1996-04

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10:00 - 11:00 AM
SATURDAY, MAY 4, 1996
OSBORNE HALL

**BOARD A** BIOLOGICAL AND PHYSICOCHEMICAL COMPARISONS OF AFFLUENTS AND EFFLUENTS OF AN OHIO RESERVOIR. KIMBERLY R. ANSON, DEPARTMENT OF BIOLOGY, P.O. BOX 720, WITTENBERG UNIVERSITY, SPRINGFIELD OH 45501-0720.

The purpose of this study was to analyze the effect of an impoundment on a stream ecosystem in Clark County, Ohio. Clarence J. Brown Reservoir is a man-made eutrophic reservoir on Buck Creek, a fifth order meandering stream with typical riffle-pool sequences. Samples were collected five times at two different sites upstream and downstream from the reservoir between September and December 1995. Physiochemical and biological properties in similar riffle zones were compared at upstream and downstream sites. The effluent of the dam is characterized by slightly decreased specific conductance, dissolved oxygen concentration, nitrate-nitrogen, and sulfate-sulfur, and increased temperature and pH values. Comparisons of macroinvertebrate communities illustrate similar populations of Hydropterygidae (Tricoptera) between the effluent and effluent of the reservoir. However, differences were found with Ancepsidae (Diptera) and Elmidae (Coleoptera) populations in upstream sites while populations of Hirudinea, Pseudeucopsyche, and Decapoda were recorded at downstream sites. Physical and chemical properties of the reservoir effluent and effluent create different habitats that may affect macroinvertebrate communities of this lotic ecosystem.


As part of an ecological assessment of Hoosier National Forest caves Dillion Creek, Orange County, Indiana, has been selected for study with respect to physiochemical parameters and cave fauna. Physiochemical parameters monitored between 14 April 1992 and 19 November 1995 such as air temperature (10.0-12.1°C), water temperature (8.0-11.5°C), relative humidity (88-100%), and pH (7.00-8.42) demonstrated relative stability. Aquatic fauna occurring in Dillion Creek include Tubuella, Nematomorpha, Cambarincolaidei, Cambanis (E) laevis Faxon, Oconnetes (O) i. inermis, Carcinus viridis Packard, and an undescribed Crangonyx species. As a continuation of the assessment, the study of the Crangonyx sp. population was conducted. Although many aquatic cave populations are so small that only a few individuals are observed, Crangonyx sp. found in the Dillion Creek stream are very abundant. To estimate population size a mark-recapture study was conducted on 7 October, 8 October, 29 October, and 19 November 1995. Amphipods were collected, marked, and then returned to the stream at four pool sites within the cave. Using the Shumacher-Eschmeyer index, the mean population size was estimated to be 777+/−108 individuals/m2. Biological and physiochemical assessment, including Crangonyx sp. population estimates, will continue through March 1996.

**BOARD C** CELLULOSE DIGESTION BY COLEOPTERANS. STEPHANIE A. MILLER AND SWIRL R. BUCHERL, BIOLOGY DEPARTMENT, HIRAM COLLEGE, HIRAM OH 44234.

Cellulose digestion among Coleopterans occurs through hypophagy of fungal hyphae. Digestion is accomplished by the presence of the cellulase complex, which includes endoglucausenas (Cx-cellulases), exoglucaanases (C1-cellulases), and beta-glucosidases (cellibioses). Cellulose digestion cannot occur without the entire complex. Several beetles are able to synthesize their own Cx-cellulases and cellulases, but they are unable to synthesize C1-cellulases. These beetles ingest cellulytic fungal hyphae, which produce C1-cellulase, and retain this enzyme within their midgut. In this study, Coleopterans were collected from rotting wood at the James H. Barrow Field Station, Hiram College, Hiram, Ohio. The beetles were sampled from four plots in the successional forest area and four plots in the mature forest area. Beetles were homogenized live, and the cellulose in the extract was isolated by column chromatography. The product of cellulose digestion (glucose) was treated with 3.5 dinitro salicylic acid, which gave a colored product that could be measured spectrophotometrically at 540nm. Of the fifteen coleopteran species collected and assayed, only Megalodana hercules and the Phaneroctas fasciata showed significant cellulase activity. Both species were found in mature and successional areas of the forest. Supported by the Howard Hughes Medical Institute.

**BOARD D** HOME RANGE ANALYSIS OF CAPTIVE REARED SPOTTED TURTLES (CLEMMYS GUTTATA). HORTON H. HOBBS IV AND TIMOTHY L LEWIS, DEPARTMENT OF BIOLOGY, WITTENBERG UNIVERSITY, P.O. BOX 720, SPRINGFIELD OH 45501.

This study was designed to measure differences in the home range of a population of captive spotted turtles (Clemmys guttata) and to determine if turtle activities are based on sex or dominance within a particular environment. Seven spotted turtles were acquired from Pasco County, Florida. The turtles were studied in a 320 liter (2.2m x 0.3m) tank and observations were made randomly twice a day every three to five days per week for fifteen weeks. Room temperatures fluctuated from 20.5°C to 23.3°C. The location and sex of each turtle were digitized and we calculated two types of home ranges, the minimum perimeter polygon (MPP), and the Dixon and Chapman harmonic mean (DC). Home ranges did not differ by sex of the turtle (P > 0.05). The turtles did partition available space according to dominance. These data are consistent with concurrent field study on spotted turtle home ranges and imply resource partitioning in the wild may be due to dominance hierarchies. This is significant since the environment for the captive turtles is extremely different from that of turtles inhabiting a cold, hard-water fen. Mechanisms that establish home ranges for both populations may be similar in spite of environmental differences.

**BOARD E** AN ASSESSMENT OF THREE CANDIDATE SPECIES AND TWO ADDITIONAL TROGLOBITIC INVERTEBRATES FROM SOUTHERN OHIO. H. H. HOBBS III, DEPARTMENT OF BIOLOGY, WITTENBERG UNIVERSITY, P.O. BOX 720, SPRINGFIELD OH 45501-0720.

An assessment of live stygian environments, and particularly of the populations of three troglobitic Candidate Species and two additional obligate cave-inhabiting taxa that were identified and fund for 1994-95 by the Division of Natural Areas and Preserves, Northeast Ohio Department of Nature Reserves. Five caves (two from three counties in southwestern Ohio were sampled for biological and physiochemical features. Each of these sites serves as the type locality for a troglobitic, all but one species known from a single cave. Results indicate that two of the three candidates (the aquatic isopod, Caecidotea carinipilium, from Fern Cave, Adams County and the carabid beetle, Pseudoneothysus ohiensis, from the same cave, Adams County) are maintaining small but viable populations and are not in immediate threat of extinction. The third species, aquatic isopod Caecidotea rotunda from Frost Cave (Pike County) is very rare yet known from four additional localities. Two other caves were studied and the pseudoscorpion, Apochthonous hobbsi, from Buckskin Cave I (Ross County) is maintaining a sizable population whereas the beetle Pseudoneothysus krameri from Cave Hill Cave (Adams County) occurs in very low densities. These troglobites are extremely vulnerable to perturbations and environmental assessments of the surface recharge areas, of the caves, and of these sensitive populations will continue throughout 1996.

**BOARD F** PHYSICOCHEMICAL COMPARISONS OF TWO LOTIC SYSTEMS IN CLARK AND HOCKING COUNTIES, OHIO. JENNIFER L. McBETH AND ERIC D. ARK, DEPARTMENT OF BIOLOGY, WITTENBERG UNIVERSITY, P.O. BOX 720, SPRINGFIELD OH 45501.

The purpose of this study was to examine the effects of geology and land usage on the physicochemical properties and to determine longitudinal physicochemical trends in two low order Ohio stream systems. Water samples were collected from 25 September through 9 December 1995 on Rock Run (Clark County) and Pine Cry (Hocking County). Three samples were taken from three locations on Rock Run and from four locations on Pine Creek. Comparative analysis showed pH for Pine Creek to be 6.97±0.06 and 8.02±0.04 for Rock Run, CaCO3 for Pine Creek 41+/−3mg/l and for Rock Run 291+/−3mg/l, and specific conductance for Pine Creek 188±7μmhos/cm and for Rock Run 640+/−20μmhos/cm were observed from upstream to downstream for pH (increase from 6.75±0.46 to 7.12±0.160 on Pine Creek and decrease from 8.06±0.122 to 7.913±0.239 on Rock Run), CaCO3 from 233.20±17.7 to 168.2±6.67(imhos/cm on Pine Creek and decrease from 8.06+/-0.122 to 7.913+/-0.239 on Rock Run), and decrease from 8.06+/-0.122 to 7.913+/-0.239 on Rock Run), CaCO3 from 233.20±17.7 to 168.2±6.67(imhos/cm on Pine Creek and decrease from 8.06+/-0.122 to 7.913+/-0.239 on Rock Run), specific conductance for Rock Run from 657.83±20.2 to 619.75±19.3 Limhos/cm on Rock Run. Inorganic nutrient concentrations were similar within both streams.

**BOARD G** NEW MAP OF OHIO ECOREGIONS DELINEATES 19 AREAS LARGER THAN 1000 SQ.KM. C. SCOTT BRIDGMAN, OHIO GEOLOGICAL SURVEY, 4683 FOUNTAIN SQUARE DR., COLUMBUS OH 43224.

Ohio has been divided into 19 ecological subregions, which differ from each other in their physical and biological characteristics such as geology, physiography, soils, hydrology, climate, modern flora and fauna, potential natural vegetation, and land use. Each single characteristic proved consistently...
and type of nutrient application on an old-field ecosystem. Thirty 16 x 20 m plots were designated controls. Three 20-cm-deep soil cores were collected when the soil was moist, or dark for 24 hr at 28 °C. They were cut into 4 cm segments then immersed in a DW bathing solution that contained cercosporin and 10ug/ml of ACC or methionine, chemicals involved in ethylene biosynthesis, more electrolytes leaked from the Tms isolate. Therefore, the increases in electrolyte leakage from Tms maize pollen leaves observed after cercosporin infiltration in the dark could involve either changes in their production of ethylene and its precursors, or changes in their sensitivity to ethylene.

The purpose of this study was to determine the effects of variation in bacterial densities on the grazing rate of a model ciliate, Tetrahymena pyriformis. T. p. was grown axenically in protease peptone broth. Cells of a constant cell density of 1x10^6 cells/ml were fed laboratory grown Escherichia coli strain B tagged with fluorescein (FLB). FLB were dispensed in concentrations ranging from 10^4 to 10^5 cells/ml. Ingestion rates were determined directly by epifluorescence microscopy in grazing bouts that lasted for 5 - 80 min. The grazing rate of the ciliates increased with greater prey densities. This suggests that these ciliates grazed more efficiently when greater concentrations of bacterial prey were present. This project was funded, in part, by the Ohio Sea Grant College Program.

This research is part of a 5-year examination of the effects of the timing and type of nutrient application on an old-field ecosystem. Thirty 16 x 20 m plots were established on a recently-tilled former corn field during May, 1995. On 20 May 1995 six plots were fertilized with ammonium nitrate at a loading rate of 300 kg/ha nitrogen. Another six plots were fertilized with diammonium phosphate at a loading of 300 kg/ha nitrogen and 76 kg/ha phosphorus. Six plots were designated controls. Three 20-cm-deep soil cores were collected from randomly-selected locations in each plot three times during the growing season. Deeper samples (up to 40 cm) were collected when the soil was moist, and the sampler could be inserted further into the ground. Analysis of variance tests of data collected on the first sample date (July 1995) showed a significantly greater amount of nitrogen in ammonium nitrate (N)-treated plots than in the control or diammonium phosphate (N/P) plots; the amount of soil phosphorus was significantly higher in the N/P plots than in the N or control plots, magnesium was significantly higher in N and N/P plots than in the control plots. This first sample indicates that the levels of soil nutrients were elevated as a result of fertilizer applications. Later soil samples and other studies conducted in these plots will allow us to examine the fate of the various nutrients in the old-field system, and the effects of these nutrients on the course of succession. Support for this research was provided by the Howard Hughes Medical Institute.

Detached leaves of Normal (N) and Texas male sterile (Tms) cytoplasm isolines (cv. B37) of maize were infiltrated with 0.1 or 0.5 µg/ml of cercosporin, a toxin associated with the gray leaf spot disease, either in the light or dark for 24 hr at 28 °C. They were cut into 4 cm segments then immersed in 25 ml DW and incubated for another 48 or 72 hr in the dark at 28 °C. Electrolyte leakage (µmhos/mg dry wt/hr) from cercosporin-treated or control segments were compared. Segments from Tms leaves that were infiltrated with cercosporin solutions while in the dark leaked up to 6X more electrolytes than those from leaves not infiltrated with cercosporin. In contrast, segments from Tms leaves that were infiltrated while in the light leaked only 3X more electrolytes, indicating that light reduced the susceptibility of Tms leaves to cercosporin. Also, electrolyte leakage did not increase significantly when leaves from N cytoplasm isolines, or from Tms cytoplasm isolines that contained nuclear genes for the restoration of male fertility, were infiltrated with cercosporin while in the light or dark. When Tms and N segments each were immersed in a DW bathing solution that contained cercosporin and 10µg/ml of ACC or methionine, chemicals involved in ethylene biosynthesis, more electrolytes leaked from the Tms isolate. Therefore, the increases in electrolyte leakage from Tms maize pollen leaves observed after cercosporin infiltration in the dark could involve either changes in their production of ethylene and its precursors, or changes in their sensitivity to ethylene.

Support for this research was provided by the Howard Hughes Medical Institute.

A seasonal study of two plant species is under investigation. 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 hypotheses about shoot development. During classroom discussion, fundamental anatomical and morphological questions were generated to be used as the basis for student laboratory projects. This research was designed to
To address the issues of farm profitability, farm sustainability and environmental protection, a modified relay intercropping (MRI) system has been studied. In this system, soybeans are planted into wheat at or past the heading stage of growth. Previous Ohio research has demonstrated favorable winter wheat and soybean production when soybeans were interplanted in early May. However, planting soybeans into wheat in early May often conflicts with conventional planting of corn and soybeans. Thus, a modified relay intercropping system has been developed to better utilize farm labor, time and equipment. A descriptive study was conducted to measure the effects of variable wheat nitrogen fertilizer on soybean yield. Two year soybean yields averaged 33.9 bushels/acre in the MRI system over the variable wheat nitrogen rates. There were significant differences in soybean yield between wheat nitrogen rates in 1995 only.

**Board A**

**A COMPARISON OF GROUND WATER POLLUTION POTENTIAL AND GROUND WATER RESOURCE MAPS: FRANKLIN COUNTY, OHIO. MIKE ANGLE, WATER RESOURCES SECTION, DIVISION OF WATER, OHIO DEPARTMENT OF NATURAL RESOURCES, 1899 FOUNTAIN SQUARE, COLUMBUS, OH 43224.**

Ground Water Resources (GWR) Maps and Ground Water Pollution Potential (GWPP) Maps are the two primary mapping products of the Water Resources Section (WRS). Both maps are produced in color for individual counties at a scale of 1:62,500. GWR Maps are generalized maps showing ground water availability, yields, and aquifer type. GWPP Maps are derived using the DRASTIC system and are more detailed maps which portray the relative vulnerability of aquifers to contamination. DRASTIC is an acronym for Depth to water, Recharge, Aquifer media, Soil type, Topography (slope), Impact of vadose zone media, and hydraulic Conductivity. GWPP Maps have detailed accompanying reports. Comparisons between the maps reveal many trends. Typically, high-yellowing aquifers and shallow aquifers tend to be more vulnerable to contamination. Lower-yielding aquifers and deeper aquifers tend to be less vulnerable to contamination. Major aquifer types depicted on the GWR Maps are represented by hydrogeologic settings on the GWPP Maps.

**Board C**


Silver Creek Metro-Park is the site of an abandoned coal mine that has been developed into a park. Over the site of the mine there is now a small reservoir. An iron and sulfate rich spring was diverted from the mine to flow out beyond the dam. The stream containing coal mine runoff, contained a significant amount of rust colored precipitate. Eleven samples were taken from this stream at 50 foot intervals and one at 1600 feet. Three more samples were taken from the reservoir, the dam spillway, and past where the stream and spillway met. Each sample was tested for temperature, pH, dissolved oxygen (DO), total dissolved solids (TDS), alkalinity, Ca, Na, Mg, K, Fe, Si, Cl, PO₄, SO₄, HCO₃ and trace elements Mn, Zn, Cu, Co, V, Sr, As, Mo, and Ni. Samples from the mine spring were high in Fe, SNA and TDS and low in DO, relative to the lake and spillway samples. A mixture of the mine stream and spillway was modeled using the discharge and chemical composition of the two streams. These numbers were then compared to the values measured at the conjunction of the streams. Most major and minor ions were accurate to within five percent of the calculated concentrations. A comparison between theoretical and actual data found that HCO₃ was higher while SO₄, Fe and Mn were lower than calculated values. This is due to the reaction of the streamwater with the atmosphere. Fe, Si and Mn concentration decreased and DO and HCO₃ increased downstream. The relationship between Fe and downstream distance is markedly linear (R = .995). In general, water from the mine spring precipitates out Fe and while absorbing CO₂, from the atmosphere to reach equilibrium.

**Board B**

**A MODIFIED RELAY INTERCROPPING: A SUCCESSFUL SUSTAINABLE AGRICULTURAL APPROACH. STEVEN C. PUCHNASHA, OHIO STATE UNIVERSITY EXTENSION, 117 E. MANSFIELD ST., BUCYRUS OH 44820.**

This thesis was conducted to determine the relation between the brine horizon and the beds of the Devonian/Silurian carbonate units known by the drillers’ name, Big Lime. The relation can take three forms: A) the brine horizon dips parallel to its parent bed, B) the brine horizon dips at a steeper angle than its parent bed, C) the brine horizon dips at a shallower angle than its parent bed. It is important to know this relation so that an approximate depth to brine can be determined during the drilling of oil and gas wells, which contain brine as a by-product, in addition to determining the depth at which brine can be found for the injection of waste brine. Data as to the depth to the “First Brine” of the Big Lime and the top of the Big Lime was determined using oil and gas well “header cards” archived in the Geologic Records Section of the Ohio Department of Natural Resources’ Division of Geological Survey. The data were imported into SURFER for Windows and contour maps were made of the top of the Big Lime and the elevation of the First Brine Horizon. These maps were compared and the relation between the brine horizon and the top of the Big Lime was determined. This relation agrees with Scenario B above. Utilizing these findings makes it possible to determine the relative placement of the Big Lime’s brine horizon compared to its upper surface. This information will aid drillers and environmental scientists in the determination of where brine will be encountered and where brine can be found for the disposal of petroleum industry brines by injection.

**Board D**

**INTERPRETATION OF THE FRESH WATER/BRINE INTERFACE OF THE DEVONIAN/SILURIAN CARBONATES OF CENTRAL OHIO. C. STEVEN CUMPTON II, 78 ODEERLE AVE., CARROLL OH 43112.**

This thesis was conducted to determine the relation between the brine horizon and the beds of the Devonian/Silurian carbonate units known by the drillers’ name, Big Lime. The relation can take three forms: A) the brine horizon dips parallel to its parent bed, B) the brine horizon dips at a steeper angle than its parent bed, C) the brine horizon dips at a shallower angle than its parent bed. It is important to know this relation so that an approximate depth to brine can be determined during the drilling of oil and gas wells, which contain brine as a by-product, in addition to determining the depth at which brine can be found for the injection of waste brine. Data as to the depth to the “First Brine” of the Big Lime and the top of the Big Lime was determined using oil and gas well “header cards” archived in the Geologic Records Section of the Ohio Department of Natural Resources’ Division of Geological Survey. The data were imported into SURFER for Windows and contour maps were made of the top of the Big Lime and the elevation of the First Brine Horizon. These maps were compared and the relation between the brine horizon and the top of the Big Lime was determined. This relation agrees with Scenario B above. Utilizing these findings makes it possible to determine the relative placement of the Big Lime’s brine horizon compared to its upper surface. This information will aid drillers and environmental scientists in the determination of where brine will be encountered and where brine can be found for the disposal of petroleum industry brines by injection.
Two distinct kinds of tektites have long been recognized; splash-form and layered Muong Nong-type. There is an apparent gradual transition from layered to splash-form. Selected layered specimens are shaped and rounded like some splash-forms and some splash-forms have markings attributable to a layered origin. There is no clear boundary between the two forms. These observations are valid, then it is probable that both forms were originated, shaped and transported by the same process and event.

**BOARD H AQUATIC ECOCOLOGICAL SURVEY FOR THE VALLEYVIEW TRAIL, AKRON, OHIO.** KATHY L. GIVENS, DIANE CONYERS-RIZZO, MICHAEL D. JOHNSON, LAURA MATAZAZA, TODD CRANDALL, JAY ABERCROMBEE AND ELIZABETH BUCHANAN, c/o ACRT, INC. 2545 BAILEY ROAD, P.O. BOX 401, CUYAHOGA FALLS OH 44221.

The City of Akron has commissioned the construction of a new bike and hike trail that parallels the Cuyahoga River along the old towpath of the Ohio & Erie Canal. The Valleyview Trail will be one of a series of links in the Ohio & Erie Canal National Heritage Corridor which, when completed, will extend 140 km from Zoor to Cleveland. The trail connects with the southern terminus of the Riverview Trail in the Big Bend Area of Sand Run Metro Park. The trail continues southward through Cuyahoga Valley National Park and ends near Perkins Street in Akron. The Cuyahoga River, Little Cuyahoga River, and Ohio & Erie Canal were assessed to determine their chemical and biological water quality and to identify potential ecological impacts of trail construction. Water chemistry results did not exceed state water quality standards. Fish index of biotic integrity values fell below water quality standards and macroinvertebrate communities were dominated by pollution tolerant and moderately tolerant organisms. These data indicate poor to moderate water quality at these sites.

**BOARD I DURATIONAL FLUCTUATIONS IN THM PRECURSORS IN A SMALL LAKE.** ANGELA B. MARTIN AND DENNIS COOKE, DEPARTMENT OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44116.

Trihalomethanes (THMs) form when chlorine reacts with naturally occurring organic matter (THM precursors) in surface waters during the disinfection of drinking water. THMs have carcinogenic and mutagenic properties. As a result, the US EPA has set limits on the amounts of THMs permissible in finished waters. However, many drinking water facilities are finding it difficult to meet these standards. An alternative approach to in-plant changes is to reduce precursor production in raw water. To do this, a better understanding of THM precursor sources and the mechanisms of precursor production are needed. Preliminary studies have shown that diurnal fluctuations in THMFP occur which may correspond to fluctuations in autotrophic and heterotrophic activity. This study investigated the relationship between diurnal fluctuations in THM formation potential (THMFP), chlorophyll, water temperature, turbidity, ORP, transparency and phytoplankton and zooplankton assemblages. THMFP was strongly correlated with chlorophyll concentrations, turbidity, and secchi depth, suggesting that eutrophication of water supplies increases THMFP. Further, these variables may provide surrogate measures of THMFP in some water supplies.

**BOARD J PALEOLIMNOLOGICAL INVESTIGATION OF THE OKEFENOKEE SWAMP.** BRENDA S. SIMMERS, JOHAN F. GOTTFRENS AND BRIAN E. RODD, DEPARTMENT OF BIOLOGY, UNIVERSITY OF TOLEDO, TOLEDO OH 43606.

The Okefenokee Swamp, one of the largest freshwater wetlands in the United States, is located on the border of southwestern Georgia and northern Florida. A paleolimnological study was initiated in 1994 to help reconstruct the history of the system. Two sediment cores, 44cm and 28cm in length, were retrieved using a push corer. Chronology was established using lead-210 and cesium-137 gamma counting, and verified with independent age markers. Recent and historic accumulation rates for bulk sediment, organic carbon, phosphorus and nitrogen were established to compare pre- and post-settlement and silviculture trends. Mercury accumulation rates over time will be compared with records from other regional systems to provide complementary information on past deposition rates and recent trends in the southeastern United States.


