEPT. OF LIFE SCIENCES, Otterbein College, Westerville, OH 43081 and Gregory Shaner, DEPT. OF BOTANY & PLANT PATH., PURDUE University, West Lafayette IN 47907.

The ability of populations of the rust fungus Puccinia recondita f. sp. triticci to respond to the selection pressure of partially resistant wheat is not well understood. The objective of this study was to determine if wild-type, asexually reproducing populations of P. recondita f. sp. triticci respond to selection for shortened latent period on partially resistant wheat cultivars C1222 or Sw 72496-6. Frequencies of virulence phenotypes (a qualitative trait not under direct selection) were used as “phenotypic markers” to monitor changes among wild-type and selected populations. In wild-type populations, phenotype FBR with virulence to host resistance genes Lr2c, 3, 3ka, 11, and 30, was sampled at a frequency of 90-100%. After selection of wild-type populations for shortened latent period on either partially resistant cultivar, the frequency of FBR decreased by 23-67% while the frequency of phenotypes FLT, KLT, and PBR, with additional virulences to host resistance genes Lr9 and 17; Lri, respectively, increased. Following these changes, the frequencies of virulence phenotypes in the selected populations were more evenly distributed, and phenotypic diversity as measured with Shannon indices increased. These changes in race specificity and population structure after selection for shortened latent period suggests that P. recondita f. sp. triticci is capable of adapting to the partial resistance of C12227 and Sw 72496-6.

BOARD 36 DEGRADATION OF HYDROGEN PEROXIDE BY LEACHATES FROM MAIZE LEAVES THAT VARY IN THEIR SUSCEPTIBILITY TO CERECOSPORINA AND TO GRAY LEAF SPOT DISEASE. M. O. Garraway and J. D. Beltman, DEPT. PLANT PATHOLOGY, OHIO STATE University, Columbus OH 43210.

Leaf segments from two maize cultivars with susceptibility and two with resistance to gray leaf spot were evaluated for their sensitivity to cercosporin, by immersing 4 x 1.5 cm segments in 25 ml distilled water (DW) without or with 0.25 or 0.5 ug/ml cercosporin, then measuring the loss of electrolytes, as changes in conductivity (uH/mg dry wt./24hr) in the DW, following incubation for 48 or 72 h in the dark at 28 C. Electrolyte loss from cercosporin-treated susceptible leaf segments was 2-3x the rate of those from dark-incubated susceptible leaves. Moreover, the exposure of leaves of susceptible maize cultivars to low levels of cercosporin increased the activity of their leafshades to degrade H2O2 while decreasing their sensitivity to cercosporin. These data support the conclusion that H2O2 plays a mediating role in the injurious effects of cercosporin, a toxin associated with gray leaf spot disease, on susceptible maize leaves.

Each component is associated with on-line help text and color graphics and species specific color graphics illustrating diagnostic characteristics of vegetative and reproductive tree and microscopic wood features. Alpha versions of the MUDIES were field tested by Dendrology students using notebook computers during the last two years. Results of comparison tests between students using the MUDIES and students using paper dichotomous keys (DKs) indicate that the MUDIES is as accurate with regard to student identification of unknowns as DKs, and that students using the MUDIES identify a given specimen on average about 113 seconds faster than their colleagues using DKs. Most all students using the MUDIES report that it is easier to use than a textbook for obtaining new information about plant taxa and for reviewing material covered on quizzes and exams. All students report that the MUDIES is easier to use than DKs and nearly all find the on-line help text and graphics, and species specific graphics extremely useful. Primary pedagogical advantages of the MUDIES include the ease with which undergraduates can become engaged in expanding the databases and enrichment of the students’ understanding of plant taxa.