The benthic macro invertebrate community of a 25 km², predominantly agricultural sub-basin of the East Branch of Nimshillen Creek was assessed during winter of 1994. The timing of sampling events corresponded to periods of high precipitation and runoff. Although in-stream dissolved oxygen concentrations were strongly correlated with total phosphorus concentrations, dissolved oxygen concentrations remained above 10 mg/l during the sampling period. The macroinvertebrate communities at sites located adjacent to forested subject to high erosion rates were less diverse than those sites located in agricultural areas with more riparian cover and less erosion. Our results suggest that the macroinvertebrate community of this stream during winter is most strongly influenced by physical alteration to the substrate by erosion events and is not significantly impacted by dissolved oxygen concentrations despite the high levels of organic matter. Recovery of the macroinvertebrate community from substrate perturbations attributable to runoff events was rapid. The relationship between erosion impacts on substrate quality during winter, land use patterns, and macroinvertebrate diversity indices and biotic scores will be discussed.

**BOARD L SOURCES OF PERSISTENT AND BIOACCUMULATIVE POLLUTANTS DISCHARGED TO LAKE ERIE FROM OHIO POINT SOURCES.** J.R. BEAVERT, L. YEOMANS AND B.A. SCHEIBER2. UNIVERSITY OF AKRON, DEPARTMENT OF BIOLOGY, ASC, AKRON OH 44325, CITIES POLICY CENTER/ OHIO CITIZEN ACTION, 400 TERMINAL TOWER, CLEVELAND OH 44113, BEAVERT SCHEIBER ASSOCIATES, INC., 3620 INGELSADE ROAD, SHAKER HEIGHTS OH 44122.

Since the 1970’s the eutrophication of Lake Erie has been reversed as a result of reduction in point source loadings of phosphorus from the watershed, however the lake continues to receive significant point source loadings of toxic pollutants (as identified by the Great Lakes Water Quality Initiative). During 1993 Lake Erie received approximately 324,000 pounds of persistent and bioaccumulative substances from Ohio industrial and wastewater treatment plants. Wastewater treatment facilities were responsible for more than 84% of this amount. More than 4% of the point source discharges to Lake Erie originated in Cuyahoga County. Many of the pollutants discharged to Lake Erie by industrial and wastewater treatment plants are associated with development, nervous system, and reproductive abnormalities in humans, wildlife, and aquatic life. A proposed change in water quality standards for Ohio’s rivers and streams will allow increased discharges of these persistent and bioaccumulative substances to more than 90% of the state’s waters. Implications of these new, less restrictive water quality standards on the health of Lake Erie will be discussed.

**BOARD M MORPHOLOGY OF COMMENSALE OSTRACODS (FAMILY ENOCYTHERIDAE).** NATALIE H. WADDELL, WITTENBERG UNIVERSITY, BOX 2798, P.O. BOX 6100, SPRINGFIELD OH 45501.

Commensal ostracods (Family Entocytheridae) were gathered from Ooconetes rusticus collected in and around Clark County, OH. Ostracods were deshelled and cleared prior to mounting on carbon tape for SEM viewing. External morphology was examined in an SEM, focusing on perimorphology for species identification.


The abundance and composition of the midsummer plankton communities of 24 Ohio wetlands were evaluated and related to potential controlling variables in 1995. Six representative sites from the following wetland types were included: impacted, non-impacted (pristine), constructed, and temporary. Physical and chemical parameters were evaluated contemporaneously with biological variables. The zooplankton communities of all wetlands were dominated by cosmopolitan crustacean and rotifer taxa typical of lake plankton communities. The dominant rotifer, copepod, and cladoceran were, respectively, Polyarthra vulgaris, Cyclops sp., and Ceriodaphnia reticulata. Overall, copepod nauplii were the dominants in most of the wetlands. Total zooplankton abundance was most strongly related to chlorophyll a concentrations over the range of trophic conditions studied. In general, rotifer abundance increased with an increase in total chlorophyll a concentrations. The relationship between zooplankton abundance and total chlorophyll a was also significant but was much weaker. Interactions among zooplankton and phytoplankton populations, land-use patterns, and wetland types will be discussed.

**BOARD O COMPARISON OF BACTERIAL COMMUNITIES FROM SEPARATE SITES WITHIN AN OHIO LAKE.** CONRAD E. WICKSTROM, DALE A. CASAMATTA AND BETTIE D. OSGREN-PALMSTRING, DEPARTMENT OF BIOLOGICAL SCIENCES AND WATER RESOURCES RESEARCH INSTITUTE, KENT OH 44242.
The bacterial community from three different habitats within East Twin Lake (Portage Co.) was sampled during the autumn of 1995. Bacterioplankton from pelagic and littoral water samples were compared with each other and with epiphytic bacteria removed by sonication from collected macrophytes (Myriophyllum spicatum). Viable counts (colony-forming units, CFU) and strain isolations were accomplished on Standard Methods Agar streak plates. CFU and DAPI direct microscopic counts were significantly greater in littoral water (1.64E CFU/mL and 5.16E bacteria/mL, respectively) compared to the pelagic samples (4.0E2, 2E4). Epiphytes counts ranged from 1.8E7 CFU/g DW to 1.5E9 bacitracin DW. Viable counts were only 0.02% to 0.36% of DAPI counts. Specific identifications are yet to be completed, however, plate transects with enumeration of colony pigmentation types indicate habitat-related community differences. Transparent:white pigmented percentages for the pelagic community were 21:55:24; the littoral and macrophyte ratios were 28:51:21 and 45:41:14, respectively. Endospore-forming species are most common in the macrophyte community. These findings are part of the initial phase of a study on the proteolytic activities of and interactions between bacterial populations within East Twin Lake. Toward that end, we have 20 diverse clones from the pelagic, 16 from the littoral and 25 from the macrophyte communities. These and additional strains will be used for these studies.

Board P: A Study of the Chemical Parameters of Eight Temperate Hard Water Springs in John Bryan State Park, Greene County, Ohio. Kathryn A. Wolfe, Department of Biology, Wittenberg University, P.O. Box 720, Springfield OH 45501.

The chemistry of springheads of eight temperate cold-water springs located in Greene County, Ohio are compared. These small springs flow from a dolomite bluff above the south bank of Little Miami River in John Bryan State Park. For convenience, the springs were arbitrarily numbered from one to eight in a West to East direction. Concentrations (mg/L) (ranges in parentheses) of O\textsubscript{2} (7.3-10.0 mg/L), CO\textsubscript{3}, CaCO\textsubscript{3}, NO\textsubscript{3}-N, SO\textsubscript{4}-S, PO\textsubscript{4}-P, and Fe were observed along with pH (5.90-8.42 mg/L), specific conductance (SC as mmhos/cm) (319-962 mmhos/cm), and turbidity (NTU). These chemical parameters were observed from September to December. The chemical variations in each spring over time were studied as well as the average differences among the chemistry of all the springs. Results indicate that the springheads maintain thermal and chemical stability; however, NO\textsubscript{3}-N, SC, and methyl orange alkalinity values are high. Oxygen, SC, CaCO\textsubscript{3}, and SO\textsubscript{4}-S seem to increase as the spring number increases (from West to East), while temperature, pH, turbidity, Fe, PO\textsubscript{4}-P, and NO\textsubscript{3}-N remain relatively constant and predictable. However, spring #4, which had little flow for the first two sample periods and eventually no flow, does not follow this trend. Spring #4 has comparatively high average temperature, O\textsubscript{2}, CO\textsubscript{3}, CaCO\textsubscript{3}, turbidity, and Fe, while its SC and SO\textsubscript{4}-S are low; NO\textsubscript{3}-N concentration in spring #4 fluctuates from high to low. Spring #2 also stopped flowing after the second collection time; however, it follows the same trends of the other springs during its period of flow.


During July of 1995, 18 stops from river mile 9.2 to 30.8 were searched visually, by hand, with bottom sieves, and dip nets. A total of 4,264 living and 1999 dead mussels comprising 23 species were found. *Actioninais ligamentina* carinata were most abundant and comprised 64% of living mussels found. Quadrat samples were taken in 6 transects that represented different habitats and produced from 0 to 44 live mussels per square meter, with an average of 13.2. Species diversity ranged from 5 to 13 species among the 3 transects. Three of the species found, *Lampsilis fasciola*, *Ligumia recta*, and *Truncilla truncata*, are listed as Ohio Special Interest, while two others, *Epioblasma trogontera* and *Simposa asa quima* are also listed as Federal Category 2. Supported by an ODNR Natural Areas and Preserves Grant and by the Howard Hughes Medical Institute.

Board R: Comparing Multiple Comparison Procedures and Their Use in Environmental Statistics. Craig W. Steele and Carol Skinner, Dept. of Biology and Health Services, Edinboro University, Edinboro PA 16444.

Analyses of experimental data in environmental biology, and other sciences, often involve comparisons drawn from multiple related comparisons made within the framework of a single experiment. Such analysis necessitates the use of some multiple comparison procedure to adjust the alpha level in a statistical analysis. Questions addressed in this survey include: 1) When and why is it important to use a multiple comparison procedure?; 2) What are the differences among the various types of procedures and when is each appropriate?; 3) How do the different procedures range from "conservative" to "liberal" in the inferences that can be drawn from them?; 4) How is the choice of a multiple comparison procedure related to the choice of an overall alpha level?; and 5) What nonparametric alternatives are available? Parametric multiple-comparison procedures covered include the Tukey, Scheffe, Bonferroni, Dunnnett, Williams, Least Significant Difference, Duncan, and Student Newman-Keuls procedures. Nonparametric procedures surveyed include the Steel's Many-One Rank, Shirley, Signed-Rank, K-Sample Rank, Kruskal-Wallis, and Friedman procedures.

Board S: Comparison and Digital Analysis of Vocalization Patterns and Repertoires of Male Red-winged Blackbirds (Agelaius Phoeniceus), S. Murina, D. Bebell, J. Antonello, C. Skinner, and A. McLaren, Department of Psychology and Department of Biology, Edinboro University of Pennsylvania, Edinboro PA 16444.

Male red-winged blackbirds (*Agelaius phoeniceus*) were recorded and observed in adjacent wetland territories in northwestern Pennsylvania (Waterford State Game Lands, no. 109) during the spring and summer of 1995. Analog tape-recordings of vocalizations were completed and territorial behaviors were monitored for each subject during three separate 30 min. observation periods conducted on each of three separate days during the breeding season. Females were observed in each subject's territory during recording. Individual territories and perching positions were mapped for each subject. The results indicated variable repertoire sizes between subjects during the observation period. Specifically, repertoire sizes ranged from a minimum of 3 to a maximum of 6 call types between individuals. Additionally, the results indicated a consistent difference in call type frequency and in the most frequent call occurred 2,637 times while the least frequent call type occurred only 1 time during the 30 min. observation periods. Analog recordings of these vocalizations were digitally converted with Canary (The Cornell Bioacoustics Workstation, Version 1.1, 1993) on a Macintosh computer for additional analysis.

Board T: Survey of the Insects Inhabiting the Funk Bottoms Wildlife Area: R.N. Williams, R.W. Rings, M.S. Ellis, and D.S. Fickle, Department of Entomology, Ohio Agricultural Research and Development Center of The Ohio State University, 1680 Madison Avenue, Wooster OH 44691.

In 1995, the Funk Bottoms Wildlife Area was the subject of an ongoing series of insect surveys intended to establish benchmark information on diversity for future reference. Traps utilized in the study include general, battery-powered black light traps, flight intercept (window) traps, Nitiulid Inventory Technique (NIT) traps, and underwater light traps. The strongest emphasis during this survey was placed on the moths (Lepidoptera). In the moth group alone, more than 307 species in 19 families were caught in 1995. The moths were broken down into status categories as follows: abundant species =33, locally abundant species =1, common species =259, locally common species =2, uncommon species =11, rare species =1, and special interest species =1. One rare Lepidoptera specimen was collected. The capture of Enagra decolor (Walker) is a new record for Wayne county, and this is only the sixth specimen of this species caught in Ohio. The beetles (Coleoptera) were also of great interest. Currently, 123 species in 39 families have been identified. Many species, however, are with specialists awaiting determination. Twenty of these species are within the sap beetle family (Nitidulidae) which was also given special attention.
layer of the lipid, so that changes in the surface pressure of the monolayer precisely reflect the kinetics of the crystal formation. A Langmuir balance with strain gauge transducer was used to sense the surface pressure as crystals form for constant temperature and surface area. We have investigated the kinetics of several lipids and report results for the time constants associated with the spreading of the monolayer, the folding and collapse of the monolayer, and rearrangement of crystals. We hope to extend this work to include video measurements of the fractal properties of the crystals. *This investigator was supported by NSF grant DMR-9322301.

**BOARD B** INHIBITION OF PLATELET AGGREGATION BY BICYCLIC L-
BENZYLOTCAHYDROSOQUINOLINES. MARC HOFFMAN, GAMAL SHAMS, KARL
ROMSTEED, SHAMAN SAVIA, VICTORIA ROCHE AND DENNIS FELLER, CAPITAL UNIVERSITY,
BIOLOGY DEPT., 2199 EAST MAIN ST., COLUMBUS OH 43209.

Excessive platelet aggregation contributes to thrombotic diseases. Trimeprofen (TMQ) and related bicyclic 1-benzyloctahydrosoquinolines have been shown to inhibit platelet activation by the stable thromboxane A2 (TX) analog, U46619. Four, novel bicyclic 1-benzyl-substituted octahydrosoquinoline derivatives, each containing a p-chlorobenzyl unit, were synthesized and evaluated for their ability to inhibit platelets. These analogs include the secondary amine (I) and its N-formyl (II, tertiary) and N,N-dimethyl (III, quaternary) derivatives as well as a tertiary amine containing a pyridine ring (IV). The compounds, including TMQ, inhibited U46619 and ADP-mediated aggregation and 4-H-SQ 29,548 radioiodin binding to TX receptors in a concentration-dependent fashion. Compounds I-IV were nearly equipotent. It has previously been proposed that the bicyclic octahydrosoquinolines inhibit platelets by a mechanism related to their lipophilicity (Shams et al., 1993). However, since varying degrees of ionization among analogs I-IV resulted in little difference in anti-platelet potency, neither a hydrophobic character nor a cationic center may be necessary.

**BOARD C** EFFECTS OF POLYCHLORINATED BIPHENYLS (PCBs) ON
INSULIN AND SERUM GLUCOSE LEVELS IN RATS. MARY E. BOLK, BETH B.
PRITS, LEE A. MESSER, BIOLOGY DEPARTMENT, BOWLING GREEN STATE UNIVERSITY,
LIFE SCIENCES BUILDING, BOWLING GREEN OH 43402.

Polychlorinated biphenyls are environmental pollutants which are known to have various carcinogenic and metabolic effects. The incidence of diabetes with PCB exposure has been noted in literature, however statistically significant experimentation has not been documented (MEDLINE - through 11/95). The present study compares the insulin/serum glucose ratios for female rats exposed to PCBs for time periods between 2.5-5 months and exposure levels of 0 PPM, 125 PPM, and 250 PPM. Initial results indicated that rats exposed to 125 PPM PCB had an insulin/serum glucose ratio of about half that of the control rats. The insulin/serum glucose ratios of the rats exposed to 250 PPM PCB were also below those of control animals. Experimentation is presently underway to determine whether the amount of food ingested the night before insulin and glucose testing plays a significant role in these ratios and/or whether the differences observed in the ratios were direct results of PCB exposure or appetite induced.

**BOARD D** FACTORS INVOLVED IN POAG: CAROTENOID INTAKE, EYE
COLOR, AND BIRTH MEASUREMENTS. C.A. GREENWELL AND D.M. SPILLMAN,
DEPARTMENT OF PHYSICAL EDUCATION, HEALTH AND SPORTS STUDIES, PHILLIPS HALL,
MIAMI UNIVERSITY, OXFORD OH 45056.

Glaucoma is the leading cause of irreversible blindness throughout the world. While many factors are believed to be associated with this disease, there are still a number that have not been thoroughly examined. This study investigates some of those associated conditions including the possible effects of high intake of carotenoids, eye color, and birth measurements, three factors upon which little to no research has been done, on primary open angle glaucoma (POAG). Researchers designed a questionnaire that inquired about low intake of carotenoids, eye color, and girth measurements, three factors suggested to be possibly linked to POAG but have since been disproven are also discussed. These factors that were speculated to be possibly linked to POAG but have since been disproven are also discussed. These are caffeine consumption; alcohol consumption; migraine headaches; and smoking. The researchers support the correlation of the above factors but stress that until there is a definitive etiology of glaucoma, all roots must be reviewed.

**BOARD E** GLAUCOMA: FACT AND FICTION. C.A. GREENWELL AND D.M.
SPILLMAN, DEPARTMENT OF PHYSICAL EDUCATION, HEALTH AND SPORTS STUDIES, PHILLIPS HALL,
MIAMI UNIVERSITY, OXFORD OH 45056.

Approximately 80,000 Americans have been blinded by one of the most serious visual disorders in the world, primary open-angle glaucoma (POAG). This is a multifactorial disease, meaning that the contributions of many conditions increase a person's susceptibility. The purpose of this research was to examine the proposed factors believed to cause POAG and discuss the ones that have been both proven and disproven. Among those that scientists have found to be positively correlated to the disease are African race and darker skin color; family history, especially that of siblings; untreated systemic hypertension; type two diabetes mellitus. Dietary effects and obesity are suggested factors, but more research must be conducted before a statement is made. Factors that were speculated to be possibly linked to POAG but have since been disproven are also discussed. These are caffeine consumption; alcohol consumption; migraine headaches; and smoking. The researchers support the correlation of the above factors but stress that until there is a definitive etiology of glaucoma, all roots must be reviewed.

**BOARD F** THE EFFECTS OF ESTROGEN AND TESTOSTERONE ON THE
DEVELOPMENT OF HYPERTENSION IN OVARIECTOMIZED FEMALE
SPONTANEOUSLY HYPERTENSIVE RATS (SHR) ON A HIGH SODIUM
DIET. BEI LIN, GAIL DUNPHY, DANIEL ELY, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON,
AKRON OH 44325-3098.

The existence of differences in the development of hypertension between sexes has been well established. This study examined the effect of testosterone and effect of estrogen on the development of hypertension. The SHR, at five weeks of age, were placed in four groups: control (n=8), ovariectomized (n=8), testosterone implants (n=6), and ovariectomized = testosterone implants (n=6). All groups were fed a high sodium (3%) diet in order to potentiate a blood pressure rise. Blood samples were collected retroorbital at 8, 12, and 15 weeks of age and frozen at -70C for NE (HPLC) and testosterone (RIA) analysis. Blood pressure (BP) was measured weekly by tail cuff sphygmomanometry for ten weeks. ANOVA showed that BP was significantly different among treatment groups (p=0.010) compared to controls. In this study, we found a significantly increased BP in all testosterone treated animals (p<0.04 for Ts, p<0.001 for OVX-Ts, respectively) compared to that of controls. Although the BP of OVX-T was higher than that of T, the difference was not significant (p=0.5). There was a significantly lower plasma level of NE in all treatment groups (p=0.0002) compared to that of controls. These results indicate that: 1) testosterone enhances the development of hypertension; 2) there appears to be a potentiation of NE in the presence of intact ovaries.

**BOARD G** AN ANALYSIS OF LIVE BIRTH CONGENITAL
MALFORMATIONS IN STARK COUNTY OHIO. JERE M. BOYER**, RONALD J.
BRAUN*, CHERYL D.G. KLEIN*, RUPAL M. PATEL*, EMILY CANIFORD**, AND WILLIAM
FRANKS**, NORTHEASTERN OHIO UNIVERSITIES COLLEGE OF MEDICINE, **STARK COUNTY
HEALTH DEPARTMENT, ***AULTMAN HOSPITAL, 2600 SIXTH ST. SW, CANTON OH 44710.

Since 1976 Stark County has ranked near the State of Ohio in the rate (per 1,000 live births) of congenital malformations. The 1987 rate for Stark was 9.1 while Ohio was 10.4. However, in 1988, the Stark rate went to 13.5 and the Ohio rate went to 10.9. For the years 1989 to 1993 (latest available records) the Stark rates of congenital malformation were 51.3, 43.2, 36.5, 18.9 and 18.9, respectively. The Ohio rates for 1989 to 1993 were 25.5, 22.7, 20.1, 20.2, 21.4 for the same years, but the respective years were statistically significant when pre-1988 data was compared with 1988 to 1992 data (p values <0.01). The 1992 and 1993 data was statistically different from the other two years reported in the intragroup but not the intergroup data (p value <0.05). Further examination of information indicated that a new birth certificate was implemented near the end of 1988 but was not fully utilized until 1999 throughout the state. The old format required the physician of record to write in actual malformations written in the medical record with appropriate documentation. As education and physician awareness increased, the Stark County rate has decreased.
Board H KNOWLEDGE OF CARDIOVASCULAR DISEASE IN UNIVERSITY STUDENTS. DIANA M. SPILLMAN Ph.D., PHILLIPS HALL, MIAMI UNIVERSITY, OXFORD OH 45056.

Every 32 seconds an American dies from Cardiovascular Disease (CVD). Despite this fact, many individuals do not know the risk factors for CVD. Five hundred students chosen at random completed a questionnaire about CVD knowledge. Less than 16% of the students knew the top three causes of death. Of the CVD risk factors diabetes and race were the least known, while high blood cholesterol, high blood pressure, obesity, inactivity and smoking were the most often known factors. Family history along with high blood pressure, elevated cholesterol and obesity were given as the most common primary risk factors for CVD. On the personal CVD risk factor questions, men did not know their familiar cardiac history, blood pressures or blood cholesterol levels. Women tended to know more about CVD than the men. Overall the students were not knowledgeable about CVD and thought of it as a condition not to be concerned with until later in life.

Board I USE OF VITAMIN AND MINERAL SUPPLEMENTS BY THE ELDERLY. CHERYL HANBLER MS, DAVID MITCHELL MS, AND DIANA SPILLMAN Ph.D., PHILLIPS HALL, PHS DEPARTMENT, MIAMI UNIVERSITY, OXFORD OH 45056.

This study was to determine the vitamin and mineral use of elderly, free living individuals in the southwestern area of Ohio. A total of 207 elderly (144 women and 63 men) responded to a survey. Only 60 individuals (42 women and 18 men) did not take a supplement. Males and females were equally likely to take supplements. Those individuals taking a vitamin and/or mineral supplement were less likely to have reported major medical problem. They also reported that the supplement had improved their general health. Most individuals purchased their supplements from local groceries and pharmacies. Nearly half were unable (or unwilling) to disclose how much they spent on dietary supplements a month. About half those taking vitamins and minerals said a doctor had recommended that they do so.

Board J DIETARY SUPPLEMENTATION AND BODY IMAGE IN FEMALE COLLEGE STUDENTS. KARIN HILDBERGANDT, MICHELLE LAYDING, AND DIANA SPILLMAN, PHILLIPS HALL, MIAMI UNIVERSITY, OXFORD OH 45056.

This study was conducted to determine the relationships between body image and the use of dietary supplement use in female college students. A questionnaire was sent to 200 randomly selected female students, with 97 (48%) returned. The surveys included questions on use of supplements, obsession with food behavior, previous diagnosis of an eating disorder, exercise habits and basic nutrition knowledge. Results showed that 21 students used supplementation. There were no correlations found between eating disorders and supplement use; however, there was a direct correlation found between supplementation, lack of nutrition knowledge and intense physical exercise practices. The students who took supplements also worked out for at least 6 hours week and estimated that their dietary fat intake was 20% or less. Most demonstrated a lack of nutrition knowledge.

Board K NAVAL ROTC MIDSHIPMEN'S KNOWLEDGE OF CARDIOVASCULAR DISEASE. JOHN R. BENJAMIN, STUDENT (NAVAL SCIENCE) AND DIANA M. SPILLMAN, PH.D. (PHS), MILLETT HALL, MIAMI UNIVERSITY, OXFORD OH 45056.

Cardiovascular Disease (CVD) is the number one crippler and killer of Americans. The CVD condition starts at a younger age than when CVD is usually detected. The established risk factors are well known in the medical community, but what does the average person know about CVD? Naval Midshipmen were chosen for a questionnaire study because of their perceived health knowledge due to the program's requirement for physical conditioning and adherence to an exercise regimen. The 28 question survey was administered to 38 students (ages 18-24) with seven female and 31 male students. The following was found: (1) No midshipman could identify the three top causes of death in the US, (2) only 20% either knew what HDL/LDL is or could identify LDL as contributing to CVD, (3) 37% did not know both their blood pressure and cholesterol level and 68% did not know their cholesterol level alone, (4) 76% did not identify race as a risk factor for CVD or correctly identify in which populations this condition existed, and (5) less than half (39%) expressed concern about CVD. The midshipmen were not knowledgeable about CVD. From the literature, this appears to be typical for the age group, although surprising due to the emphasis placed on physical conditioning in the NROTC program. Clearly the education programs implemented by such groups as the American Heart Association are not as successful as hoped. A renewed emphasis on a comprehensive education into the causes and prevention of CVD is imperative, especially in this surveyed age group where prevention must have already begun.

Board L PHARMACISTS' EVOLVING ROLES IN HEALTH CARE. MARCIA M. WORLE, R.PH., AND JON C. SCHOMMER, Ph.D., THE OHIO STATE UNIVERSITY, COLLEGE OF PHARMACY, 500 WEST 12TH AVENUE, COLUMBUS OH 43210.

The purpose of this study was to investigate the relationships among three independent variables; role overload, role ambiguity, and role conflict, with the dependent variable of pharmacists’ counselor role orientation. A random sample of 301 licensed pharmacists actively practicing in Ohio was mailed a questionnaire to obtain their views about the evolving rules of pharmacists in the health care system. Measurement items were purposed using Cronbach coefficient alpha and factor analysis. The pharmacists were categorized using the NOS survey as follows: pharmacy manager versus staff pharmacist, community pharmacy versus institutional pharmacy, and low daily average prescription volume (< 150/day) versus high daily average prescription volume (> 150/day). Multiple regression analysis was used to investigate the relationships among the variables according to these categories. Of 273 deliverable surveys, 127 (46.5 percent) were returned in usable form. The results showed that overload, ambiguity, and conflict in pharmacists' roles can affect their orientation towards counseling their patients. Also, the different categories of pharmacists studied were influenced differently by role overload, ambiguity, and conflict. As pharmacists’ roles in health care continue to evolve, some "growing pains" will continue to be experienced by various segments of pharmacists.

Board M A COMPUTER PROGRAM FOR DOSE-RESPONSE DESCRIPTION OF CHEMICALLY INDUCED OxIDATIVe STRESS. JANIEZ Z. BYCZKOWSKZ AND CARLYS D. FLEMMING, MANTECH ENVIRONMENTAL TECHNOLOGY, INC., P.O. BOX 31009, DAYTON OH 45431-0009.

Risk characterization combines dose-response description with exposure. While the exposure to chemicals, in most cases, can be characterized reliably by direct measurements or can be estimated with physiologically based pharmacodynamic (PBPK) models, the exact dose-response characteristics are much more difficult to define. Particularly problematic are extrapolations of the expected biological effect from high to low doses for so-called "nonspecific" action of proxidant chemicals affecting several cellular targets simultaneously. To solve this problem, a biologically based pharmacodynamic (BBPD) model was developed, based on a description by Vroegop et al. (Free Rad. Biol. Med. 18:141, 1995). The resultant computer program simulated the dose-dependent biological effects of chemically induced oxidative stress in tissue preparations. The program was written in Advanced Continuous Simulation Language (ACSL) with a FORTRAN sub-routine and simulations were performed using SIMUSOLVE software (DOW Chemical Co., Midland MI). The BBPD model described formation of free radicals over time as a function of the proxidant chemical concentration, and predicted the dose-dependent response of multiple cellular targets at each time. The BBPD model was calibrated with the literature data for free radical generation in liver slices, and for dose-dependent effects of oxidative stress in cultured neuronal N18 hybridoma cells. The BBPD model allowed us to distinguish between the "one-hit" targeted mode of action of free radicals and the "multi-hit" stochastic interaction with multiple nonspecific cellular targets. It is suggested that the algorithm developed and calibrated with experimental data in vitro may be employed for future dose-response characterization of action of proxidant chemicals in vivo, using the physiologically based pharmacokinetic/dynamic models. * Supported in part by Dept. of the Air Force Contract No. F33615-90-C-0532 and AFOSR Work Unit No. 2312A02.

Board N REGULATION OF AT1 RECEPTOR MRNA IN VASCULAR SMOOTH MUSCLE CELLS FROM SHR AND WKY RATS BY ANGIOTENSIN PEPTIDES. LIVAM A.A. NEWES*, ROBBIN A.S. SANTOS**, AMY MILSTED, DEPT. OF BIOLOGY, UNIVERSITY OF ATRON, ATRON OH 44325-3908; **UNIVERSIDADE FEDERAL DE MINAS GERAIS, BELO HORIZONTE, BRAZIL.

We characterized the effect of angiotensin peptides on angiotensin subtype 1 (AT1) receptor gene expression in VSMC from SHR and WKY rats. The effects of Ang(1-7) and Ang II on AT1 receptor mRNA expression were examined in aortic vascular smooth muscle cells (VSMC) cultured from male SHR and WKY rats. Cells were incubated for 24h in serum-free medium containing Ang-(1-7) (0.01-10 μM) or Ang II (0.1-1.0 μM). Steady-state mRNA levels were evaluated by Northern blot analysis; the results were expressed as relative levels of AT, mRNA/GAPDH mRNA. In VSMC cultures from either SHR or WKY rats no effect on AT1 mRNA was observed with Ang-(1-7) at doses ranging from 0.01-10μM, however down-regulation of AT1 receptor mRNA was observed in SHR and WKY VSMC treated with Ang II. In VSMC from SHR, Ang II (0.1-1.0 μM) reduced AT1 mRNA levels by 22-46% of control levels, but the reduction was statistically significant only at 10μM (46 +/- 13%, p<0.05) in WKY rat VSMC the reduction was 24-50% (p<0.05) of the control levels. No significant differences were found either between SHR and WKY, or...
between doses of Ang II. Our results indicate that the AT1 receptor is not regulated differently by angiotensin peptides in SHR compared to WKY rats. *Supported by CNPq.*

**BOARD O PCR ANALYSIS OF Y CHROMOSOME SEQUENCES FROM FIXED CYTOGENETIC PREPARATIONS.** HOLLIE K. WALEN, 1 and GAIL D. WENGER, 2 DEPARTMENT OF MOLECULAR GENETICS AND PATHOLOGY, THE OHIO STATE UNIVERSITY, COLUMBUS, OH 43210 and CYTOGENETICS LABORATORY, CHILDREN'S HOSPITAL, COLUMBUS OH 43205.

With identification of the genes responsible for a variety of human disorders, investigation of an increasing number of diseases at the molecular level becomes possible. Applications of polymerase chain reaction (PCR) using fixed cell preparations are described. This testing allows rapid analysis of six as well as evaluation of Y chromosome sequences in Turner Syndrome (TS) patients. Individuals with this condition often have short stature, gonadal dysgenesis, and cardiovascular and renal abnormalities; most have a 45,X karyotype. The risk for development of gonadal tumors in these patients is significantly higher in individuals with Y chromosome sequences present. PCR was performed using fixed cell pellets from cultures established for cytogenetic studies. Primers for the Y chromosome genes SRY and DYZ3 were used, as well as for amelogenin, a gene with homologous sequences on the X and Y chromosomes. Amplified product was detected on ethidium bromide-stained agarose gels. Issues of sensitivity and specificity are addressed. Amplification of DYZ3/SRY was found in 3 of 27 TS patients tested, all have a mosaic karyotype 45,X/46,XY. This methodology allows performance of PCR-based testing on standard fixed cytogenetic preparations and sensitive detection of Y chromosome sequences in at-risk TS patients.

**BOARD P APPLICATION OF DIGITAL IMAGE ANALYSIS FOR HELPING TO DEFINE THE PROGNOSIS OF SELECTED MALIGNANCIES.** DAVID L. MASON, and MIGUEL A. PEDRANA, WITTENBERG UNIVERSITY AND COMMUNITY HOSPITAL, SPRINGFIELD OH 45501.

Cells obtained from a variety of malignancies and stained by the Feulgen procedure are evaluated by an integrated digital image analysis system (CAS 2000) for determining, on a quantitative basis, two main nuclear features, ploidy and the rate of division, S-phase. As a generalization, malignancies are assessed both for scoring of sex as well as evaluation of Y chromosome sequences in Turner Syndrome (TS) patients. Individuals with this condition often have short stature, gonadal dysgenesis, and cardiovascular and renal abnormalities; most have a 45,X karyotype. The risk for development of gonadal tumors in these patients is significantly higher in individuals with Y chromosome sequences present. PCR was performed using fixed cell pellets from cultures established for cytogenetic studies. Primers for the Y chromosome genes SRY and DYZ3 were used, as well as for amelogenin, a gene with homologous sequences on the X and Y chromosomes. Amplified product was detected on ethidium bromide-stained agarose gels. Issues of sensitivity and specificity are addressed. Amplification of DYZ3/SRY was found in 3 of 27 TS patients tested, all have a mosaic karyotype 45,X/46,XY. This methodology allows performance of PCR-based testing on standard fixed cytogenetic preparations and sensitive detection of Y chromosome sequences in at-risk TS patients.

**BOARD Q AUDITORY PERCEPTIONS OF DIFFERENT TYPES OF MUSIC.** DONALD FUEG, LINDA PETROSSIO, CORYN WILCOX, LISA ANDRA, SCHOOL OF HEARING AND SPEECH SCIENCES, LINDLEY HALL 219, OHIO UNIVERSITY, ATHENS OH 45701.

The purpose of the present study was to determine the effect of preference for three different types of music on magnitude estimation scaling behavior in young adults. Three groups of college students, 10 who liked rock music, 10 who liked big band music, and 10 who liked classical music were tested. Subjects were instructed to assign numerical values to a random series of nine supathreshold intensity levels of 10 second samples of rock music, big band music, and classical music. Data analyses indicated that subjects who liked rock music scaled that stimulus differently than those subjects who liked big band and classical music. Subjects who liked big band music scaled that stimulus differently than those subjects who liked rock music and classical music. All subjects scaled classical music similarly regardless of their musical preferences. The results were studied in terms of personality types as well as the physical nature of the stimuli. It was suggested that classical music appeals to a wide variety of personality types, unlike rock and big band music. Spectrographic analyses of the three types of music showed that classical music is the most complex of the three stimuli in terms of frequency and amplitude distributions over time. Further research is warranted since music of all types represents an important part of our lives and influences our daily behaviors.

**POSTER SESSION**

**Saturday, May 4, 1996**

**Osborne Hall**
Today aluminum is omnipresent, but its advantages are misleading. Current cookware. This experiment was performed by testing seven different types of meat samples of each type of meat. I found the fat content in each meat sample ground hamburger, ground pork, and ground turkey. The experiments used 10 trials in the early stages of Alzheimer's Disease. The first test, consisting of five repetitions to approximate five years of rainfall. After each eluate the water will be tested for pH, hardness, and alkalinity. These results will be compared to parallel tests of water samples from the six water sources to determine soil buffering capability depletion.

**BOARD E THE POISONED WELL. COLIFORM BACTERIA/ E. COLI HAZARDS AND THEIR IMPLICATIONS. CHERYL L. WELCH, 5030 MARSH-EDISON RD., MARION OH 43302.**

Poisoning of water wells occurs everyday without warning. In this investigation, I tested for coliform bacteria in many wells around the Marion County area. After filtering and culturing the bacteria, I tested for aldehydes on the m-ENDO petri dish which suggests coliform bacteria. If this test, and its verification tests come back positive, I then tested for Escheria Coli, Klebsiella pneumoniae, nitrates, and Pseudomonas aeruginosa. Since Coliform Bacteria is an indoor bacteria, meaning that if coliform is present in a well, that other harmful disease-causing organism may also be present. After gathering the results, I then obtained well logs and mapped out Marion County showing trouble spots versus the fairly safe areas from sewage seepage. I did this by comparing my results with the County Health Departments, and coming up with reasonable ideas as to where. Then, using the well logs, I mapped out areas where the aquifer was sand, silt, clay, shale, and gravel. The aquifer is very important because septic sewage must go through the aquifer before reaching the water supply. Then I combined the two danger maps together into one map that shows the hazard areas of Marion County.

**BOARD G INCREASING THE DEPTH EFFECT OF STEREOSCOPIC 3D IMAGES BY USING READING GLASSES. KAREN J. BOY, 6806 WINDSOR ROAD, HUDSON OH 44236.**

Viewers of true 3D stereoscopic images often feel discomfort and see "double" images that they are unable to fuse. Computer programs have had difficulty overcoming this because it is caused by the difference between the accommodation (focus) point and the convergence point (inward rotation point of the eyes). Increased distances of the virtual image from the screen greatly influence this difference, and its problems. My hypothesis reasoned that by using lower correction glasses to change the accommodation of the viewers to a calculated distance behind the computer screen these problems could be reduced. Ten subjects were tested with common 3D glasses and with the improved 3D glasses. My results concluded that for almost all viewers the improved glasses helped them to see images closer to the set depth, and 60% of viewers found the improved glasses made images easier to fuse, while 10% of viewers preferred the normal glasses. Also, 60% of viewers preferred the improved glasses for less eye strain, and no viewers preferred the common 3D glasses. These results indicate that the improved glasses made many improvements for viewers of 3D images.

**BOARD H HEAVY WEIGHT CONTENDERS: A LOOK AT FAT. DANIEL T. MOSS, 5388 HEADGATE RD., INDIAN SPRINGS OH 45011.**

This investigation concerns the type of ground meat which contains the most amount of fat. I chose to study this because so many people are interested in dietary intake of fat and there is much discussion about which meat has the highest fat content. Many people are told that ground turkey is a healthier choice than ground beef or pork in food preparation. I wanted to see if the claims were true. The meat samples that I chose to investigate were ground chuck, ground hamburger, ground pork, and ground turkey. The experiments used 10 gm samples of each type of meat. I found the fat content in each meat sample by subtracting the weight of the empty petri dish from the weight of the petri dish with the samples of fat. After a series of three trials, I compared the results of each trial and then calculated the average based on those three trials. The results indicated that ground turkey had the greatest amount of fat and ground hamburger had the least amount. This information seemingly contradicts the information given to millions of diet conscious consumers.

**BOARD I SPF MOISTURIZERS. ANNA SOLVEIG HILL, 5608 CRUIKAR DR., DAYTON OH 45424.**

Certain over-the-counter face moisturizers contain a sunscreen of SPF (Sun Protection Factor) 15. Do these moisturizers provide greater protection than a conventional sunscreen of SPF 15? It was hypothesized that the sunscreen would provide better UV (ultra-violet) protection than the face moisturizers, because the sole purpose of sunscreen is protection from the sun, while the moisturizers are for cosmetic reasons. Five different products were tested. Four were over-the-counter face moisturizers, with SPF 15; the fifth was a SPF 15 sunscreen. The experiment consisted of exposing UV sensitive paper, enclosed in a clear plastic cover, to direct sunlight with a 3 cm diameter circle of each product on top of the plastic cover. After the UV sensitive paper was exposed to the sunlight for a defined period, it was brought inside and photographed to record the results as a permanent record. The image that each of the products left on the UV paper constituted the degree of protection from the UV rays. These images were then compared to a "gray scale" generated by a computer printer. This scale was used to determine the level of UV protection that each product provided. From this comparison, it was determined that the SPF 15 sunscreen provided the best ultra-violet protection of all tested products, thus supporting the hypothesis.

**BOARD J NOISE -- GOOD? BAD? MAYBE BOTH! BRIAN R. DULIN, ZANE TRACE HIGH SCHOOL.**

Circuitry was developed to control noise based upon an understanding of how sound travels through a medium, certain electrical properties, and finally how waves behave in the presence of other waves. Research on the properties of waves indicated that various electromagnetic and water waves interacted to enforce or cancel superimposed waves based upon their phase relationships. The trigonometric relationships concerning waves were evaluated and found to at least mathematically indicate my hypothesis could be correct. The underlying relationships can be expressed as: \( Y = A \cos(kx - \omega t) \) and \( Y = A \cos(kx - \omega t + \phi) \). In addition to \( k(x - \omega t) \) covering the relative phase relationship of the waves, it was also utilized in considering how to process wave signals to force two waves into and out of phase with each other to study the resultant waves. Mechanical and electronic means of phase shifting (including researcher constructed circuits) produced very significant levels of noise cancellation over a range of frequencies. This research could lead to relatively inexpensive and light weight means of controlling traffic and industrial noises.

**BOARD K DO SPECIFIC AMBIENT ODORS ENHANCE SHORT TERM MEMORY FUNCTION IN EARLY STAGE ALZHEIMER'S DISEASE PATIENTS? BRETT THOMAS PERALA, 600 EASTWOOD ST., GENEVA OH 44041.**

It was hypothesized that short term memory in early stage Alzheimer's Disease patients would be enhanced when subjects were exposed to the ambient odors of peppermint, lemon, and rosemary during the administration of name/face recognition tests. Two separate tests were administered to live subjects who were identified as having the mental faculties as are indicative of the early stages of Alzheimer's Disease. The first test, consisting of five photographs with first names and occupations or hobbies was administered with no odor present. The second test, of the same format was administered while the subjects were in the presence of the ambient odors of the essential natural oils of peppermint, lemon, and rosemary. Test results indicated that when subjects were exposed to the ambient odor their scores improved overall. It was concluded that exposing early stage Alzheimer's Disease patients to the specific ambient odors of peppermint, lemon, and rosemary does have a measurable positive effect on the short term memory of the patients.

**BOARD L OLFACTION; A LEARNED ASSOCIATION. KRISTEN E. HUMBACK, 2589 SHAFFER AVE., CINCINNATI OH 45211.**

New research has shown that olfaction through olfactory cortex and hypothalamic center evoke more emotion and behaviors than any other sense. In order to investigate my hypothesis, that olfaction is a learned behavior
The geographic ranges of Desmognathus weltersi and D. quadramaculatus come in close contact in southern West Virginia, but are thought to be mutually exclusive. Both species are believed to be ecologically similar in their preference for semi-aquatic habitats in high gradient mountain streams. D. monticola however, is sympatric with both species and is thought to prefer significantly more terrestrial stream-bank habitats. Microhabitat characteristics of these three species have been measured in southern West Virginia and southeastern Kentucky in order to clarify the ecology of D. weltersi, which has not been quantified. Preliminary results suggest that D. weltersi and D. quadramaculatus are not significantly different in their microhabitat preferences. However, D. monticola is significantly more terrestrial than either species. Competitive exclusion may help to explain the allopatric ranges of D. weltersi and D. quadramaculatus. Further study is needed to determine whether or not both species share the same limited resource.

9:15 GENETIC RESPONSES OF FISH IN SMALL STREAMS TO LANDSCAPE VARIATION. Mark M. Myers, E. Raymond Heithaus, and Patricia A. Heithaus, Biological Department, Kenyon College, Gambier OH 43022.

Past studies have revealed significant correlation between patterns of allozyme variation in stream fishes and water quality as influenced by pollution. In Knox County (OH) agricultural practices may influence 80% of first- and second-order streams, with influences including removal of surrounding forest, altered water flow, sedimentation, and input of agricultural chemicals. Studying first- and second-order streams reduces upstream effects. In this study we used allozyme electrophoresis to examine the responses of genetic parameters in Ethostoma caeruleum (Rainbow Darters), E. nigricorne (Johnny Darters), and Phoxinus erythrogaster (Red-bellied Dace) populations in small streams surrounded by forested lands pasture, cultivated fields with vegetated riparian strips, and cultivated fields without riparian trees. Twenty streams were sampled in the Kokosing River drainage area in eastern Knox County. The most distant streams were >40 km apart. Twenty-four individuals of each species were collected from each stream, when possible. For variable enzyme systems, heterozygosity was near 12% for fish from streams surrounded by forested land but only 2% for fish from the streams in non forested habitats. Allelic polymorphism was low for all species at the spatial scale in this study.


The vertebrate ovary and the follicles in it consist of distinct cell types and an array of extra cellular matrix components. During the course of the reproductive cycle, the follicle matures, ovulates and transforms into the corpus luteum. During ovulation, the oocyte must breach the extra cellular matrix of the follicle before it can move into the oviduct. In this context, a role for interstitial collagenase, an enzyme that degrades type I collagen matrix, has been implicated in the mammalian ovary. However, the precise distribution of this enzyme in the ovary has not been determined. Using specific antibodies, we have localized the interstitial collagenase and type I collagen in the rat ovary. Immature rats were primed with pregnant mare's serum gonadotropin (PMSG, 15 IU) in 100 µl of phosphate buffered saline (PBS). Two days later, to induce ovulation, some of these animals were injected with human chorionic gonadotropin (hCG, 5 IU/100 µl PBS). The animals were sacrificed at appropriate times, the ovaries were removed and processed for cryostat or paraffin sectioning. Type 1 collagen formed a dense wreath around the follicles and corpora lutea. The collagen matrix was also found in the interstitium and in the walls of the interstitial arterioles and venules. The interstitial collagenase was present in the oocytes and in the cells of the follicular wall. Endothelial cells in the interstitial blood vessels were also stained for the enzyme. The unique distribution of the interstitial collagenase and the type I collagenase suggests that they might play key roles in ovarian physiology. More significantly, the presence of collagenase in the ovary suggests that the oocyte most likely determines the site of ovulation on the follicular wall.

9:45 DEVELOPMENTAL DIFFERENCES IN RENAL RENIN GENE EXPRESSION IN HYPERTENSIVE AND NONHYPERTENSIVE RATS. Tony K. Lee, Loman A. A. Neves, Monte E. Turner, Dan L. Ely, Amy Milsted, The University of Akron, Dept. of Biology, Akron OH 44325-3908.

We established a development profile of renal renin mRNA levels for the University of Akron SHR and WKY strain rats and assessed whether changes in the renin mRNA correlated with the presence of the hypertensive
Y chromosome, using the backcross strains SHRY and SHRa. We examined 1 day and 14 day old male pups from the SHR, WKR, SHRa, and SHRY rat strains. Kidney renin mRNA levels were quantified by Northern blotting, using a rat renin cDNA. Levels of renin mRNA were significantly lower in 14 day old rats compared to 1 day old rats, in each of the four strains. At day one, renin mRNA levels were highest in the SHR strain (1.31 +/- 0.09), followed by the WKR strain (0.73 +/- 0.06). The SHRa and SHRY strains (0.57 +/- 0.07, 0.45 +/- 0.05) were not found to be significantly different, but both were found to be lower than the SHR and WKR strains. At 14 days, levels of renin mRNA were not found to be significantly different between SHRa and SHRY (0.13 +/- 0.01, 0.11 +/- 0.01) or between WKR and SHRY (0.48 +/- 0.06, 0.40 +/- 0.02) strains. However, renin mRNA expression was lower in SHRa and SHRY compared to WKY and SHR. At day one, levels of renin mRNA were lower in the WKY strain in comparison to the SHR strain. Separation of the hypertensive Y chromosome and the hypertensive autosomal components is associated with altered regulation of renin mRNA expression.

10:00 THE ORGANIZATION OF CHEMICALLY ACTIVATED FOOD SEARCH BEHAVIOR IN GOURAMIS, KURT M. SCHMITT, DR. CRAIG W. STEELE, AND DR. CAROL SKINNER, DEPARTMENT OF BIOLOGY AND HEALTH SERVICES, EDINBORO UNIVERSITY, EDINBORO PA 16444.

Many studies have determined the thresholds of detection by fishes for many stimulating substances; however, few have examined the influence of chemoreception on fish foraging behavior, and none on the ethological organization of food search and foraging behavior. Insight into these behaviors is gained through the study of the response of the blue gourami to chemical stimuli. The blue gourami, Trichogaster trichopterus, is used because it has unusual taste appendages in its extended pelvic fin rays. The chemical stimulus used was a solution of seven amino acids and taurine. The solution was introduced into the gourami tank in three different concentrations. Data were collected through observation and then analyzed to examine the influence of chemoreception on fish foraging, feeding, ethological structuring and optimal foraging theory.


PCBs are xenobiotics that are ubiquitously dispersed throughout the environment and food chain. Female Sprague-Dawley rats were exposed to PCB in their diet from the day of conception as determined by the presence of sperm in the vaginal smear. This toxin is known to cross the placenta and is metabolized for 9-10 yr. and 18-20 yr. cycles; but tests also revealed the 4-yr. cycle. Other Siberian salmon species and steelhead (Oncorhynchus sp.) and steelhead. In this study the role of each of five species showed fairly clear cycles of these periods; but tests also revealed the 4-yr. cycle. The chum (O. keta) gave significant (p<.05) 9-10 yr. and 18-20 yr. cycles; but tests also revealed the 4-yr. cycle. Such a cycle was even more evident in the sockeye (O. nerka) too; but overall the contribution of coho, chum and sockeye to total landings was small and barely influenced the impact of the 10-22-30 yr. cycles of chinook and steelhead.

10:45 PROBABLE 10-12 YR. HARVEST CYCLE IN STELLAR SEA LION (EUMETOPIAS JUBATUS) IN BRITISH COLUMBIA, JOHN F. WING, P.O. BOX 720, WITTENBERG UNIVERSITY, SPRINGFIELD OH 45501.

Bigg (1988) summarized the annual kill of stellar sea lions in British Columbia (BC) for the years 1912-1915 and 1922-1968 as well as census counts for the years 1971-1982. The species favors exposed coastal sites and BC rookeries and haulouts extend all the way from Alaska to James Bay. The kill series shows sharp ups and downs with lows about 1913, 1922, 1934, 1965, and 1966. The contingency periodogram test (Legendre et al, 1981) applied to residuals of the 1922-1968 kill gave significant (p<.05) 11-12 yr. and 23 yr. cycles. The kill residuals can be correlated with those of a number of cyclical prey. Residuals of N. Pacific total salmon catch correlated .343 (p<.05) and residuals of regionsex salmon pack also correlated positively, SE Alaska (753, n=18, p<.001), BC.200, n=38, n.s., and Washington (618, n=18, p<.01). The lower correlation for BC salmon may be because 1) all salmon destined for US rivers travel past the BC ocean-facing rookeries and haulouts while 2) only some BC salmon do while others come from the highly irregular catches in the BC inland passages.

2:15PM SATURDAY, MAY 4, 1996
TIMKEN SCIENCE HALL 271
JOHN F. WING - PRESIDING

2:15 DEVELOPMENT OF INTEGRATED PEST MANAGEMENT (IPM) AS A VIABLE ALTERNATIVE TO CHEMICAL CONTROLS OF ANIMAL AND PLANT PESTS. GEORGE E. KLEI, DEPT. OF BIOL. SCIENCES, KENT STATE UNIVERSITY-STARK CAMPUS, 6000 FRANK AVE., NW, CANTON OH 44720.

The publication of Silent Spring in 1962 by Rachel Carson and other similar books and articles later helped to dramatize overly problems of resistance, environmental contamination, and increased costs that farmers, professional entomologists, and pest control operators were encountering during the 1960s as they attempted to continue controlling agricultural pests by predominantly chemical means. This paper will review some of the progress towards truly sustainable agricultural methods that have been made since the early "spray & pray" days of synthetic chemical control that occurred during the decade after WW II. By the current situation in the US Midwest, it will include such data as the increasing numbers of IPM and Biological Control papers that have been presented at the Entomological Society of America's annual meetings, the increasing numbers of IPM articles that have been published in the ESA's journal, Environmental Entomology, and the increasing number of Entomology/Bio. Science faculty positions dedicated to research in IPM. The author will also outline some of his own observations of this profoundly changed discipline, from his early experiences on a working dairy farm, through graduate training in insecticide resistance, side-effects and soil ecology, up to currently working as a professional ecologist, board-certified entomologist and university biological sciences professor.

2:30 TEMPORAL DISTRIBUTION AND BEHAVIOR PATTERNS OF SEXUAL ACTIVITY OF GIANT CANADA GEESE IN OHIO. BLAKE L. BATES AND PHILIP C. WHITFORD, BIOLOGY DEPT., CAPITAL UNIVERSITY, 2199 E. MAIN ST., COLUMBUS OH 43209.

Most past descriptions of sexual behavior for Giant Canada Geese, Branta canadensis maxima, were incidental to other research and lacked adequate data to define timing, frequencies, and parameters of specific behaviors. Our preliminary observations led us to question the long accepted belief that most sexual activity occurred before 10:00 am in this species. We expanded our research to include research in IPM. The publication of Silent Spring in 1962 by Rachel Carson and other similar books and articles later helped to dramatize overly problems of resistance, environmental contamination, and increased costs that farmers, professional entomologists, and pest control operators were encountering during the 1960s as they attempted to continue controlling agricultural pests by predominantly chemical means. This paper will review some of the progress towards truly sustainable agricultural methods that have been made since the early "spray & pray" days of synthetic chemical control that occurred during the decade after WW II. By the current situation in the US Midwest, it will include such data as the increasing numbers of IPM and Biological Control papers that have been presented at the Entomological Society of America's annual meetings, the increasing numbers of IPM articles that have been published in the ESA's journal, Environmental Entomology, and the increasing number of Entomology/Bio. Science faculty positions dedicated to research in IPM. The author will also outline some of his own observations of this profoundly changed discipline, from his early experiences on a working dairy farm, through graduate training in insecticide resistance, side-effects and soil ecology, up to currently working as a professional ecologist, board-certified entomologist and university biological sciences professor.

2:30 TEMPORAL DISTRIBUTION AND BEHAVIOR PATTERNS OF SEXUAL ACTIVITY OF GANDAN CANADA GEESE IN OHIO. BLAKE L. BATES AND PHILIP C. WHITFORD, BIOLOGY DEPT., CAPITAL UNIVERSITY, 2199 E. MAIN ST., COLUMBUS OH 43209.
observation for all time blocks, 28.3% of copulation attempts occurred before 1000, 48.1% before 1200. Peak copulation rates were observed 1000-1200 (21.7%) and 1400-1600 hours (21.2%), with 16.5% and 13.8% occurring from 1400-1500 and 1600-1800 hours, respectively. These results indicate a strong morning bias in past observations causing underestimates of sexual behavior frequency for the species.


Genetic markers may be used to examine population structure and to discriminate between populations. We are using transferrin polymorphisms to describe patterns of geographic variation in wood ducks (Aix sponsa). We expect to find geographic variation in allele frequencies due to limited female-mediated gene flow. Gene flow may be low between populations because females return to nest at their natal site. Variation in transferring is being examined in four populations of wood ducks nesting in Ohio. These are located at Ottawa National Wildlife Refuge, the Ravenna Army Ammunition Plant, Mosquito Creek Wildlife Management Area, and Berlin Wildlife Management Area. Serum has been collected from female wood ducks that nest in artificial nestings structures. After processing, samples were stored at -70°C until electrophoretic analysis. Samples were run on native polyacrylamide gels alongside purified transferrin for comparison. Transferring were isolated using Western blot analysis. Electrophoretic analyses revealed a variable electromorph exhibiting a stereotypical transferrin pattern: 2-banded homozygotes (representing the iron saturated and unsaturated proteins) and either 3- or 4-banded heterozygotes.

3:00 PACIFIC DRAINAGE BASIN, I: SYNCHRONY IN SALMON HARVEST CYCLES, 1897-1971. JOHN F. WING, WITTENBERG UNIVERSITY, P.O. BOX 720, SPRINGFIELD OH 45501.

Canned salmon records for Alaska, BC, Washington, Oregon and Northern California were taken from Gregory and Barrie (1939), Marks and Sellwell (1965), and Nebby (1971). Trends were removed and residuals were intercorrelated for evidence of regional correspondences indicating near-synchrony of any cycles. In locations where catch or counts were also available these were used to validate the proxy canny measures. Validation correlations ranged from: .860-.937 (all p<.001). Results showed O-lag inter correlations were mostly moderate and significant (P<.05) between adjacent regions but mostly low positive and less significantly frequent for more distant regions; however shift in lag of only 1-2 years raised magnitude and significance. Graphs showed six cycles of salmon production from 1877-1992. Long records (40 yrs or longer) showed 10-12 yr. and 20-24 yr. cycles at p<.01 or better, but only the Alaska and BC series reached the .05 level or better for both cycles. A short N. California Coast record gave a 10-yr. (p<.01) cycle with a strong 5-yr. (p<.01) sub-cycle. Thus canny production showed evidence of regional cycle synchrony but with slightly lower correlations than actual catch records.


Wing found (residuals of fur harvests for seven mammals in the Columbia River Basin (CRB) showed 10-12 yr. cycles and (2) residuals of total salmon landings also displayed 10-12 yr. cycles. The latter correlated positively with five of the furbearers, most importantly the mink (p<.05) and otter (p<.01). Wing also intercorrelated residuals of canned salmon records for six sites in the Pacific drainage basin (PDB) and found five of the fifteen correlations were significant as well as finding near-synchronous cycling. It follows that harvests of salmon-feeding furbearers also might cycle in unison in the PDB. This study presents O-lag intercorrelations of otter harvest residuals for five regions: Alaska, BC, Washington, Oregon and California. Correlations ranged from .025 to .451. Six of the ten were significant (p<.05 or better) and seven were of moderate size (.301 to .451). When otter harvests from adjacent intermountain states were added to the matrix the new resultant correlations were of lower and marginally fewer were significant, suggesting the PDB is a fairly homogeneous region.

3:30 PACIFIC DRAINAGE BASIN, III: POSSIBLE CAUSES OF SYNCHRONOUS CYCLING OF FAUNAL HARVESTS. JOHN F. WING, P.O. BOX 720, WITTENBERG UNIVERSITY, SPRINGFIELD OH 45501.

Wing (1965) has shown that for over 50 years at least six furbearers have displayed 10-12 yr. and 20-24 yr. cycles in the Columbia River Basin. Most of these animals are predators scavenging on Pacific salmon (Cedro and Hixon et al, 1989). Wing (1968a) also has shown synchronous cycling in both salmon and otter harvests which extend beyond the CRB to include the entire Pacific Drainage Basin (PDB). Further, these synchronous cycles extend to the offshore islands of BC as shown in the kill record of the Stellar sea lion (Wing, 1968b). This paper presents some possible causes of such synchrony. Emphasis is on vanLoan and Labitzke’s (1984) report of a 10-12 yr. cycle in middle atmosphere pressure systems and the relationship to ocean circulation, and hence its consequences (1) on the Alaskan gyre, coastal upwellings, and pelagic biomass and (2) Alaskan lows affecting inland weather patterns and hence faunal harvests.

AQUATIC/MICROBIAL ECOLOGY
9:00AM SATURDAY, MAY 4, 1996
TICKEN SCIENCE HALL 251
ARTHUR L. VORHIES - PRESIDING

9:00 THE HYDROPHOBIC NATURE OF BACTERIAL COMMUNITIES IN TWO OHIO STREAMS. CHRISTOPHER J. McNAMARA, MICHAEL J. LENKE AND LAURA G. LEFF, DEPARTMENT OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44242.

The hydrophobicity of bacterial cell surfaces can influence factors such as adhesion to surfaces and nutrient utilization. The purpose of this study was to compare the surface hydrophobicity of bacteria from different stream communities. Three habitats (course rock substrate, fine depositional sediments and water) from two streams (Bixon Creek and Mahoning Creek) were sampled. Bacteria were dislodged from the rock and sediment samples using sonication and 0.1 ml of each sample was plated onto modified nutrient agar. Colonies were transferred to modified nutrient broth and the hydrophobicity of samples was determined by measuring the difference between the optical density before and after mixing with n-octane. 13% of the bacteria were found to be hydrophobic, 61% of these hydrophobic bacteria were found in the water column. 74% of all bacteria were Gram-negative and identified using API-NPT strips. Spingomonas paucimobilis and Chromyces luteolus were identified as hydrophobic bacteria. The low numbers of hydrophobic bacteria found in the substrate samples suggest two possibilities: 1) more hydrophobic bacteria live in the water column than on substrates or 2) methods other than sonication may be necessary to remove hydrophobic bacteria from these surfaces.

9:15 TEMPORAL PATTERNS OF BURKHELDIOMA CEPACIA ABUNDANCE IN TWO OHIO STREAMS. ADAM A. LEFF AND LAURA G. LEFF, KENT STATE UNIVERSITY, TRUMBULL CAMPUS, 4314 MAHONING AVE, WARREN OH 44483.

The abundance of B. cepacia was determined in two Northeastern Ohio streams, the Mahoning River and Bixon Creek. Midstream surface waters were sampled monthly for one year. Stream water was examined for bacterial abundance by the following methods: fluorescence microscopy for total bacteria, plate counts for culturable bacteria (CFUs), and colony hybridization for B. cepacia using a species specific-rRNA gene probe. The number of CFUs isolated on modified nutrient agar were highest Nov. through Jan. and dropped when streams were ice covered during late winter. Number of CFUs rose during the spring and were relatively low during the summer and fall. Total bacterial numbers followed similar trends, peaking during the winter and spring and declining during periods of ice cover. However, total numbers remained at moderate levels during the summer and fall, suggesting a higher percentage of dormant or inactive cells. The percentage of total bacteria which were B. cepacia ranged from 0-24%, averaging 11% for the winter and spring and 0% during the summer months. Water turbidity and flow were lowest during the summer months indicating that B. cepacia may be associated with particulates and originate from sediments or allochthonous sources.

9:30 DETECTION OF PHOSPHORUS LIMITATION OF BACTERIAL GROWTH IN LAKE ERIE. XUEQING GAO AND ROBERT T. HEATH, DEPT. BIOL. SCI. AND WATER RES. RES. INST., KENT STATE UNIVERSITY, KENT OH 44242-0001.

Whether natural populations of aquatic bacteria are growth limited by P-availability is an unresolved issue, important for both scientific and practical purposes. We investigated the feasibility of using bacterial productivity and ....

Cold water springs represent an environment that is different from streams fed from run-off. Springs are more stable in chemical composition, water velocity, and temperature. Spring bacterial assemblages may be dominated by cells from groundwater and stream assemblages may contain a higher proportion of soil bacteria carried in by run-off. Because gram positive bacteria are more abundant in soils, by comparing gram staining results between a spring and a stream the importance of soil bacteria may be determined. Water and rock samples were collected from Triple Springs Stream at West Branch State Park from the eucron and a stream site farther downstream. Bacteria were cultured on modified Nutrient Agar (mNA) and colony forming units were enumerated. Thirty-three individual bacterial colonies from each sample were subjected to gram staining. The total percentage of gram positive bacteria from the eucron (water=38%; rock=43%) was no significantly different from the stream site (water=37%; rock=46%). The results of the study suggest that there is not a significant amount of gram positive bacteria being introduced to the stream by run-off.


The development of predictive models of global environmental change requires an explicit understanding of the various spatial and temporal scales at which natural or anthropogenic changes operate. As part of a larger study of scale processes in southern Ohio oak forests, we evaluated the variations in microbiologically-mediated N mineralization and nitrification on three spatial scales: (1) regional scale, i.e. among four similar forested areas, (2) local scale, i.e. among those similar and contiguous watersheds within each forested area, and (3) topographic, i.e. along gradients of elevation and moisture within each watershed. While N mineralization and NH4 pool sizes varied significantly only at the regional scale, NO pool sizes and nitrification varied significantly at all three scales. These results support the hypothesis that ecological processes which depend on a small guild of specialists (such as nitrification) will vary more in space and time than processes mediated by large, diverse guilds (such as mineralization). Thus, different nutrient cycling processes should be expected to operate at different combinations of scale, and this must be considered when designing sampling schemes and in paramaterizing models to predict effects of environmental change on these processes.

LANDSCAPE SCALE AND MICROBIAL ECOLOGY. II. SOIL ENZYME ACTIVITY. KELLY L.M. DECKER, MICHAEL J. FISHER, AND RALPH E.J. BOERNER, DEPARTMENT OF PLANT BIOLOGY, OHIO STATE UNIVERSITY, 1735 NEIL AVE., COLUMBUS OH 43210.

In this portion of the larger study of scale processes in southern Ohio oak forests, we determined the scale dependency of three major enzyme systems in soil (β-glucosidase/βG, acid phosphatase/AP, and chitinase/CH) as a means of evaluating microbial community structure variation across scales. In addition to the three levels of spatial scale utilized above (regional, local, and topographic), we also evaluated microscale variations by taking samples 0.5m upslope and downslope of a single red oak (Quercus borealis) tree in each of 36 sampling areas. Activity of all three enzymes and soil organic matter (OM) content differed significantly at the regional level, with the higher enzyme activities being associated with the lowest organic matter content. Activity of all three enzymes also varied significantly among continuous watersheds. AP and CH activity varied significantly among plots along the elevation/moisture gradient, with greatest activities in the driest sites. At the microscale, activity of AP and OM were significantly greater 0.5m downslope than upslope, of a given oak. The same was true for BG in two of the four forested areas. Although these results suggest that microbial community structure varied significantly at all scales from regional to microscale, there was less of a tendency for microclimate variations along elevation gradients to be important than was the case for N turnover.
3:00 A PRELIMINARY SURVEY OF AQUATIC INSECTS IN TWO BELIZEAN STREAMS. HEATHER MORAN AND ROBERT MURRAY, DEPARTMENT OF BIOLOGY, 310 E. MARKET STREET, TOLEDO OH 43604.

Collections were made from two third-order streams in the Coxcomb Basin, Maya Mountains, Belize, C.A. While similar in size and depth, the streams were quite different in substrate, canopy cover and water chemistry. Sampling sites were taken from riffle and leaf litter areas; the two streams showed significant differences in both species diversity and total numbers. For example, in the leaf litter of the Coxcomb Branch, three families of Trichoptera comprised almost 50% of the fauna; riffles of the same stream show less than 15% of that same fauna. Conversely, Coleoptera and Ephemerocerota together make up nearly 70% of the riffle system insect fauna while comprising only 25% of the leaf litter fauna. Similar differences can be found between the lower (Mexico Branch) and also between similar habitats in the two different streams. To date, two new species of Elmidae (Coleoptera), one new Dryopidae (Coleoptera) and one new species of Lutrochidae (Coleoptera) have been identified.

3:15 UTILIZATION OF SNAILS OF THE FAMILY SUCINEIDAE BY LARVAE OF HIGHER DIPTERA. BENJAMIN A. FOOTE, DEPARTMENT OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44122.

Snails of the pulmonate family Succinidae are common in freshwater and terrestrial habitats where they are heavily preyed upon by at least eight species of higher Diptera. The life histories of representative species will be presented. Larvae of Scominidae are mostly overt predators, whereas those of the Calliphoridae have more parasitic habits. Resource partitioning involving the trophic, temporal, and spatial dimensions will be discussed.

3:30 DETERMINING THE POST MORTEM SUBMERSION INTERVAL OF CARCASSES IN AN OHIO STREAM. J.B. KEIPER, E.G. CHAPMAN, AND B.A. FOOTE, DEPT. OF BIOLOGICAL SCIENCES, KENT STATE UNIVERSITY, KENT OH 44242.

Although insects can be used to determine the post mortem interval of a corpse in a terrestrial setting, no such method exists for determining how long a corpse has been submerged in a stream. To obtain data for determining this twenty adult rats were placed in Bixon Creek located in northeastern Ohio. Ten were left in a riffle and ten in a pool. One rat from each site was recovered on a corpse in a terrestrial setting, no such method exists for determining how long the same numbers of individuals over time gave no accurate indication of the PMSI, the generic diversity on the riffle and pool rats each increased to above three genera after 33 days. Also, Orthocicatius spp. appeared only after 15 days on the riffle rats. A carcass developed very little biomass during the first 8 days of submersion. These data can aid in criminal investigations involving a corpse submerged in a stream.

3:45 A COMPUTERIZED GEOGRAPHICAL DATABASE FOR THE OHIO ODONATA SURVEY. DAVE MISHAFFREY, BIOLOGY DEPARTMENT, MARIETTA COLLEGE, MARIETTA OH 45750.

The Ohio Odonata Survey has compiled a database of over 18,000 records since 1989. Records are being added as additional museum specimens are catalogued and field collections are made. The database supports recommendations to the ODNR Division of Wildlife regarding endangered species status and protection of critical habitats. Custom software supports decision-making and helps target future collections. Reports are produced listing the data by species, county, site, and by habitat, among others. Graphical representation is possible via a simple geographic information system (GIS) that plots data on a map showing Ohio and all 88 counties; the flight period of each species is plotted simultaneously. The software and database can reside on desktop and laptop computers and were written using Visual Basic and Access in the Windows environment. The system is being enhanced by adding latitude and longitude data for each record either through field determination of location (by use of the global positioning satellite system (GPS)) or through identifying past collection sites on a commercial map program. The enhanced software is running in prototype form for Washington County, Ohio, and plots exact collection sites on the map. Naturalists with similar needs should be able to develop a similar system for under $3,000 (US).

4:00 FREQUENCY AND DIVERSITY SURVEY OF ALGAL GENERA IN CONSTRUCTED WETLAND BASINS AT OLENTANGY RIVER WETLANDS RESEARCH PARK. JOHN A. KANTZ, JR. AND ROBERT DEAL, DEPARTMENT OF NATURAL SCIENCE, SHAWNEE STATE UNIVERSITY, PORTSMOUTH OH. 45662.

This six month survey was conducted in the two constructed wetland basins at Olentangy River Wetlands Research Park in Columbus, Ohio. Fourteen total mat and plankton samples were taken once a month from specific sites in both basins and drainage swale from June through November. 1995. These data include monthly frequency trends of 78 observed genera from six Divisions. This data will serve as a base for comparisons with future yearly surveys and will be used for a 1995 dynamics study of the wetlands. Also noted is a diversity comparison between a basin that had rushes planted, another basin that was allowed to develop naturally, and the shared drainage area (swale).


This study investigated the hypothesis that heterotrophic protozoa (HP) are major producers dissolved organic phosphorus (DOP) compounds by "scavenging" HP from other organisms. Rate of DOP production was estimated radio metrically, after addition of 32P-phosphate to lake water drawn from 1-7 m depths in East Twin Lake, a mesotrophic kettle lake. HP densities were determined by primulin staining and epifluorescence microscopy. DOP produced in 30 minutes did not correlate to densities of HP with depth. DOP production was highest at the epi-metamllion interface; HP densities were highest at the meta-hyphominion interface. When HP were increased above ambient densities no significant increase in rate of DOP production was measured. These findings suggest that HP were not responsible for DOP generated in East Twin Lake's pelagic system This study was supported by the Ohio Sea Grant College Program.

4:30 EFFECTS OF ZEBRA MUSSELS (DREISSENA POLYMORPHA) ON PHOSPHORUS DYNAMICS OF LAKE ERIE PLANKTON COMMUNITIES. ROBERT T. HEATH, HELEN HAP, AND XUEQING GAO, WATER RESOURCES RES. INST. AND DEPT. BIOL. SCI., KENT STATE UNIV., KENT OH 44242-0001.

The influence of zebra mussels (ZM) on nutrient cycles is not well known. Here we report that P-dynamics of natural plankton communities, sampled in 1B above dense ZM populations in the western basin of Lake Erie (LE), differed greatly from those characteristic of LE before invasion of ZM. SRP concentrations were elevated: 8.8 lg P L-1 (280 nM), and phosphate uptake was greatly slowed (bacterial: 0.02 nM min-1, algae: 0.04 nM min-1). Release of inorganic PO4 and uptake of 32P-ATP also were greatly slowed in comparison with other LE plankton communities. Our findings suggest that ZM exert both short- and long-term effects on P-dynamics. Our findings are consistent with the view that ZM are "keystone remineralizers", excelling sufficient quantities of phosphate that may release remnant phytoplankton populations from control P-availability. This study was supported by the Ohio Sea Grant College Program.

Reproductive Botany - History of Botany

9:00AM SATURDAY, MAY 4, 1996
TIMKEN SCIENCE HALL 240
ROBERT KLIPS - PRESIDING

9:00 INBREEDING DEPRESSION IN TWO ROSE MALLOWS. ROBERT A. KLIPS, DEPARTMENT OF BIOLOGY, DENISON UNIVERSITY, GRANVILLE OH 43023.

The reduced fitness of progeny produced from selfing is an evolutionary force that helps shape the mating system of many self-compatible plant species. The rose-mallows (genus Hibiscus sect. Malvopsis) bear large self-compatible insect pollinated hermaphrodic flowers that bloom for one day, possess simultaneously mature anthers and stigmas, and have a mixed mating system. To determine whether inbreeding depression may have influenced the maintenance of features that foster outcrossing, progeny produced.
Inbreeding depression and selfing rates in a self-compatible, hermaphrodite herb, *Schiedea membranacea* (Caryophyllaceae). Theresa M. Colley, Department of Plant Biology, The Ohio State University, 1735 Neil Ave., Columbus OH 43210.

Contrary to the assumptions of most theoretical models, inbreeding depression and selfing rates may not be constant in a population. Phylogenetic analysis offers an opportunity to study how levels of inbreeding depression (IBD) and selfing rates change over time. Levels of IBD and selfing rates were measured in a hermaphroditic species, *Schiedea membranacea*, and compared to estimates suggested by phylogenetic analysis. IBD was hypothesized to be low in *S. membranacea* because of widespread occurrence of selfing in related species. Eleven individuals were hand-pollinated in the greenhouse with pollen from the same plant (self) and pollen from a different individual (outcross). The selfing rate was determined using starch gel electrophoresis. IBD was evident through the stages measured for many selfed seeds per capsule, mean seed mass, percent seed germination, percent seedling survival, and floral biomass. While the mean level of IBD was approximately 0.70, maternal families showed various levels of IBD, ranging from 0.0 to 0.97. IBD varied within family according to the cross type with a significant interaction of family and cross. On the basis of high genetic variability in maternal sibships, it appears that this species is highly outcrossed. Because the measured level of IBD is much higher than the levels suggested by phylogenetic analysis, an increase in the mean level of IBD and a decrease in the selfing rates may have occurred over time. In combination with high outcrossing rates, high levels of IBD may explain the maintenance of hermaphroditism and outcrossing in *S. membranacea*.

9:30 Pollination Ecology of Pedicularis Parryi Purpurea. Lazarus W. Macior, Department of Biology, University of Akron, Akron OH 44325-3908.

The pollination ecology of *Pedicularis parryi purpurea* in association with *P. bracteosa* *paysmona* was studied in the summer of 1995 in Teton Co., Wyoming. As in a prior study of *P. bracteosa*, *P. parryi* was found by insect enclosure to be pollinator dependent. Both plants bloomed synchronously in adjacent habitats, *P. bracteosa* in a moist willow thicket and *P. parryi* was found by insect exclosure to be pollinator dependent. Both plants bloomed synchronously in adjacent habitats, *P. bracteosa* in a moist willow thicket and *P. parryi* was found by insect exclosure to be pollinator dependent. Both plants bloomed in adjacent habitats, *P. bracteosa* in a moist willow thicket and *P. parryi* was found by insect "ABSTRACTOR FOR BIOLOGICAL ABSTRACTS."

The life of Emanuel D. Rudolph (1927-1992), noted polar lichenologist and historian of botany, is well documented by Ronald L. Stuckey [The Bryologist 93:437-446, 1990; The Michigan Botanist 34: 4-23, 1996]. Additional insight into Rudolph’s scholarly endeavors is revealed through his contributions as an abstractor for Biological Abstracts. In 1952 while he was a graduate student in the Henry Shaw School of Botany at Washington University and the affiliated Missouri Botanical Garden in St. Louis, Rudolph accepted the intellectual challenge of preparing abstracts for Biological Abstracts. During 1952-1977 he prepared abstracts for 6 botanical serials (2 of them in Spanish) and 10 taxonomic serials. Biological Abstracts for abstracting in serials for which Rudolph prepared abstracts located 382 abstracts written by him. Except for a few unsigned abstracts written in the late 1960’s, his abstracts were signed “E.D. Rudolph,” and varied in length from one sentence to a whole document.


The most important achievement of United States’ agricultural experimentation stations has been the development of hybrid corn. The powerful new technique of crossing inbred lines of corn to induce heterosis not only enabled corn breeders to derive high-yielding corn, but to derive insect- and disease-resistant hybrids. The remarkable success story of hybrid corn is far from the work of talented, and too often obscure, corn breeders. This paper seeks to remedy this oversight in one case by introducing Glen H. Stringfield, a corn breeder at the Ohio Agricultural Experiment Station between 1924 and 1959. When he began his work in 1924, Ohio’s corn yield averaged only twenty-seven bushels per acre. The European Corn Borer was present in forty percent of the state’s cornfields, and in 1927 the Ohio Department of Agriculture estimated that it decreased yields by twenty percent that year. In this alarming context Stringfield developed nearly sixty inbreds resistant to the Borer’s first brood, most notably Oh43. In addition, he derived several highly resistant hybrids, most notably the early maturing Ohok62. In many cases these inbreds and hybrids surpassed Stringfield in longevity. In 1956 Oh43 was the second most widely used public inbred in hybrid crosses, and in 1964 it ranked first among public inbreds. In 1958 Ohok62 was planted more extensively in Ohio and Indiana than any other public hybrids. As late as 1988 the Iowa Agricultural Experiment Station still used Oh43 in its breeding program. As a result of his work, when Stringfield retired in 1959 Ohio’s corn yield had climbed to 62.5 bushels per acre, more than double the yield at the start of his career. Concomitantly, Borer damage to corn in Ohio diminished from 8.5 million to 600,000 dollars between 1954 and 1965. The development and spread of hybrid corn in Ohio provides a case study of the value of publicly-funded agricultural science.


In 1927-1992, noted polar lichenologist and historian of botany, is well documented by Ronald L. Stuckey [The Bryologist 93:437-446, 1990; The Michigan Botanist 34: 4-23, 1996]. Additional insight into Rudolph’s scholarly endeavors is revealed through his contributions as an abstractor for Biological Abstracts. In 1952 while he was a graduate student in the Henry Shaw School of Botany at Washington University and the affiliated Missouri Botanical Garden in St. Louis, Rudolph accepted the intellectual challenge of preparing abstracts for Biological Abstracts. During 1952-1977 he prepared abstracts for 6 botanical serials (2 of them in Spanish) and 10 taxonomic serials. Biological Abstracts for abstracting in serials for which Rudolph prepared abstracts located 382 abstracts written by him. Except for a few unsigned abstracts written in the late 1960’s, his abstracts were signed “E.D. Rudolph,” and varied in length from one sentence to a whole document.

A hemiparasitic flowering plant with only two known populations in Ohio, *Aureolaria pedicularia* is a root parasite with a narrow host range. However, little research has been done to identify the host range of this hemiparasite. This plant has threatened status in Ohio, and knowledge of its host range could potentially aid in the development of strategies for its preservation. This project seeks to determine the host range of *Aureolaria pedicularia* through histological comparison of host roots and roots of potential hosts. Root collections were made from the Athens county population site. Procedures are being developed to embed these root samples in LR White, a plastic resin, and to differentially stain the sections. Preliminary results indicate perennial hardwood species serve as hosts for *Aureolaria pedicularia*.

10:45 Celebrating 100 Years of the F.T. Stone Laboratory: President George W. Rightmire’s Efforts During Six Years to Hire the First Full-Time Director (1930-1936). Ronald L. Stuckey, Herbarium, The Ohio State University, 1315 Kinnear Road, Columbus OH 43212.

In 1925, when Julius F. Stone donated Gibraltar Island to The Ohio State University for an aquatic field Biological Laboratory, he envisioned a facility second to none in America. The University’s Board of Trustees supported his idea, and the State Legislature provided financial support for construction of new buildings for the island Laboratory. Beginning in the autumn of 1930, President George W. Rightmire, who was determined to develop the Laboratory, personally began searching for a full-time, year-round Director. In the first phase, six individuals were reviewed, but none were acceptable. Rightmire then followed the June 1930 recommendation of a University Faculty Committee which asked him to form an Advisory Committee comprised of distinguished alumni on faculties of other Universities. That
2:15 AN ASSESSMENT OF THE ALLELOPATHIC POTENTIAL OF GARLIC MUSTARD (ALLIARIA PETIOLATA; BRASSICACEAE) BRIAN C. MCCARTHY AND SHERYL L. HANSON, DEPT. OF ENVIRONMENTAL PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

Garlic mustard is a non-indigenous plant that is aggressively invading woodlands throughout the eastern United States. Previous work has shown that the species is having a negative impact on the diversity of understory communities and is actively displacing native species. The purpose of our study we to evaluate the extent to which allelopathy might be involved in the success of this invasive species. While members of the Brassicaceae have frequently been cited as being potentially allelopathic, few studies have been able to clearly demonstrate this effect. A water extract of garlic mustard tissue was prepared following a dilution series of 0.1, 0.01, and 0.001%, in addition to a 0.0% control. Separate extracts were prepared from root and leaf tissue. These extracts were applied to seeds and seedlings of four target species: radish, winter rye, hairy vetch, and lettuce. While seed germination rates varied by species and concentration, germination, germination 5-7 days was generally unaffected by the garlic mustard extracts. Only radish seeds treated with the most concentrated root extract exhibited a significantly depressed germination relative to the water control. Likewise, seedling biomass was generally unaffected by treatment Only shoot biomass for rye was significantly depressed relative to the water control.

3:00 PATTERNS OF HARDWOOD MORTALITY IN A SOUTHEASTERN OHIO OAK-HICKORY FOREST. GRETCHEN M. WALTERS AND BRIAN C. MCCARTHY, DEPT. OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

The reporting of forest decline has increased dramatically in recent years. Many forests throughout the central Appalachians have been observed to be in declining health. The purpose of our study was to evaluate the health of a southeastern Ohio oak-hickory forest. Thirty-two 0.1 ha plots were established throughout the 550 ha Waterloo Wildlife Experiment Station (ODNR) in Athens County, Ohio. Data were collected for all living and dead stems with a dbh >= 10 cm. For living trees, a decline index (DI) was determined to evaluate the percentage of branch dieback, undersized leaves, and chlorosis. Dead trees were also identified and categorized by mode of mortality (log vs. snag). Among the live trees, only two species (Sassafras albidum and Juglans nigra) exhibited non-normal DI values. All other species were observed to be healthy or exhibiting only trace symptoms of decline. In contrast to decline, mortality patterns were markedly different among species. Mortality was highest for Carpinus sp. (36%) and Quercus (17%). There was no clear evidence of geographical clustering among stands based on mortality patterns. Our data suggest that persistent symptoms of decline are not evident; rather, mortality is likely the result of episodic inciting factors.

3:15 VARIATION IN ACORN PRODUCTION AND CHEMISTRY OF TWO OAK SPECIES (QUERCUS PRINUS AND Q. VELUTINA) WITH RESPECT TO TOPOGRAPHY. J.L. REED AND B.C. MCCARTHY, DEPT. OF ENV. AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

Site quality has been shown to affect various aspects of resource allocation in plants. In particular, long-lived woody plants will establish a trade-off between reproductive effort, growth, and defense. The extent to which a tree balances reproductive effort against the production of carbon-based defensive compounds (e.g., tannins) is not well understood. While, slope aspect (e.g., N vs. S) is well known to influence site quality, the extent to which it ultimately affects seed production and tannin content has not been well studied. Thus, for two species of oak (Q. velutina and Q. prinus), we examined acorn production, patterns of predation, and tannin content of 36 trees on north- and south-facing slopes at the Waterloo Wildlife Research Station, Athens County, Ohio. Quercus velutina acorns suffered >50% mortality by acorn weevils (Curculio conotrichaeus) whereas, Q. prinus suffered <20%. Q velutina trees growing on south-facing slopes experienced greater predation than those on north-facing slopes. In contrast, slope aspect did not influence Q. prinus predation rates. Further, Q. velutina acorn tannin content was significantly greater on south-facing slopes compared to north-facing slopes; however, Q. prinus did not show a discernible pattern. Site quality, as indicated by slope aspect, appears to significantly influence the reproduction and defense of certain oak species but not others.

3:30 COMPETITIVE EFFECTS OF LONICERA MACAKII ON NATIVE TREE SEEDLINGS. DONALD E. TISDEL AND DAVID L. GORICHOW, DEPARTMENT OF BIOLOGY, FAIRMONT STATE COLLEGE, FAIRMONT WV 26554, DEPARTMENT OF BOTANY, MIAMI UNIVERSITY, OXFORD OH 45056. Lonicera macakii (Rupr.) Maxim., native to eastern Asia, was introduced to North America ca. 1920 as an ornamental plant. Non-cultivated shrubs of L. macakii now occur in Ontario and at least 23 states of the eastern US, growing at densities of up to 6800 shrubs/ha in secondary forests. Because there is a reduced herb layer under dense stands of this shrub, L. macakii may
be disrupting the natural succession of forests and old fields through allelopa-
yth and/or competition. Field experiments were conducted to examine the
effect of L. maackii shoot pruning and root trenching on the native tree
seedlings. Pruning the shoot of L. maackii significantly increased the survival
of Acer saccharum (Chi-square p=0.02) and Fraxinus americana (p=0.03). Trench-
ing the roots of L. maackii did not significantly affect survival of any of the
species. Trenching and pruning combined further increased survival over
shoot pruning alone in A. saccharum (p=0.001). Competition for light appears to
be the most important effect of L. maackii on tree seedling survival. Root
competition becomes important to seedling survival when light is not limiting.

CROP PLANTS: PHYSIOLOGY AND
HUMAN INTERACTIONS
9:00AM SATURDAY, MAY 4, 1996
TIMKEN SCIENCE HALL 221
ROBERT H. CICHEWICZ - PRESIDING


This study examined the responses of Phaseolus vulgaris and Beta vulgaris to one aspect of biointensive cultivation. The biointensive method of crop production emphasizes a number of unique cultural practices but we sought only to isolate the contribution of double digging (loosening the planting bed to ~80 cm deep) to crop productivity and nutrient uptake. Comparison beds were prepared with the soil cultivated to ~30 cm (single dug) and ~5 cm (surface dug). The 1994 season (beans only) there were 10 replicate beds measuring 1.5 m² for each cultivation type. During the 1995 season there were 5 replicate beds for each cultivation type for both beans and beets. Although there were significant differences (1994 beans) between the surface dug beds and other cultivation types for leaf biomass and chlorophyll content, there were no significant differences in the biomass of beans (whole fruit) produced. There were no significant differences in beet green or root (edible portion) biomass between the different cultivation types. Levels of Ca, Mg, and K in the bean fruits and beet roots were not significantly different between cultivation types. This study demonstrated that deep cultivation significantly alters the soil profile as measured by penetrometer resistance, but that this change does not necessarily alter bean/beet productivity or nutrient uptake.

9:15 THE EFFECT OF INCUBATION TEMPERATURE ON THE SENSITIVITY OF NORMAL AND TEXAS MALE STERILE CYTOLASM MADE LEAVES TO BIPOLARIS MAYDIS RACE T TOXIN. J. D. BELTRAN AND M. O. GARBAYA, DEPT. OF PLANT PATHOLOGY, THE OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

To evaluate the effect of temperature on maize leaf responses to Bipolaris maydis race T (BMT) toxin detached leaves of Normal (N) and Texas male sterile (Tms) cytoplasm isolines (cv. B37 and OH43) were infiltrated with various concentrations of (BMT) toxin for 24 hr at 28 C in the dark, then cut into 4 cm segments. One set of segments from the toxin-infiltrated leaves were immersed in a DW bathing solution at 18 C in the dark and another set of segments were left at room temperature. One set of segments from toxin-treated Tms segments accompanying an increase in temperature. Neither light nor the C-4 metabolites affected the potency of the BMT toxin. Also, the high sensitivity of Tms isolines to BMT toxin, observed in the dark, is from toxin-treated Tms segments accompanying an increase in temperature. Root competition becomes important to seedling survival when light is not limiting.
goal of our research is to determine whether crop genes are likely to persist in wild populations. To investigate this question, we crossed squash and sunflower cultivars with wild conspecific plants. For sunflowers, we crossed two cultivar varieties with wild sunflowers from three geographic regions (Texas, North Dakota and Kansas). In the Kansas group only, cultivar pollen resulted in larger seeds than did wild pollen. Based on early growth of seedlings from the above crosses, hybrid progeny appear to be slightly larger than nonhybrids. In the case of squash, we crossed a disease-resistant transgenic variety and a similar non-transgenic variety with wild squash from Arkansas and Mississippi populations. Using a transgenic variety offers a unique opportunity to directly examine the persistence of transgenes in the wild. Preliminary results show that fruit size does not differ between the hybrid and nonhybrid progeny. Further fitness measures are planned including looking at dormancy characteristics and the relative fitness of hybrid progeny of these crosses. Taken together, our preliminary data suggest that hybrids are successful enough to allow crop genes to persist in wild populations.


Several parameters were examined in a 1st-year old-field plant community enriched with nitrogen and phosphorus fertilizers. Thirty 6 x 20 m plots were established in a recently-tillage former corn field during May, 1995. During the first year, six plots were treated with ammonium nitrate (N) fertilizer, six were treated with diammonium phosphate (P2O5) fertilizer, and six were designated as controls. All treated plots received 300 kg/ha nitrogen; N/P plots also received 768 kg/ha phosphorus. Above-ground plant biomass and plant litter was sampled from 3 quadrants (0.25 m2) 3 times during the growing season from each plot. Plant samples were separated into standing dead and live biomass; live biomass was further separated by species. All samples were dried for 72 h at 80°C and weighed to the nearest 0.01 g. Analysis of variance tests of the first plant sample indicate that above-ground biomass was significantly greater in N/P plots than in N or control plots; the wild radish (Raphanus sativus) was the most abundant species. The wild radish and the relative fitness of hybrid progeny of these crosses. Taken together, our preliminary data suggest that hybrids are successful enough to allow crop genes to persist in wild populations.

3:00 CYTOLOGICAL CHANGES IN NEEDLES OF ECTOMYCORRHIZAL AND NONMYCORRHIZAL PITCH PINE SEEDLINGS EXPOSED TO ALUMINUM AT TWO NUTRIENT LEVELS. CAROLYN J. McQUATTIE, USDA Forest Service, 359 Main Rd., Delanco, NJ 08043.

Cellular symptoms of aluminum toxicity in needles of pitch pine (Pinus rigida) may vary depending on the mycorrhizal status of the seedling or nutrient level in the irrigation solution. Four-week-old pitch pine seedlings growing in sand culture were inoculated either with a broth slurry of the fungus Psilotus troctorus or with sterile broth and were exposed to Al (0, 10 or 20 mg/L) in nutrient solution containing either a low or high level of nutrients. After 66 days, needles from each treatment were chemically fixed and resin-embedded for transmission electron microscopy. Additional needles from the low nutrient level were frozen in liquid propane, freeze-substituted in chromium tetroxide and resin-embedded for examination by x-ray microanalysis (EDS). At 10 mg/L Al mesophyll disruption (chloroplast and cytoplasm deterioration) in needles of mycorrhizal (M) and nonmycorrhizal (NM) seedlings was greater at the low nutrient level. At 20 mg/L Al, increased chlorosis and greater chloroplast deterioration were seen in needles from NM seedlings compared to M seedlings at both nutrient levels. Starch grains in chloroplasts, seen only at the low nutrient level, were significantly larger in needles of NM seedlings. Al was detected by EDS in the xylem, endodermis, and plasmolysed mesophyll cells in needles from NM seedling but only in xylem cells in needles from M seedlings.

3:15 GENOTYPIC VARIATION FOR CONDENSED TANNIN PRODUCTION IN TREMBLING ASPEN (PAPULUS TRIMLOIDES) UNDER ELEVATED CO2 AND IN HIGH AND LOW FERTILITY SOILS. JENNIFER L. MANSFIELD AND PETER S. CURTIS, DEPT. OF PLANT BIOLOGY, 1735 Neil Ave., Ohio State University, Columbus OH 43210.

The Carbon/Nutrient Balance Hypothesis suggests that leaf C/N ratios influence the synthesis of secondary compounds such as condensed tannins. Plants grown under elevated CO2 and low fertility often have higher C/N ratios and should therefore increase production of carbon-based secondary compounds. Six genotypes of Populus tremoloids were grown under elevated and ambient CO2, partial pressure and high and low fertility in field open-top chambers at the University of Michigan Biological Station. During the second year of exposure, leaves were harvested 3 times (June, August, and Septem-
ber) and analyzed for condensed tannin production using the Radial Diffusion Assay. Preliminary analysis indicates significant genotype, fertility, and CO₂ effects, but no significant interactions among these terms. For each genotype, plants grown in high CO₂ (700 ppm) and low fertility had significantly higher tannin production compared to plants grown under ambient CO₂ (350 ppm) and high fertility. Our results support the Carbon/Nutrient Balance Hypothesis and suggest that rising levels of CO₂ in the atmosphere may alter plant secondary compound production.

3:30 THE EFFECT OF ATMOSPHERIC CO₂ AND SOIL NITROGEN ON THE PHOTOSYNTHETIC LIGHT RESPONSE OF TREMBLING ASPEN (PUPULUS TREMULOIDES), XIAOQING WANG, AND PETER S. CURTIS, DEPT. OF PLANT BIOLOGY, 1735 NEIL AVE., OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

Photosynthetic light response curves of plants can be used to elucidate environmental effects on leaf dark respiration, quantum yield, light compensation point and the maximum CO₂ assimilation rate. We studied the photosynthetic light response characteristics of trembling aspen saplings grown in open-top chambers at the University of Michigan Biological Station in northern lower Michigan. The trees were grown under four treatments: ambient (350 ppm) and elevated (700 ppm) CO₂, and low and high soil N availability. Each treatment was replicated five times. Major results included: 1) elevated CO₂ grown plants had significantly higher dark respiration than those grown at ambient CO₂, but soil N availability had no significant effect on dark respiration; 2) Quantum yield of elevated CO₂ grown plants was significantly higher than that of ambient CO₂ grown plants, but it was not affected by soil N levels; 3) Neither CO₂ concentration nor soil N availability had a significant effect on the light compensation point; 4) Both CO₂ concentration and soil N availability had significant effects on light saturated net assimilation rates. Since CO₂ effects on dark respiration and quantum yield were independent of soil N availability, a shift in leaf-level physiology is expected under future, high CO₂ conditions even when soil fertility limits plant growth.


Many folk and homeopathic remedies are based on the natural antibacterial activities of certain plants. The objective of this study was to investigate the anti-microbial effectiveness of some of these plants. The samples used were chosen on the basis of their purported antimicrobial activity. Three extracts were prepared from each sample. Active compounds were extracted using ethanol, water, and steam. One-hundred microliters of prepared sterilized extract was loaded into shallow assay wells that had been cut into Mueller Hinton agar plates seeded with either Pseudomonas aeruginosa, Staphylococcus aureus, Salmonella typhimurium, or Enterococcus faecalis. In addition, each plate contained both a positive and negative control. Plates were incubated in an upright position for 24-48 hours. After that time bacterial growth surrounding the wells was examined. Extract activity was ranked on a scale of 0-4 with 0 indicating no inhibition and four indicating a very active compound. Of eleven herbal preparations tested, six have demonstrated antimicrobial activity. Two of those compounds have shown activity greater than 2 on the scale. These preliminary results suggest some validation for the claims of certain herbal preparations.

EARTH AND SPACE SCIENCE DIVISION


Americans spend much of their lives in motor vehicles. Government safety recommendations give procedures to follow when caught in a vehicle during severe weather. This ranges from staying in the vehicle (blizzard, lightning) to quick evacuation out of the vehicle (flood, tornado). This reassess-


On June 30, 1908, as much as 30 million metric tons of NOx were injected into the atmosphere when the massive Tunguska meteorite exploded over Siberia. Barometric and seismographic stations the world over recorded the event. Within two weeks of the impact, the Smithsonian Astrophysical Observatory measured a 45% reduction in atmospheric ozone in the northern hemisphere. In this study, records from 217 weather stations located above 30 degrees north latitude were reviewed for precipitation and/or temperature anomalies for the years 1908 to 1911. This three year interval is in keeping with the duration of global climate anomalies associated with other singular atmospheric perturbations, such as volcanic eruptions. Anomalies were considered to be years in which a station's yearly precipitation or mean annual temperature exceeded by two standard deviations the station's historical mean. Review of the 217 stations' records from the National Climate Data Center's Meteorological Archives (CD-ROM Word Weather Disc) revealed 36 northern hemisphere precipitation anomalies and 30 temperature anomalies. These anomalies were confined mainly to tropospheric frontal boundaries located in the western United States, the Mediterranean and Eastern Asia.

9:45 LAND OWNERSHIP AND PARCEL SIZE AS ANTECEDENTS TO LAKE HOPE STATE PARK. I.M. DeCHANG, DEPT. OF GEOGRAPHY, CLIFFINGER LAB, OHIO UNIVERSITY, ATHENS OH 45701.

Lake Hope State Park is nestled in Zaleski State Forest, Vinton County, Ohio. Land ownership played a major role in the park's evolution. Three phases of land ownership were investigated: the Ohio Company of Associates lands, iron furnace lands, and governmental lands. The Ohio Company owned land in southeastern Ohio that was sold to individuals. Some land repaid Revolutionary War debts for their service during the war, thus essentially dividing the area into relatively small parcels. The iron industry, beginning in 1854 at Hope Furnace, reassembled some of these smaller parcels into larger lots. Large tracts of land allowed the iron industry to prosper for twenty years, supplying fuel and essential minerals for iron production. In 1870 Douglas Pulham bought the failing iron furnace and acquired contiguous parcels of land from smaller land owners in order to pay their debts. Following the "heyday" of the iron industry, heirs and stockholders sold their land to the federal government due to bleak prospects of more minerals. Furnace land holders perceived the land as worthless, thus, willing to sell. Large land holdings allowed for easier establishment of Lake Hope State Park. Lake Hope was built as a flood protection measure in the Raccoon Creek watershed. This reservoir complied with the needs of building protection from flooding in the Ohio River Valley. Therefore, the nature of parcel size and ownership influenced the spatial evolution of Lake Hope State Park.

10:00 THE 1794 BATTLE OF FALLEN TIMBERS: TWO CENTURIES OLD AND NOT OVER YET! JEFFREY J. GORDON, DEPARTMENT OF GEOGRAPHY, BOWLING GREEN STATE UNIVERSITY, BOWLING GREEN OH 43403.

The Battle of Fallen Timbers, won against the Ohio tribes on Aug. 20, 1794, supposedly occurred on the Maumee River floodplain near present-day Toledo. This decisive military action broke Indian resistance in the newly acquired Northwest Territory; resulting in the Treaty of Greenville which opened a vast hinterland for white settlement. When 816 acres, near the Fallen Timbers historic landmark commemorating this pivotal event were rezoned in February 1995, their possible significance in the battle was raised. A site survey of 167 acres was commissioned to determine the exact battle area. In June, 1995, archeologist Dr. G. Michael Pratt, and volunteers, discovered over 300 battlefield artifacts near one mile northeast of the designated site. Now, two centuries later, there is a battle over the battlefield. Geographical problems, other available options for shelter to the motorist. Safety rules and research are needed to clarify risks to vehicle occupants during severe weather.
Spatial data are often collected in a point-sampling fashion. Values for locations without observations, therefore, have to be estimated from measured point samples. A specific method to accomplish this task is by means of interpolation. In the interpolation process, a numerical procedure generates an estimate of functional dependence at a particular location, based upon knowledge of the functional dependence at some surrounding locations. This technique assumes that the phenomenon being predicted is closely approximated by the mathematical function; the unknown values are then calculated according to this function. Since mathematical functions for spatial data are usually nonanalytical and seldom known, an optical interpolation is hard to achieve. As a result, many interpolation methods, with different mathematical functions exist. The quality of the interpolation results, therefore, depends on the accuracy, number and distribution of those sampled points as well as the methods selected. In this study, the effects of interpolation methods (including inverse distance, kriging, minimum curvature, radial basis function, Shepard’s method, and triangulation) on quality of isoline maps will be compared. Ohio’s climate data is used in this study for comparison.

**3:15** AN ANALYSIS OF STREAM CHANNEL MORPHOLOGY AND FLOOD PLAIN BEDROCK ELECTROMAGNETIC TERRAIN CONDUCTIVITY. J. RICHARD JONES, DEPARTMENT OF GEOLOGY, ACADEIA UNIVERSITY, WOLFSVILLE, NOVA SCOTIA, BOP 1X0, CANADA AND KENNETH A. LASOTA, DEPARTMENT OF NATURAL SCIENCES, ROBERT MORRIS COLLEGE, PITTSBURGH PA 15219.

Electromagnetic terrain conductivity data can reveal variations within the permeability of subsurface rock units. This study tests how well such subsurface variations are reflected in an associated stream channel. A Geonics EM31 electromagnetic conductivity instrument was used to measure the conductivity at 10 intervals along a 1,080 m transect established 10 m above the bank of Mingo Creek, located about 30 km south of Pittsburgh, PA. Conductivity measurements were recorded at three and six meter depths for Pennsylvanian age strata consisting of shales, sandstones and limestones. The recorded conductivity measurements are within the range of other sandstone, shale and limestone lithologies. The spatial correspondence between high and low conductivity measurements along the flood plain transect with associated stream channel features is excellent. High conductivity of the bedrock beneath the flood plain is associated with channel pools, and low conductivity with bedrock outcroppings or ruffles within the channel. Spatial variations in the conductivity spectra reveals an apparent conductivity shift that follows the regional northeast-southwest structural trend.

**3:30** DEVELOPMENT OF NEW PUBLIC WATER SUPPLY WELLFIELDS USING ELECTROMAGNETIC CONDUCTANCE: TWO CASE STUDIES, WESTERN AND CENTRAL OHIO. RICHARD COWLES, AND EINSTEIN WILLIAMS, BENNETT & WILLIAMS, 2700 E. DUBLIN GRANVILLE RD., COLUMBUS OH 43231.

EM surveys, combined with geologic/hydrogeologic information, provide a quick, inexpensive tool for maximizing potential wellfield sites. EM surveys using an EM34-3 instrument were conducted for two separate water suppliers in western and central Ohio. In both studies, buried valley aquifer systems with glacially-derived sediments, were examined for new water supply wells. Case Study I. A region of east-central Ohio, experiencing rapid population and development growth, needs water supply to serve new demands. Several traditional investigations using exploration borings and located well logs have failed to find an adequate supply. An EM survey identified 60 acres with potential for wellfield development. Following a 48-hour pumping test, it was determined that this site would produce approximately 1.5 million gallons per day. Case Study II. City of Great Miami River, needs to expand current wellfield to supply adjacent communities and comply with OEPA requirements. Two test borings on City owned land failed due to shallow rock and sedimentary deposits. Initial findings reduced site by 1/3; EM survey was conducted to optimize positioning of wells on remaining site. Survey found adequate area with aquifer material, also found large plume from up gradient lagoon. Discovery avoided costly mistake of installing new wells in ultimately abandoned area. Instead, city implemented alternative well field management practices, upgraded construction of existing wells, and created wellhead protection.

**3:45** USING WATER RESOURCES FOR IRRIGATION IN SEMIARID LAND: A VIEW FROM THE REPUBLIC OF YEMEN. ABDULLA M. AHMED, 1130 MORRIS RD #3, KENT OH 44240.

The Southwest of Arabian Peninsula (Yemen) is one of the most extensively terraced areas in the world. Terraces have a soil conserving as well as a water-collecting function. Rainfall is the main source of both surface and ground water. The annual rainfall varies from 20mm in the coastal areas to 1000mm in the interior mountainous areas. Since the amount of rainfall is not always sufficient, development of a system for irrigation was necessary for successful crop production. The agriculture in the mountain areas mostly dry land farming, while in the low land, agriculture depends on floods and ground water. Thus, the terrace system and types of irrigation systems characterize Yemeni agriculture. These systems were developed over thousands of years and require continuous maintenance. The fame of the ‘Araba Felix’ of ancient times is based on particularly intensive agriculture production. However, in recent years, socio-economic changes have affected the traditional system of agriculture by virtue of which Yemen had lived in harmony with the ecosystem over centuries. Some of these effects on environment are positive and others are negative in relation to irrigation and land use for agricultural purposes.

**4:00** DRAINAGE BASIN DELINEATION OF THE WARRENSBURG ROAD KARST, DELAWARE COUNTY, OHIO: IMPLICATIONS FOR EVALUATING LAND USE IMPACTS. T. JOSEPH DOGWILER, JOHN B. RITTER, AND HORTON H. HOBBES III, DEPARTMENTS OF GEOLOGY AND BIOLOGY, WITTENBERG UNIVERSITY, P.O. BOX 720, SPRINGFIELD OH 45501-0720.

The Warrensburg Road Karst, underlain by the Columbus Limestone and located east of the Scioto River in southwestern Delaware County, Ohio is characterized by numerous insurgent sinkholes, subterranean drainage conduits, and a resurgent spring. The hydrology and sedimentology of the resurgence and downstream conduits of Detwitt Spring have been studied to create a framework within which future analysis can be performed and land use impacts within the area evaluated. Surface drainage consists of short (<0.25 km) first-order, ephemeral streams that flow into the subsurface via sinkholes. Five sinkhole insufficiencies have been connected positively with Detwitt Spring using Fluorescein dye tracing. The resurgence has multiple overflow points successively increasing elevations that function during high discharge events. Based upon surface topography, these conduits, reservoirs, and surface streams are situated within an approximately 1 km² drainage basin. Soil erosion in the Warrensburg Road Karst is significant. Suspended sediment loads of between 0.25 and 1.04 g/l have been measured at the insufficiencies and correlated to individual storm events. This sediment is derived in a large part from channel scour (ranging from 2.5 cm per storm event) upstream of the insufficiencies. Decreased sediment concentration and lack of fine sediment deposition at the resurgence suggests that sediment is being stored, at least temporarily, in the subsurface.

**4:15** FRACTURE FLOW IN HIGH CLAY CONTENT GLACIAL MATERIALS - APPLYING THE FRACTRAN MODEL. JULIE P. WEATHERINGTON-RICE, BENNETT & WILLIAMS ENVIRONMENTAL CONSULTANTS INC., 2700 E. DUBLIN GRANVILLE RD., SUITE 400, COLUMBUS OH 43231.

Ongoing research in Ohio has established that fracture formation and depth are functions of clay mineralogy and historic low water tables. Illite clay control fracture formation, desiccation rapidly and do not rehydrate to reheat. Observations indicate that fractures form in a short time and persist, creating dominant routes of water and contaminant transport. FRACTRAN. Suckidy and McLaren, Waterloo Centre for Groundwater, is the first model designed to address this hydrogeologic situation. The model was applied to the Clarkco Landfill Site, Clark Co., Oh. Previous investigations by Antioch College and CDNR have established the presence of fractures near the facility. The elevation and site of the facility suggests historic dewatering during Hobocene or before. Computations based on traditional sampling method results and equations indicated that the time-of-travel through 30 feet of till over a 100 gpm+ s&q aquifer was 170 years. FRACTRAN confirmed the 170 years for saturation
of the till but showed breakthrough in 12.5 years with random fractures 0.25 mm in width. Runs made with Ohio EPA recommendations for hydraulic conductivity showed breakthrough in 7.5 years. The use of this model is not appropriate for every setting. Clay mineralogy identification and ratios, grain size analysis, and site pit investigations should be the determining factors for application. Where clay fractions are significant, illite ratios increase with depth, fractures become dominant pathways. FRACTRAN applies.

**Earth and Space Science - Geology**

9:00AM Saturday, May 4, 1996

Timken Science Hall 160

**Mark J. Camp - Presiding**

9:00 Poston Brick Works in Indiana and Illinois. Mark J. Camp, Department of Geology, University of Toledo, Toledo OH 43606.

The Poston Family of England first arrived in New England in the early 1700s. Some Postons' settled in the Hocking Valley of south central Ohio around the 1830s and became involved in many agricultural, industrial, and scientific developments of the region. Of interest to geologists are Irvin G. and Clarence E. Poston, born and raised amidst the coal and clay industry of Nelsonville, Ohio. Around 1852, Irvin moved to Veedersburg, Indiana where he established the Wabash Clay Company in 1852. Originally the firm used local fire clay, but then turned to local Pennsylvania shales. Two different shales were combined to make Poston block, used for street paving. The brickworks, sold to the Culver Brothers in 1906, operated for many more successful years. Irvin built a second brick works in Crawfordsville around 1900, the Poston Paving Brick Co. Mississippian Borden Group shales were used here. Into the 1950s, the Crawfordsville plant was a major producer of various brick products. Clarence E. Poston moved from Logan Ohio to Crawfordsville in 1902 and returned to the brick business in 1957, constructing a brick works at Attica, Indiana. Mississippian shales were made into pavers originally, but production switched to face bricks around 1920. The plant remained within the Poston family until its sale in 1961. Irvin Poston moved to Martinsville, Indiana in 1907 and within one of his sons Edwin, opened the Martinsville Brick Company. Local Borden shales were used here until 1946 when the plant closed. In 1950 the plant reopened under management of another Poston company from Illinois. The Poston Brick Co. at Springfield, Illinois was established in 1916 by Emmett V. Poston and his father, Irvin. This plant evolved into the Poston Brick and Concrete Co. before closing in the early 1970s. The closing of the Thomas Moulding Brick Co. of Martinsville, Indiana in 1976 ended the Poston realm. Local evidence remains of these once important plants, but Poston blocks lie in many streets and buildings of midwestern communities.


James A. Garfield was a Radical Republican legislator and, for a short time before being assassinated, US President. During his legislative career he was an indefatigable and influential proponent of progressive causes, including government support of education, school libraries, and scientific research. As an Ohio State Senator, Garfield argued for the resumption of an Ohio geological survey. Later, as a United States Congressman, Garfield had an important role in the funding of various nineteenth century geological work in the western part of the country and played a key role in the establishment of the US Geological Survey. Garfield was an active attendee at scientific lectures and had cordial relations with several prominent scientists, including geologists Ferdinand Hayden (1829-1887) and John Wesley Powell (1834-1902). The Garfield Monument in Cleveland's Lake View Cemetery contains the remains of Garfield and his wife as well as Garfield's daughter and son-in-law, Joseph Stanley-Brown (1857-1941). Stanley-Brown served as a Secretary first to Powell and then to Garfield. He also published on geological topics.


Mapping of two-dimensional parameter space in the region of the earth's orbit has led to the identification of two retrograde (clockwise motion) and two prograde (counterclockwise motion) zones for stable capture orientations. The parameters, magnitude (position of the planet in degrees at the beginning of the encounter simulation) and orbital eccentricity of the planetoid (relative to a circular orbit for the planet), can be defined as a region of this two dimensional parameter space in which the orbital orientation at the time of a close encounter (a putative capture encounter) is favorable for long-term, post-capture orbital stability. The major requirements for stable capture are: (1) sufficient energy dissipation by tidal action within the interacting bodies and (2) proper orientation of the orbit of the candidate planetoid at the time of the encounter. If we assume adequate energy dissipative properties for the interacting bodies, then the orientation of the encounter becomes critical. For stable prograde capture, the major axis of the orbit of the candidate planetoid must be within +5° of a line perpendicular to the tangent of the planet's orbit and for stable retrograde capture, the major axis of the planetoid's orbit must be within +5° or a line parallel to the tangent of the planet's orbit. These severe geometric constraints can be met over narrow bands (about 0.5%) of planetoid orbital eccentricity extending for several 10's of degrees of planet anomaly. An estimate of the probability of stable gravitational capture can be obtained by measuring the line intercept of stable capture zones for a given band of planetoid orbital eccentricity.

9:45 New Bedrock Geology Maps of Central-West and Northwest Ohio. E. Mac Swinnford, ODNR, Division of Geological Survey, 4383 Fountain St. Dr., Columbus OH 43224.

The Bedrock Geology Mapping Group at the Ohio Department of Natural Resources, Division of Geological Survey, supported by cooperative federal and state agencies, has remapped the bedrock geology of western Ohio on 7.5-minute quadrangles. A digital compilation of more than 200 of these maps for central-western and northwestern Ohio indicates a considerable change from the geology depicted on the current 1920 state bedrock map. The map compilation reflects a heavily dissected bedrock surface in western Ohio, in contrast to a relatively smooth bedrock surface in northwestern Ohio. The areal distribution of the bedrock is influenced by the structure of the regional basins and arches. The most prominent structural feature indicated by this new bedrock mapping is the north-south trending Bowling Green Fault, mapped from the Michigan-Ohio border southward to central Hancock County. Comparison of the area's bedrock geology with a basement structure map, a magnetic anomaly map, and an oil and gas fields map emphasizes the important relationship between the surface geology, subsurface geology, and deep crustal geology of the region. The new open-file bedrock geology quadrangle maps provide an excellent data set that can assist planners in making land-use decisions and explorationists in developing and utilizing mineral resources, ground water, and fossil fuels.

10:15 A Case History of an Abandoned Deep Mine. Ann G. Harris, Department of Geology, Youngstown State University, 410 Wick Avenue, Youngstown OH 44555-0001.

On March 4, 1995, three vehicles were on the eastbound lane of Interstate 70 just east of Cambridge, Ohio, when suddenly an 8 foot section of the road collapsed and the first car fell into it. The second car could not stop and ran over the roof of the first car. The semi-truck stopped but its front wheels rested on the roof of the car. The woman in the first car had her foot crushed and eventually it was amputated. The reason for the collapse was the Murray Hill #2 coal mine that operated from 1912-1935. It was owned by the Akron Coal Company. The #7 or Upper Freeport coal was 5-5 1/2 foot thick was mined. The average depth of the holes was 66 feet and part of the mine was filled with water. Almost 2,200 boreholes with 12 foot centers were drilled and each filled with an average of 18 yards of grout. While drilling the boreholes sometimes the adjacent borehole would eject water like a geyser higher than the mast of the drilling rig. The mine had been dewatered several times by strip mining which added to its instability. I-70 was finally reopened on August 16, 1995.

10:30 Late-Pleistocene Valley Stratigraphy and Drainage History of the Licking River, Ohio. Ted A. Filholko, Dept. of Geology and Geography, Denison University, Granville OH 43023.

Logs of oil/gas and water wells, when analyzed with caution, can provide a generalized valley-fill stratigraphy for the deep bedrock valleys of east-central Ohio. These data are combined with topographic features, soil patterns and shallow cores to map the distribution of diamict, outwash, lacustrine, and fluvial deposits within valleys of the Licking River drainage. The upper 30+ meters of valley fill in the North Fork, South Fork and Raccoon Creek
Spatial patchiness and taphonomy of mollusc species in a single core: Relationships in time and space, Graham's Harbor, San Salvador, Bahamas. Tim Lynch, Hays Cummings, and Mark Boardman, School of Interdisciplinary Studies, Miami University, Oxford OH 45056.

Community reconstruction is of paramount importance in paleoecological analysis. Here, we focused on spatial variability in one core. Just how variable are community composition and taphonomic processes in the time and space represented by a single core? A 3.30 cm across and 20 cm deep and representing hundreds of years of time-averaging, was taken from a lagoon in the Bahamas in a dense sea grass bed. The sample was divided horizontally and vertically into 68 subsamples. The shelly fauna were identified to species, and linear dimensions were measured for each hard bodied organism. The total core comprises over 15,000 individuals representing over 20 species. The two major goals of this project are (1) to investigate spatial patchiness on a microscale and (2) to recognize taphonomic processes in vertical and horizontal dimensions. Interestingly, the contents of the core were not well mixed. We found incredible spatial heterogeneity both in the vertical and horizontal dimensions in terms of species composition and the degree of taphonomic alteration. Shell destruction within the core appeared to be caused by dissolution caused by sea grass rhizome and root growth and decay. We will also report on: horizontal and vertical comparisons of molluscan abundance and diversity; taphonomic gradients within the core; and trends of species composition and community structure both vertically and horizontally.

Earth and Space Science - Geology
3:15PM Saturday, May 4, 1996
Timken Science Hall 160
Shannan E. Peters - Presiding

Spatial patchiness and taphonomy of mollusc species in a single core: Relationships in time and space, Graham's Harbor, San Salvador, Bahamas. Tim Lynch, Hays Cummings, and Mark Boardman, School of Interdisciplinary Studies, Miami University, Oxford OH 45056.

Community reconstruction is of paramount importance in paleoecological analysis. Here, we examined the living molluscan community to better understand the distribution and ecological framework of mollusc populations in a tropical lagoon. We compared ecological parameters in the living community with seagrass cover with the goal of using the same ecological information from the molluscan death assemblage to predict the abundance of seagrass in the recent past. Live molluscs were collected from three environments of differing seagrass density to examine molluscan distribution as a function of seagrass cover. Forty-eight shallow cores were collected. At each sampling location, a seagrass cover index was also determined by counting the seagrass species present and the number of blades per species per 25 m² of seafloor. Each living mollusc was identified within each core. Molluscs were categorized according to ecological role- herbivore, parasite, carnivore, omnivore, deposit feeder, filter feeder, and gastropod. Different cores were grouped according to the number of live molluscs and their distribution. Significant results (P<0.05) were obtained from ANOVA and MANOVA for seagrass cover, bivalve/gastropod ratios within each core, and the number of carnivores, scaphopods, herbivores, and deposit feeders present.
Predators play an important role in benthic community structure. In the time-averaged molluscan death assemblage in Grahams Harbor, evidence of past predation consists primarily of bore holes of shells by carnivorous gastropods. Here, we examined the ecological roles of the species being preyed upon from three distinctive environments: a dense seagrass bed, 3m in depth, a backreef area, 6m in depth, and a seagrass-sand transition, 3m in depth. At the location of each of the 48 cores collected, a seagrass cover index was calculated. Forty-eight shallow cores were collected. Bored molluscs were categorized according to ecologic role: herbivore, parasite, carnivore, omnivore, deposit feeder, filter feeder, type: bivalve or gastropod; total number of bored molluscs, and life location— in fauna or epifauna. There were significant differences (P<0.05) in the ecologic roles of molluscs preyed upon among environments. Seagrass cover is of paramount importance in determining which ecologic roles are preyed upon preferentially from one environment to the next. We found that bivalves are bored more frequently than gastropods regardless of the environment they were collected in. In some molluscan species, over 30% of the individuals in the death assemblage were preyed upon. Carnivorous gastropods, despite their reputation for carnivory of other molluscs, were the most favored prey items in the seagrass-sand transition environment. Also, infauna were bored more often than epifauna in each environment.

**Education Division**

**EDUCATION**

9:15AM SATURDAY, MAY 4, 1996
TIMKEN SCIENCE HALL 220
MICHAEL GROTE - PRESIDING


Concerns about how farming affects water quality and maintaining a viable, profitable agriculture prompted the USDA to select sites in five Midwestern states to model an effective partnership of research, demonstration, and educational programs. Management Systems Evaluation Area (MSEA) sites are located in Missouri, Iowa, Minnesota, Nebraska, and Ohio. The objective is to evaluate the impact of farming practices on water resources, to demonstrate practices to farmers, and to increase the adoption of practices that will maintain and enhance water quality. The cornerstone of this program is the close integration of research and education within and between projects, through a broad-based partnership of scientists, educators, agencies, and organizations. The regional MSEA education component has helped producers make better management decisions that protect water resources by providing public awareness information, demonstrating new farming technologies and strategies, and providing education and technical assistance. These regional efforts focus on nutrient and pesticide management, water management, and other Best Management Practices. Ohio has provided water quality information and support to more than 10,000 agricultural producers and landowners, and other users through a variety of outreach mechanisms.

9:30 GREENHOUSE GASES AND THE 5% SOLUTION, GLEN G. KIZER, PO BOX 163340, COLUMBUS OH 43216.

One of the most hotly debated topics for the remainder of the 1990s will be whether or not global climate change is being caused by the warming of the atmosphere. The trend in current thought is that greenhouse gases are going to melt the polar caps and these greenhouse gases are the result of burning fossil fuels. The Rio Treaty and the Berlin Accord are going to eventually result in federal mandates for the limitation of greenhouse gases. There is a public debate taking place within the scientific community and within both media and political arenas. The issue will remain a volatile one for many years. We need to create a project in which a coalition is formed on at least some parts of the issue in Ohio, we could meet the targets currently contained in the growing number of international accord. We could switch to nuclear power or we could all buy cars that are 25% more fuel efficient, or we could retrofit our power plants. These things are difficult to implement into a culture where few people even understand the phrase greenhouse gases or the issue of global climate change. Or we could plant trees. To accomplish a 20% reduction in year 2000 CO2, projected levels we would have to increase tree cover in Ohio from the 30% cover of 1980 to a 35% cover in the year 2000. This is a 5% increase. Estimates are that this would cost $1.7 billion. It will not. We will accomplish this goal and we will educate our state population on the entire air cycle so that they better understand the issue and both sides of the debate. We improve the environment and educate our adult population at the same time. My paper will talk about the coalition we are forming among environmental, business, and government groups to get the trees planted to improve the scientific literacy of the adult population at the same time.
Education

2:15PM Saturday, May 4, 1996
TIMKEN SCIENCE HALL 220
JIM L. JACKSON - PRESIDING


We should not lose sight of the ways in which technological and economic issues confronting sustainability are grounded in what Faulkner has called "the verities of the human heart in conflict with itself." The challenge which faces us today must be perceived as requiring more than a technological fix—the challenge indeed, as deep ecologists have been pointing out for some time now, goes directly to our most fundamental conceptions of our relationship to the natural environment. As one historian states: "the environment, seen first as a technological and scientific problem, then as an economic and political one, has become a philosophical and ethical one" (Young, Sustaining the Earth, Harvard UP, 1990, p.x). To adequately meet this challenge we will need to confront these fundamental conceptions—and I would argue that the most natural environment for doing so is that of the humanities classroom. From my own experience teaching literature, I would suggest that any humanities course can be instrumental in educating students with a range of environmental issues, giving rise to the kind of analysis and general ethical and philosophical discussion necessary to sustain the ideal of sustainable development.

April Program Abstracts

2:30 STUDENTS, ENVIRONMENTAL SCIENCE, MULTIMEDIA, AND PREDICTION OF SUCCESS. JIM L. JACKSON, JOHN J. HIRSCHBEIN, DOROTHY A. BISHOP, DAVID A. MASSARO, 7448 BIRKNER DR., KENT OH 44240.

Freshmen arriving at universities and job applicants for industrial positions bring a broad range of previous experiences with them. Massaro found the number of math courses completed in high school and their scores on the instrument, Group Assessment of Logical Thinking, were strong predictors of student success in a college level science course. In short, problem solvers tend to be more successful. Industry is also interested in problem solvers. Multimedia laboratory experiences were developed to promote problem solving and expose users to authentic learning experiences. Users of the experiences find an extensive computer environment where they obtain, evaluate and interpret environmental data. The experience forces students to move from the concrete to higher level interpretations. Most of our presentation demonstrates the multimedia problem solving experiences. The multimedia materials are set in a Windows environment, and industry will find prospective employees can be evaluated using these materials. In addition, job applicants can learn Windows environment skills, while sharpening their problem solving skills.


Cornell University is one of several prestigious American universities offering a summer management development institute for college and university administrators and managers. Cornell University's Administrative Management Institute (AMI) has been in existence only since 1993, however, and therefore little if any mention has been made of it in the literature describing higher education management development programs. The presenter, also a participant-observer in Cornell University's 1994 AMI, attempts to address this gap in the literature. Results of an AMI participant survey conducted by the researcher, including participant demographics and perceptions, program benefits and features, and recommendations for further research are shared. Findings indicate that a greater emphasis needs to be placed on personal management and leadership as dimensions of the AMI management development program. In addition, follow-up studies related to future sessions should be conducted to further inform decision-making concerning program features. Replication is also suggested in terms of providing for comparative participant perceptions related to other nationally renowned higher education management development programs.

3:00 THE USE OF TECHNOLOGY IN HIGHER EDUCATION PROGRAMS: A NATIONAL SURVEY. DIANNE BROWN-WRIGHT, PH.D., THE UNIVERSITY OF AKRON, COLLEGE OF EDUCATION, 410-C ZOOK HALL, AKRON OH 44325-4208.

Changes in student lifestyles and demographics argue for alternative modes, places, and times of instruction. The purpose of this study was to investigate the use of technology in graduate programs in Higher Education in the United States. The researcher also sought to determine perceived constraints to such utilization as well as incentives at either the college or university level to encourage the use of technology in the delivery of instruction. A national survey was conducted using the Directory of the Association for the Study of Higher Education (ASHE) Higher Education Program Directors. Survey results were examined, with a particular eye on the identification of technologically based active learning strategies which could be easily replicated. While some of the initiatives identified as technologically used appeared to be being fully implemented, most others were found to be in the early stages of formulation. Limited faculty time, knowledge, skill, and resources were found.
Prior to 1994 the introductory sequence for biology majors at Capital University consisted of a fairly traditional approach - Introduction to Biology followed by Zoology and Botany courses. Both science and non-science majors shared the introductory course, which meant that the skills level of the class as a whole was usually low. This proved to be unsatisfactory for the biology majors (including premedical) with retention of majors in the program averaging just 74% between the first and second semesters, and 66% between the freshman and sophomore years. Starting in 1994 a new freshman sequence was introduced which separated biology majors from nonmajors and used an integrated, experiential format to teach the foundational theories of biology. Greek and Latin scientific terminology were introduced in week one and continued throughout the semester, and laboratory exercises were rewritten to be more investigative. The expectations for biology majors were increased, and students were informed about the reason for these changes. The department faculty spent time relaying information about the department, careers in biology, and study time expectations for science majors. As a result of these changes, retention rates among biology majors has risen to 92% and students report a stronger commitment both to the department and to the university. It remains to be seen whether or not these changes will be reflected in graduate and professional school acceptances in coming years.

As medical school application numbers continue to rise, premedical advisers and department chairs are coming under increased pressure from students, parents, and faculty to maintain high success rates for senior students applying to medical schools. To do this well, especially in an era when the number of freshman students self-selecting a premedical major or track is increasing dramatically, requires some way to predict overall success rates and thus redirect those freshman who are not likely to be accepted into medical school. To find such a predictor, records of all students at St. Francis College who had applied to medical school during the years 1986 to 1992 (n = 38) were analyzed. High school GPA, ACT scores, and grades in freshman science courses were compared with acceptances at medical school. Positive correlating (Pearson) were found between math ACT score and first semester biology grade (.39), math ACT and first semester chemistry grade (.37), and math ACT and first semester GPA (.60). A positive correlation (.72) was also found between math ACT score and medical school acceptance. The ACT reading score was not significantly correlated with any of these. A math ACT score less than 22 was never associated with successful medical school admission. Thus, while one cannot predict which students will be admitted to medical school, one can reason use math ACT (or SAT) scores to encourage students to rethink unrealistic expectations early in their college careers.

Our lab previously developed an assay for the rat liver 6-hydroxymelatonin sulfotransferase (6HMST) activity and observed male-dominant sex dimorphism. Here, we explored the dimorphism's basis. First, 6HMST activity was examined in 10-40 day old, 2-6 mo. old, and >10 mo. old rats. Activity in females rose until day 30. In males it increased until adulthood. The dimorphism was not apparent until puberty, suggesting gonadal regulation. To test this, the effect of castration was examined. 6HMST activity was unaltered in female castrates. Male castrates exhibited a marked decline in the enzyme activity. Effects of estradiol or testosterone on males and females, respectively, were also studied. Androgen had no effect and estrogen led to large drops in 6HMST activity. Ion exchange chromatography suggested that one enzyme causes the 6HM sulfation in all cases. The data are related to earlier studies of sulfation of 6HM & related substrates.

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The fate of polycyclic aromatic hydrocarbons (PAH) released into the environment by fossil fuel combustion is important because these carcinogenic compounds adsorb on airborne coal fly ash particles emitted by coal-fired power plants. In an effort to mimic this natural process, the spike method (small volume of solution with a large mass of ash) and the slurry-spoke method are two commonly used deposition techniques. The suspension method, a newer, less commonly used technique, of depositing anthracene on coal fly ash particles (6.17% C) was examined to attempt to develop the procedure and determine its viability as a deposition method. It has been shown that this deposition method provides a more homogeneous coverage of the PAH on the ash surface. In a separate funnel, ash was allowed to settle in a 206 ppm solution of anthracene in methanol. After collecting and allowing the ash to dry, quadruplicate Soxhlet extractions were run for 24 hours. The solution remaining in the funnel was quantified using UV-visible spectrophotometry. Of the 185 µg anthracene/g ash deposited, 57 +/- 6% was recovered. The effect of varying the solution concentration on the resulting surface concentration will be discussed.


Diamond is not only a friend to women, but also a friend to the electronics industry due to its properties like large band gap, high peak electron velocity, high breakdown field, high thermal conductivity, radiation tolerance, and chemical stability. These properties allow electronic devices made in diamond to be operated at extreme conditions. Ion implantation is a popular technique to dope electronic materials for obtaining n-type, p-type, and high resistance layer needed to make electronic devices. In our study, we used phosphorous (P) ion implantation to obtain n-type layers. The first four range statistics of P in diamond were obtained. These were found to be more than the corresponding theoretical values. Preliminary results on electrical characteristic indicate n-type layers. P atoms did not redistribute even after 1200°C/2.5 min, furnace annealing. Detailed results on P ion implantation and the fabrication of electronic devices in diamond using P ion implantation will be presented at the conference.

9:45 COMPUTER SCIENCE IN CYBERSPACE: A NEW ELECTRONIC LITERATURE. J B HILL, UNIVERSITY OF AKRON, SCIENCE & TECHNOLOGY LIBRARY, AKRON OH 44325-3907.

Historically journal literature has been a widely accepted method of scholarly scientific communication. With the advent of instantaneous internet transmission, scholarly communication has begun to change. Ideas are communicated through email, listservs, bulletin boards and increasingly electronic journals. Since the cyber community is a relatively computer savvy population, there is a ready-made audience for computer information on the internet. The electronic journal has emerged as a vehicle to organize and communicate through email, listservs, bulletin boards and increasingly electronic journals. This paper will discuss the solution concentration on the resulting surface concentration will be discussed.

10:00 COST, IMMEDIACY, IMPACT, AND USE: VARIABLES FOR SCIENCE SERIALS EVALUATION. NANCY HAYES AND J.B. HILL, UNIVERSITY OF AKRON, SCIENCE & TECHNOLOGY LIBRARY, AKRON OH 44325-3907.

Serial publications are the primary avenue for the exchange of scientific research. An explosion of information, resulting in an increase in titles and volumes, comes at a time when science libraries are confronted with problems of serials price inflation, budget constraints and space limitations. As a result, libraries need to use both qualitative and quantitative measures to systematically evaluate science serials collections. Qualitative measures, such as the Institute for Scientific Information's impact factors and immediacy index, often prove to be valuable bibliometric tools at the point of serials selection. Quantitative measures, such as cost and use, are often more compelling considerations at the point of serials cancellations. Science librarians need to recognize the problems associated with the use of each of these variables and consider the merits of all four measures when evaluating a serials collection's quality and utility.

ENVIRONMENTAL SCIENCES & RESOURCE MANAGEMENT DIVISION
1:00 - 2:00 PM FOLLOW-UP INTERACTIVE SESSION WITH DR. THOMAS GLADWIN. WHAT DIFFERENCE WILL SUSTAINABLE DEVELOPMENT MAKE FOR MY COMMUNITY? RANDALL CAMPUS CENTER STEWART COMMUNITY ROOM

ENVIRONMENTAL ISSUES OF SUSTAINABLE DEVELOPMENT
2:15PM SATURDAY, MAY 4, 1996 FOUNDERS HALL 39 FRANK J. COSTA - PRESIDING


The intellectual origins of the sustainability concept are examined. These include garden city and anarchical self sufficiency theory of the late 19th and early 20th century. Later 20th century contributions to the concept of sustainability are also explained. Divergent approaches to, and attitudes about, the concept are examined from the perspectives of both the developed and developing world. Emphasis is placed upon sustainability as it relates to urbanization, planning and eco-tourism.


There is no significant or substantive definition of sustainable tourism development in the broad sweep of literature that has emerged during the past two decades. The literature suggests that it is difficult to develop a definition of sustainable tourism development since the concept is still in an infancy or evolving stage. Even more importantly, it is suggested that the challenges and problems affronting sustainable tourism development are largely region-specific. In this paper, the small developing island states (SIDS) of the Caribbean is used as a microcosm for developing a working definition of sustainable tourism development. Within this context, sustainable tourism development is defined as "tourism which is developed and designed to remain visible over an extended period of time while placing minimum demands on the natural environment and aggressively protects the ecosystems of the region." The main idea underlying this definition is that tourism development should continue in the small island developing states but within the bounds of the environmental limits of the region.

2:45 SUSTAINABILITY IN ECOTOURISM IN BELIZE. LAURA A. DEYOUNG, P.O. BOX 138, BATH OH 44210.

Ecotourism provides a conservation preservation technique, preserving ecosystems and species as well as man's historic cultural resources from developers and locals who want growth through usurping the natural resources. This paper looks at Belize's use of ecotourism as a sustainable economic development tool: (1) to protect ecosystems, endangered species, and historic cultural resources by creating enough local economic gain in the private sector and enough social benefit in the public sector to generate an incentive to protect rather than destroy the ecosystem; and (2) to avoid negative impacts on the ecosystems, species and historic cultural resources by identifying tolerable levels of carrying capacity.

3:00 COMPARATIVE SUSTAINABILITY POLICIES IN INDIAN CITIES. CHRISTOPHER D. GUSACK, THE UNIVERSITY OF AKRON, DEPARTMENT OF GEOGRAPHY AND PLANNING, AKRON OH 44325-5005.
Historically, development efforts in the major Indian cities of Bombay, Calcutta, and Delhi have primarily been aimed at traditional concerns such as housing and infrastructure. Recently, however, the issues of environmental sustainability and conservation have been incorporated into development plans for these cities. These cities then, offer the unique opportunity for a comparative analysis of local implementation of sustainability into planning and development. Therefore, the objectives of this paper are: to provide an overview of the primary planning and development efforts in Bombay, Calcutta, and Delhi since independence; examine the more recent attempts of these cities to manage sustainable development; provide a comparison of sustainable development practices between the cities; and identify problems facing future sustainable development in these cities.

Public officials and planning agencies need sound environmental data on which to base guidelines for sustainable development. These data should be provided by qualified experts in a manageable, easy-to-understand format. We include an ecological planning tool to be used by local governments for this purpose. The Index of Ecological Integrity (IEI) evaluates the ecological value of undeveloped lands and assigns metric values to each contiguous parcel or vegetation cover type. These parcels are then prioritized based on this estimated value numerical results are graphically presented in a series of geographical information system (GIS) base maps with recommendations for land-use planning. Using this information, local agencies can prepare legally defensible guidelines for sustainable development. For example, areas with high ecological value may be considered for low impact land-use activities or conservation easements. Conversely, low quality areas may be targeted for higher impact activities. The IEI has wide application for the planning community to assess environmental infrastructure.

This paper discusses various issues and options related to the Urban Landuse Policies for Bangladesh in the light of experiences from projects undertaken in a number of developing Asian cities. Urban land policy is considered necessary and interrelated with other national factors. The economic constraints, limitation of resources and prevailing sociopolitical situation in Bangladesh play predominant roles while formulating landuse policies. A well defined land policy is a key requirement for planned expansion, development and growth of cities in Bangladesh. It would enable the government to design cities for a sustainable future.

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Water Issues

9:00AM Saturday, May 4, 1996
Founders Hall 24
Jay M. Johnson - Presiding

9:00 LAND-USE PLANNING FOR SUSTAINABLE DEVELOPMENT USING THE INDEX OF ECOLOGICAL INTEGRITY. Laura K. Mataraza, Elizabeth L. Buchanan, Ken Joehlin, P.J. Lavinge, Jay Abercombie, Todd Chandall, Michael D. Johnson, Ken Christensen, Karen Wise, ACRT, Inc. P.O. Box 401, Cuyahoga Falls OH 44221.
Surface water analyses in the last 35 years have shown anomalously high strontium abundances in Ohio rivers and streams. To better understand the extent and origin of this strontium anomaly, all available surface water analyses including strontium and calcium data were compiled. Sr/Ca x 10, ratios were then calculated and averaged over each drainage basin in the Ohio River Basin. Drainage basins with Sr/Ca x 10, ratios greater than the average crustal ratio of 5 (Faure 1991) include the Sandusky River, the Maumee River, the Olentangy River, the Great Miami River, the Mad River, and the Scioto River. High Sr/Ca ratios occur particularly in Scioto River tributaries northwest of Columbus. Recent sampling of river water has been done to augment the existing data. Comparison of compiled Sr/Ca ratios with the lithologic and glacial boundaries show that high Sr/Ca ratios correspond with Silurian carbonate bedrock and overlying till and that low Sr/Ca ratios correspond with unglaciated Devonian and Mississippian clastic rocks. Feulner and Hubble (1960) were the first to propose that high strontium abundances originated from the mineral celestite (SrSO₄) which is known to occur in the carbonate bedrock and till of Ohio. The compiled Sr/Ca ratios and their relationship to lithology supports this conclusion; however whether bedrock celestite or celestite in the till has more of an effect on Sr/Ca ratios is still in question.

10:00 DEGRADATION OF PHENOL USING CLAY/FLYASH MIXTURE SUPPLEMENTED BY BIOAUGMENTATION. HOWARD H. LO, RAYNOR WAN, AND YOUNG-TSE HUNG, DEPT. OF GEOLOGICAL SCIENCES, CLEVELAND STATE UNIVERSITY, CLEVELAND OH 44115.

The objectives of this study were to investigate the effectiveness of adsorption treatment using clay/flowash mixture and the adsorption treatment supplemented by bioaugmentation with LLMO (liquid live microorganisms) for the treatment of phenolic wastewater. Parameters used in the study included wastewater strength, type and dosage of adsorbent, and type of LLMO. Clay and flyash were mixed in different proportions with a clay to flyash ratio of 3:1, 1:1, and 1:3. Strength levels of phenolic wastewater were 10, 50, and 100 mg/TOC (total organic carbon). Dosages of adsorbents used were 0, 5, 10, 15, and 20 g/l. Five types of LLMO used were S-1, E-1, G-1, N-1, and NEW-1. Results showed that clay/flowash mixtures were effective in removing phenol from wastewater with TOC removal efficiency of greater than 70% for high strength wastewater. When clay/flowash adsorption was supplemented with LLMO biaugmentation the phenol removal was increased to greater than 80% TOC removal efficiency. LLMO E-1 and G-1 appeared to be more effective in phenol removal efficiency. LLMO bioaugmentation had the highest phenol removal rate with 87% removal efficiency.

10:15 MIXING OF WATER IN THE BIG WALNUT CREEK, CENTRAL OHIO. TIMOTHY R. PETZ AND GUNTER FAURE, DEPARTMENT OF GEOLOGICAL SCIENCES, OHIO STATE UNIVERSITY, COLUMBUS OH 43210.

The concentrations of conservative cations and anions in streams are generally controlled by mixing of two or more components including groundwater, surface run-off, and water discharged by waste-water treatment plants, and other anthropogenic sources. Big Walnut Creek provides an opportunity to demonstrate the effect of mixing at its confluence with Alum Creek and Blacklick Creek and at its confluence with the Scioto River south of Columbus. The results show that the concentrations of the major conservative cations (Ca, Mg, Na, and Si) and of water in Big Walnut Creek, Alum Creek, and Blacklick Creek collected upstream of the confluences define mixing triangles as expected. The mixed water downstream of the confluences is represented by points that lie within the triangles of mixing. The relative abundances of water derived from the tributaries can be determined by resolving the cation concentrations of the mixed water into its components. Water collected from the Scioto River downstream from its confluence with Big Walnut Creek is anomalously enriched in Na caused by discharge of water from the waste-water treatment facility south of Columbus. The concentrations of the major conservative cations increase as Big Walnut Creek flows through Gahanna and gradually decrease downstream to the confluence with the Scioto River.

10:30 PLANT RESPONSES TO WASTEWATER BIO SOLIDS PRODUCED AT A PLASTICS MANUFACTURING FACILITY. DENNIS BISHOP AND ARTHUR TISEE, DEPARTMENT OF ENVIRONMENTAL AND PLANT BIOLOGY, OHIO UNIVERSITY, ATHENS OH 45701.

Many municipalities and industries are faced with the environmentally sensitive problem of disposal of wastewater biosolids, the residual organic material produced during wastewater treatment. Currently, much of this material is disposed of in land fills or incinerated, despite the fact that the material is rich in organic and mineral plant nutrients. We have examined the land application potential of biosolid wastes produced from Dupont's Washington Works, Parkersburg, WV. We have determined the average concentration of heavy metals and plant nutrients in the biosolids to arrive at maximum application rates based upon these criteria. In greenhouse studies we mixed the biosolids with either potting mix or two soils, at rates ranging from 50 to 0% biosolid. Growth responses of tomatoes, turnips, and beans were determined, including nodulation of beans. Biosolid/soil mixtures as high as 25% biosolids increased plant growth, but 50% biosolids consistently inhibited biomass accumulation. Elemental analysis of plant tissue indicated that excess nitrogen was the most detrimental element in mixtures containing high proportions of biosolids. Field studies have demonstrated that applications of this biosolid product enhances plant growth when incorporated at levels of up to 25% of the soil volume.


The arbovirus called yellow fever has impacted transportation and thus commerce from the steam era to the present day. Human-environment interaction is important to communicable diseases. Mosquito habitat is examined closely in relation to spatial corridors of transport. The subgenus Stegomyia of the genus Aedes includes several mosquito vectors. The most famous and relevant of the vectors is Aedes aegypti. This mosquito favors standing water near houses, as may be found in old tires, rain puddles, and flowerpots. It does not enjoy woodlands of any type, tropical or otherwise. It is not a wetlands mosquito. Yellow fever can only remain endemic to tropical and semitropical regions without a killing frost. Current endemic regions are Africa, Central America, and South America. The United States have been free of yellow fever since 1878. Disproven theories and current findings alike are examined for lessons about sustainable commerce and development. The filth theory, transportability theory and germ theory affected everyday life during the debate over each hypothesis. The historical actions of railroads, cities, and states are viewed through the present-day kaleidoscope of virology and airline travel. African decolonization has led to national assertion in the last several decades, changing attitudes and funding for public health and disease control.

1:00 - 2:00 PM FOLLOW-UP INTERACTIVE SESSION WITH DR. THOMAS GLADWIN. WHAT DIFFERENCE WILL SUSTAINABLE DEVELOPMENT MAKE FOR MY COMMUNITY? RANDALL CAMPUS CENTER STEWART COMMUNITY ROOM

ENVIRONMENTAL ISSUES
2:15PM SATURDAY, MAY 4, 1996 FOUNDERS HALL 24

F. JOHN KLUTH - PRESIDING

2:15 COMPARATIVE STUDY OF PROCEDURES FOR THE DEPOSITION OF POLYCYCLIC AROMATIC HYDROCARBONS (PAH) ON COAL FLY ASH. BRIAN W. MAY AND ROBERT F. MAULDON, DEPARTMENT OF NATURAL SCIENCES, SHAWNEE STATE UNIVERSITY, PORTSMOUTH OH 45662.

A by-product of burning coal, called fly ash, has been shown to adsorb carcinogenic substances known as polycyclic aromatic hydrocarbons (PAH). It is impossible to calculate extraction efficiencies with native PAH because the initial concentration is unknown; therefore spiked PAH are used to mimic the effects of the natural process. The uniformity of deposition involving spike, slurry-spike, and suspension methods was examined. A surface concentration of 185μg anthracene/coal fly ash resulted with each deposition procedure. An ultrasonic extraction was performed on the coal fly ash (6.17% C) coated by the PAH. A surface concentration of 61.9% C acetone solution was used. The extraction efficiency was determined by comparing the PAH concentration in the spike solution with the PAH recovery. The degree of uncertainty indicates that there is a non-uniform surface coating of the PAH in spike and slurry-spike deposition procedures. The suspension method, as
Hazardous chemical management in a manufacturing environment involves identifying and locating the hazard. Identifying the hazard involves monitoring the materials coming in through purchases, shipments, and gifts and determining though Material Safety Data Sheets, Labels, and common sense which are liable to present a hazard. Hazards must be gauged in terms of the reactivity, flammability, and health risks of the materials involved. Computer data base techniques are useful for organizing the data involved. This paper describes one approach that has been taken to deal with these issues as well as the nature of the data base that has been required. Particular emphasis is placed on integrating the data collection into the general practice of the business so as to minimize the cost of data collection.

2:45 KINETICS OF OXIDATIVE STABILITY OF UNSATURATED FATTY ACIDS ENCAPSULATED IN CYCLODEXTRINS. WENDY A. REICHENBACH, DAVID B. MIN, DEPARTMENT OF FOOD SCIENCE & TECHNOLOGY, OHIO STATE UNIVERSITY, 2121 FYFFE ROAD, COLUMBUS OH 43210.

The effects of α- and β-cyclohextrin (CD) on the oxidative stability of linoleic (LA) and linolenic (LN) acids stored at 35°C, 50°C and 65°C have been studied by measuring headspace O₂ depletion in air tight 35 mL serum bottles. Aqueous solutions of LA or LN were encapsulated in α- or β-CD in mole ratios of 1:1, 2:1, 3:1 and 4:1 (molest CD:LN or LN) by homogenization at 8000 rpm for 1 minute and then dried under vacuum. The headspace O₂ was measured using thermal conductivity gas chromatography. The rates of O₂ depletion at 35°C, 50°C and 65°C for LA alone were .019, .041 and .072, and for LN alone were .022, .063 and .086 mole O₂/L headspace gas, respectively. When LN was encapsulated in CD at a 2:1 (CD:LA) mole ratio, the rates of O₂ depletion were .00049, .021 and .015 for α-CD and .0031, .065 and .15 for β-CD at 35°C, 50°C and 65°C, respectively. The rates of O₂ depletion for both α- and β-CD were greater at 50°C and 65°C indicating that CD was prooxidative to LN at 50°C and 65°C for both α- and β-CD. When LA was encapsulated in β-CD at a 1:1 (CD:LA) mole ratio, the rate of O₂ depletion was .0063, .026 and .10 mole O₂/L headspace gas at 35°C, 50°C and 65°C, respectively. When LA was encapsulated in α-CD at a 1:2 mole ratio (CD:LA), the rates of O₂ depletion were .00917, .010 and .011, respectively, indicating that the oxidative stability of LA was increased 116x at 35°C and 410x at 50°C.

3:00 NEANDERTHAL SPEECH AND HUMAN ORIGINS. CHRISTOPHER W. NOLLY, BIOLOGICAL SCIENCES, BOX 5190, KENT STATE UNIVERSITY, KENT OH 44242.

Flexion of the inferior surface of the skull has been considered important to the reconstruction of fossil hominid vocal tracts. It has been argued that the European Neanderthals possessed less exocranial flexion than living humans, and consequently were physically limited in their ability to produce speech. Reduced linguistic ability has been suggested as a genetic isolating mechanism between Neanderthals and "anatomically modern" humans, providing evidence that Neanderthals were an extinct side branch in hominid evolution. Exocranial flexion was examined for samples of human (n=100) and chimpanzee (n=50) skulls from the Cleveland Museum of Natural History. No overlap in the degree of exocranial flexion occurred between the two species. Four skulls (with relatively complete bases (including one recently reconstructed skull) comprised the Neanderthal sample. The Neanderthals were encompassed entirely within the range of variation for humans and outside that for chimpanzees. The flexion of the Neanderthal sample (x=41.7°, sd=5.0) was not significantly different than the human sample (x=46.3°, sd=7.5). Consequently, it is unwarranted to use exocranial flexion as an indicator of Neanderthals' ability to produce speech or as evidence that they did not contribute genetically to following European populations.


Five features make the Grameen Bank of Bangladesh unique in its approach to women's development: targeting the poor, targeting women, providing microloans, conditionality and group responsibility. This grassroots strategy of making credit accessible to poor women has been effective in the area of women's development through poverty alleviation and empowerment in Bangladesh, promoting sustainable development through targeting the poorest of the poor. Due to its success, it is important that this strategy can be used elsewhere to combat the feminization of poverty and thereby address a key aspect of sustainable development both in developing and developed countries. In order to test the replicability of this approach in an urban, First World context, two microlending organizations will be examined. The first is the Women's Self-Employment Project (WSEP) in Chicago, which is known to closely mirror the Grameen Bank approach, hence used as model. The second organization will be a smaller one in Ohio, having fewer of the five Grameen features than the WSEP. If both organizations have been successful in empowerment and poverty alleviation, a comparison of the two through interviews of borrowers and organizers will indicate which variables are essential in order to achieve these, and how we can begin to effectively approach women's development in an environment so different from the one in which the Grameen Bank exists. The results will also show which features of the Grameen Bank approach may or may not prove effective in a First World, urban context due to cultural, rural/urban differences.


Identifying priorities consistent with principles of sustainable development may mean reducing the level of militarization. Militarization impedes on a nation's ability to allocate its resources efficiently as well as negatively affecting both present and future human and natural resources. Militarization is especially pronounced in the Third World for which development priorities are so critical. My study proposes to address the following question, "Does a higher level of militarization impede upon the human development of a nation?" By comparing the impact of militarization on development within Costa Rica, a relatively demilitarized nation, and within Panama, a more highly militarized country, the study focuses on the period between 1970-1985.

3:45 CULTURAL INTEGRITY AND PRESERVATION THROUGH SUSTAINABLE DEVELOPMENT. LIYA AKULU, BOX C-1024, THE COLLEGE OF WOOSTER, WOOSTER OH 44691.

The paper examines the effect a sustainable form of development, ecotourism, has on an indigenous population's right to cultural integrity and presentation. Human rights and development have increasingly come to be seen as complementary concerns that reinforce each other. It is generally assumed that an increase in one will eventually lead to an increase in the other. Many development projects disrupt indigenous populations' rights to social well-being and cultural preservation as they do not take their needs or the environment into consideration. Theoretically, sustainable development protects both natural resources and communities from exploitation and promotes the kind of development. Ecotourism is promoted as a sustainable form of development and the paper attempts to assess this claim by looking at its impact on both natural resources and communities of indigenous peoples. The cases to be used are two national parks, the Serenghi in Tanzania and the Masai Mara in Kenya. The impact these parks have on the Masai's ability to maintain their culture will be examined.

4:00 ECOFeminism and sustainable development. NEELA THAPAR, DEPARTMENT OF GEOGRAPHY, KENT STATE UNIVERSITY, KENT OH 44242.

Ecofeminism, as a movement started in the 1970s and gained momentum in the 80s. It combines the perspectives of ecology, feminism and peace. The Movement expresses the women's concern as a preserver and nurturer, for environment degradation and environment processes that sustain life. Mies and Shiva view the feminist perspective as one that propounds the need for a new cosmology and new anthropology which recognizes nature including humans, being maintained by cooperation, mutual care and love. This paper looks at the basic ideology of ecofeminism which views the preservation of earth's diversity and of human cultures as precondition for maintenance of life, the need of such concerns in a capitalist patriarchal society where man dominates and exploits both nature and women. The paper examines the controversy and protest against construction of a large dam on the Namada river in India and its implications on the environment and Namada tribals. The paper also looks at other such examples which reveal ecofeminism viewing 'modernization' and 'development' contributing to destroying and exploiting the nature.
TYPE I PRODUCTION FROM CULTURED RAT FIBROBLASTS. SUZANNE quantification was developed using an enzyme-linked immunoabsorbant as-

fibroblasts to Ang II or T treatments. An assay for collagen type I detection and collagen production in cultured SHR fibroblasts is more responsive than WKY sive Wistar-Kyoto (WKY) rat. The objective of this study was to determine if 9:15 DEVELOPMENT OF A TECHNIQUE TO MEASURE COLLAGEN shows an inverse effect with NE release in the kidney, possibly by complement-

WKY strains. To conclude, the presence of a modified angiotensin II peptide a strain did not show significant differences from LDH values for the SHR and

MORGAN, DARLENE WALRO, AND DANIEL ELY, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON, AKRON OH 44325-3908.

The objective was to determine the perfusion effects of [Sar\(^1\)-Angio-
tensin II, an analog of Angiotensin II, on norpinephrine (NE) release of isolated kidneys. Male rat kidneys were obtained from the Spontaneously Hypertensive Rat (SHR), normotensive Wistar-Kyoto (WKY), and SHR/a, a congenic rat strain derived from SHR and WKY. Kidneys were surgically removed, isolated, and perfused with one of three concentrations of [Sar\(^1\)-Angiotensin II (10\(^{-6}\), 10\(^{-5}\), and 10\(^{-4}\)M) for each strain (4 kidneys/ concentration/ strain). Renal nerves were stimulated during five time periods and each consisted of seven minutes nonstimulation and three minutes stimulation. Per fusates were col-

lected and analyzed for NE by HPLC with electrochemical detection and lactate dehydrogenase (LDH). LDH values are used to determine the amount of cellular trauma; kidneys with elevated LDH levels would not be used in the analysis. The NE levels of SHR and WKY kidneys increased with decreasing concentrations of sar-angiotensin II. In the SHR/a strain NE levels remained stable as sar-angiotensin concentration decreased. LDH values for the SHR a strain did not show significant differences from LDH values for the SHR and WKY strains. To conclude, the presence of a modified angiotensin II peptide shows an inverse effect with NE release in the kidney, possibly by complement-

9:15 DEVELOPMENT OF A TECHNIQUE TO MEASURE COLLAGEN TYPE I PRODUCTION FROM CULTURED RAT FIBROBLASTS. SUZANNE MORRAN, DARLENE WALRO, AND DANIEL ELY, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON, AKRON OH 44325-3908.

Recent studies have shown that Angiotensin II (Ang II) and Testoster-
one (T) cause an increased collagen type I deposition in blood vessels in rats. Studies within our laboratory have shown the Spontaneously Hypertensive Rat (SHR) to have more collagen deposition in vascular walls than the normoten-
sive Wistar-Kyoto (WKY) rat. The objective of this study was to determine if collagen production in cultured SHR fibroblasts is more responsive than WKY fibroblasts to Ang II or T treatments. An assay for collagen type I detection and quantification was developed using an enzyme-linked immunosorbant as-

say (ELISA). Three variables were examined with known amounts of collagen type I: indirect vs. competitive ELISA, blocking solutions (2% BSA or 10% milk) and primary antibody (Rockland Laboratories) concentration. Our findings have shown the indirect ELISA produces the most consistent results. The milk block yielded the lowest background and most reproducible results. Primary antibody concentration was most sensitive to varying collagen type I concentra-
tions at 1:1000 dilution. Presently, fibroblasts are being cultured from both SHR and WKY to determine and compare the effect of Ang II and T on collagen type I synthesis in vitro.

9:30 GENETIC EFFECTS OF HEART AND VESSEL COLLAGEN ON HYPERTENSION. R. HAJJAFAR AND D. ELY, DEPT. OF BIOLOGY, UNIVERSITY OF AKRON AKRON OH 44325.

The objective of this study was to examine the genetic and environmen-
tal components contributing to collagen deposition in hypertension. Spontane-
ously Hypertensive Rat (SHR), normotensive Wistar-Kyoto (WKY) and cross strains SHR/Ky, and SHR/a were used. A total of 120 rats, five weeks of age, were divided into four groups, i.e. control, castration (5 weeks), castration + testosterone, and hydralazine. At 15 weeks of age the blood pressure (BP) was measured for three consecutive weeks. At this point animals were anesthetized, and heart and mesenteric arteries removed and processed for Electron Microscopy (porolon E5000). Photographs with 600X-1200X sure were video taped, digitized and the amount of collagen quantified (Sigma Scan). The BP in control group of SHR, SHR/Ky, and SHR/a were significantly different than the WKY (183±5, 178±10, 176±7, and 123±10). There were no significant differences in BP after castration. In the castrated + testosterone group, there were significant differences between SHR, SHR/Ky, SHR/a compared to WKY (187±5, 185±10, 184±7 to 120±10). On hydralazine all strains maintained a BP of 125±10. Collagen amount in control group and castrated + testosterone group was significantly higher in SHR, SHR/Ky and SHR/a than the castrated or hydralazine group. There were no significant collagen differences in WKY in any treatment. These results suggest that the lack of testosterone in castrated animals was a reason for reduced BP and lower amounts or collagen. Preventing the rise of blood pressure with hydralazine kept collagen at a normal level.


Cross-fostering experiments between SHR and WKY have shown that exposing SHR pups to milk from WKY mothers can significantly reduce BP of the adult SHR. The purpose of this study was to determine the relationship between milk electrolyte levels in two rat strains to BP of their offspring and to produce a consistent milking technique. Oxytocin (Sigma, 5 i.u. in 0.5ml of H2O) was injected subcutaneous thirty minutes before milking. WKY and SHR rats were then lightly anaesthetized with Brevital IP and placed in a supine position before samples were collected. A vacuum-assisted milking apparatus was constructed to simulate natural suckling. Vacuum between 25 and 28 cm of mercury, pulsed 25 times/min was used for the duration of milk collection. The samples were frozen at -70°C and analyzed for sodium (Na\(^+\)), calcium (Ca\(^++\)), potassium (K\(^+\)), chloride (Cl\(^-\)), magnesium (Mg\(^++\)) and total protein (Hitachi Model 717 clinical analyzer). Milk samples from SHR contained higher con-

centrations of Na\(^+\):(p<0.005) and lower concentrations of Ca\(^++\): (p<0.005) compared to WKY. Levels of Mg\(^++\), Cl\(^-\) and protein were not significantly different. These findings are consistent with those reported by McCarty and Tong 1992. The dietary content of electrolytes that have been implicated in the development of hypertension differs between SHR and WKY strains.

10:30 DEVELOPMENT OF A LUNGE STANDARDIZATION TEST FOR THE USE IN LOWER EXTREMITY INJURIES. KRYSTLE D. ADLOFF, SIMON K. LAWRENCE, AND TIMOTHY BERRIDGE, DEPT. OF LIFE AND EARTH SCIENCES, OTTERBEIN COLLEGE, WESTERVILLE OH 43081.

Preliminary research in Physical Therapy has shown that closed kinetic chain exercises are more beneficial than open kinetic chain exercises during rehabilitation. Closed kinetic chain activities require the entire lower extremity to work together, whereas activities involving the quadriceps isolate a specific muscle. A closed kinetic chain exercise used in the therapy of patients with lower extremity injuries is the lunge. Research has concentrated on the assessment of a patient performing the open kinetic chain exercises. However, limited research is available regarding closed kinetic chain activities which are utilized to evaluate the patient's improvement. Therefore, the purpose of this study is to develop a standardization of the lunge test which will allow therapists to evaluate a patient's progress with lower extremity injuries.

10:45 SCIENCE FOR NURSES: SUCCESSFUL TEACHING STRATEGIES. MARY D. GAHBAUER, LIFE SCIENCE DEPT., OTTERBEIN COLLEGE, MAIN STREET, WESTERVILLE OH 43081.

There have been numerous publications over the last ten years on the need for nursing education to keep pace with the increase in knowledge of the biological sciences, but this has not occurred. Furthermore, nurses have been described as being 'relatively uninterested' in natural science. Fears are expressed that there will be a widening gap between nursing theory and the reality of biological disturbance in patients. The author, who has experience of clinical practice as well as the teaching of science to nurses at all stages of training, examines teaching strategies which have proven successful in gain-

ing nursing student interest and engagement in learning life science.
Previously we have shown that levels of cellular protein kinase C (PKC) increase during the first 1 h following infection with herpes simplex virus type 1 (HSV-1) and then decrease to background levels throughout the remainder of the infection cycle. We have further shown that H-7, an inhibitor of PKC, inhibits HSV-1 production. Here we examined the kinetics of virus protein synthesis by immunofluorescence (IF) and DNA production by Southern hybridization. Virus proteins representative of the early and late classes were detected by IF at 6 h and 9 h post-infection, respectively, in untreated infected cells but were barely detectable by 12 h post infection in H-7 treated cells. Similarly, the onset of DNA synthesis occurred later in H-7 treated infected cells than in untreated infected cells. Maximum anti-viral activity was demonstrated when H-7 was added during the first 4 h of infection and H-7 was less inhibitory when added after 6 h post-infection. These data suggest that phosphorylation of either cellular or viral proteins by PKC are important in the initial steps of HSV-1 infection. We are presently comparing the phosphorylation states of HSV-1 immediate early proteins in untreated and H-7 treated cells in order to identify the target of the antiviral activity of H-7.

It has been shown that N-(6-aminohexyl)-5-chloro-1-naphthalene-sulfonamide (code name W-7) inhibited herpes simplex virus type 1 (HSV-1) in a dose-dependent manner at concentrations which were not toxic to uninfected cells. Early viral protein synthesis was similar between untreated and W-7-treated virus-infected cells as measured by immunofluorescence and Western immunoblotting. Electron microscopy analysis of nuclei revealed that capsids were aberrantly shaped and the ratio of immature to mature capsids was higher in drug-treated cells compared to untreated cells. SDS-PAGE analysis demonstrated that several polypeptides were underrepresented in capsids isolated from nuclei of drug treated cells compared to capsids isolated from untreated cells. Several capsid proteins isolated from nuclei of untreated cells were phosphorylated in vivo but were not phosphorylated in W-7-treated cells. These data suggest that W-7 may affect synthesis and/or phosphorylation of capsid proteins thereby reducing HSV production.

NS cells are large granular lymphocytes found in areas of high hematopoietic activity. NS cells suppress immune responses in a genetically unrestricted, nonspecific manner. Our results suggest that NS cells preferentially suppress the development of Th1 cells. To further verify that NS cells suppress Th1 cell development, we developed a suppression assay across a cell-impermeable membrane. Inserts containing a cell-impermeable membrane were placed into the wells of a 24 well plate. 4 x 10^6 bone marrow (BM) cells from C57B/16 mice (a source of NS cells) were placed inside the insert. 10^6 spleen cells (SpC) plus a stimulating agent, either the mitogen Con A or anti-CD3 antibody, were added to the well outside the insert. The assays were run for 72 and 48 hours, respectively. Suppression was determined through H-thymidine uptake. Results show that NS cells suppressed both Con A induced proliferation (66.5%) and anti-CD3 induced proliferation (52.0%) across a cell-impermeable membrane. However, the kinetics are different. To suppress a Con A response, SpC and BM cells can be added to the wells simultaneously. To suppress an anti-CD3 response, BM cells must be incubated in the inserts 24 hours before the addition of SpC and antibody. To confirm preferential NS cell suppression of Th1 cells, SpC were stimulated with anti-CD3 antibody in the presence of BM (as described above). FNA was isolated after 1.5, 4 and 24 hours. A Northern blot analysis for IFN-gamma (Th1 cell) and IL-4 and IL-5 (Th2 cell) was performed. Preliminary mRNA results show that NS cells can suppress the Th1 lymphokine IFN-gamma, as compared to unsuppressed controls, across a cell-impermeable membrane.

Within the last five years, a new technique has been developed for locating DNA sequences in interphase nuclei by the application of DNA probes. This technique, adapted for the identification of aberrant genes associated with certain cancers, may be used for the prediction of progression of the malignancy. This study probed for the HER-2/neu (ErbB-2) oncogene because it has been found to be associated with prognosis in breast cancer. Several other cancers available to probe detection are discussed.

Social & Behavioral Sciences Division

Health Behaviors and Quality of Life: The College Population: Issues and Implications

9:00AM Saturday, May 4, 1996
Cattell Library 46
Alinde Moore - Presiding

A majority of Americans own pets and spend time and financial resources on their pets. A literature review yielded mixed results. However, there is evidence that improved human health may be one benefit of the human animal bond. Previously, we have demonstrated that there is a significant correlation between engaging in self and pet health maintaining behaviors. This suggests that a direct behavioral mechanism may be one cause of links between human and pet health. Here, we replicate that finding with a new data set (n = 24, g < .001) and explore additional relationships with additional variables such as quality of life measures, resource allocation, commitment, and expected contribution of a pet to one's quality of life. A multiple regression equation modeled the best life one could expect to have now against measures relating to pet ownership such as pet attachment and commitment. Results indicated that commitment to pets made a significant contribution to estimates of the person's positive expectations of their life.

9:15 Impact of Cancer: Coping Process and Quality of Life
Kerry S. Kennedy, MUCUS, 1972 Clark St., Alliance OH 44601.

This paper examines how the diagnosis of cancer affects the patient's self-esteem, coping process, and quality of life. Newly diagnosed patients, those who have had treatment, and those in remission are included in this sample (n=75). Questionnaires were distributed through an Oncologist's office. The following hypothesis were tested: the quality of life after the diagnosis of cancer will be lower than the quality of life prior to diagnosis, the higher the perceived social support the higher the quality of life, and the higher the self-esteem, the higher the quality of life. The coping process was examined in perceived social support. Locus of control was used to determine if the patient is active or passive. A patient assuming the active role, defined as going above and beyond what the physician recommends by going to support groups or information seeking, was found to have control over the outcome of the illness, in contrast to the passive patient who blamed outside or chance happenings for his/her illness.
April Program Abstracts  

9:45 ENVIRONMENTAL ASSESSMENT: PSYCHOLOGICAL/ENVIRONMENTAL FACTORS-SUBSTANCE ABUSE ON CAMPUS. ROBERT A. DUBICK, UNIVERSITY OF AKRON, 301-F ZOOK HALL, AKRON OH 44325-4208.

Over the past six years data on over 25,000 college students from 42 colleges nationwide have been collected and analyzed. This effort calls for a fundamental reorientation in dealing with the drug and alcohol problem as an educational task and objective. This study uses proactive prevention which is built on a distinction between a medically focused treatment approach and a psycho-environmentally focused prevention approach. This analysis has resulted in findings pertaining to dominant psychological predispositions and propensities, and social environmental influences upon residential vulnerability levels. The practical value of the new information in these areas is tremendous for systematic approaches to proactive prevention programming activities on campuses. The presenter is currently involved in an analysis grant developing training based on the new knowledge. The principle focus of the analysis is upon training and applications with specific reference to the incorporation of research findings into university training, education, and activities programs.

10:00 TRADITIONAL VERSUS ADULT STUDIES STUDENTS: THE COLLEGE EXPERIENCE. BERNADETTA J. KING, CAMPUS BOX 1443 MOUNT UNION COLLEGE, CLARK AVE., ALLIANCE OH 44601.

There are distinct differences between adult studies students, those returning to college after a number of years, and traditional students, those who enter college immediately after high school. According to the literature, adult students report less social support available for them within the college setting than for traditional students, but adult students use more social support form outside the college community than do traditional students. Adults experience more demands besides college and more concerns with everyday conditions, yet adult students perform better academically, have more confidence in their academic ability, and experience less stress on a regular basis than traditional students. In addition, the younger a student is the more likely he/she is to be attending college for vocational reasons, and the older a student is the more likely he/she is to be attending college for reasons of personal enrichment. I found the same relationship among traditional and adult studies students at Mount Union College as appeared in the literature. I am using secondary analysis of data gathered from a survey conducted at Mount Union College in the spring semester of 1994 to study this topic.

10:15 GENDER REPRESENTATION ON LOCAL TELEVISION NEWSCASTS. DEREK E. HATCHER, MOUNT UNION COLLEGE, ALLIANCE OH 44601.

The media has been under scrutiny for its portrayal of gender and its promotion of gender stratification. Broadcast news reaches millions of viewers, and may have an affect on public opinion. This project examines the representation of gender on four local Cleveland television stations. Through the use of content analysis, gender representation was studied with respect to male and female on-air times, the location from where a story is reported, who is interviewed on camera during the course of the story, and with respect to the subject of the story. The literature indicated that men were represented significantly more than women in the categories under study. Following the results reported in the review of the literature, the hypotheses tested suppose that men would be over represented on television newscasts when compared to women. Men where found to be dominant in these news programs, and certain story subjects where found to be gender-specific. Also, some stations had greater variations than others. The randomly selected sample (n=60) was observed on week nights only. Included in this study was a theoretical background of Conflict Theory to sociologically explain gender stratification and male dominance.

10:30 DIVERSITY IN THE FUTURE WORK FORCE. RILLY CANDDELL, JENNIFER TURNES, AND SARA STAATS, THE OHIO STATE UNIVERSITY AT NEWARK, 1179 UNIVERSITY DRIVE, NEWARK OH 43055.

Increasing diversity is expected in the future work force. The Bureau of the Census (1993) projects increasing diversity in several areas including age, gender, ethnic/racial diversity, and in the inclusion of persons with disabilities. Because current college students will spend much of their lives in the work force of the future, we are surveying them concerning their expectations about diversity. Our current results show that students would find interactions with diverse co-workers significantly easier than interactions with either diverse supervisors or diverse employees. This finding is of importance because employers often cite difficulty of integrating persons of disability or difference into a work group as a reason for not hiring such persons. Fuqua, Rathbun, and Gade (1984) reported the most frequent reasons for employers not hiring persons with disabilities were perceived lower productivity, higher accident, and higher worker’s compensation rates. Many investigators have concluded that employers view persons with disabilities seeking employment negatively (Fuqua, Rathbun, & Gade, 1994; Johnson and Heal, 1976; Scheuerle, Guilford, & Garcia, 1982). Since the college student of today could/will be the employer of tomorrow their opinions and attitudes of diversity is of major importance.

10:45 IDENTIFICATION OF DYNAMIC SYSTEMS: A GUIDE FOR THE NEW RESEARCHER. TAN S. EL-ALI, WILBERFORCE UNIVERSITY, DIVISION OF ENGINEERING AND COMPUTER SCIENCE, WILBERFORCE OH 45384.

The subject of system identification covers many areas in engineering and science. One can find system identification techniques applied in civil engineering, electrical engineering, mechanical engineering, physics, and many other fields. Within each field the process of identification takes different approaches. Some approaches deal with real-time identification while others deal with frequency domain identification. Within each approach different techniques are used and systems with single-input single-output and multi-input multi-output are visited. This paper will make it easy for the new researcher in the field of system identification. It will discuss the meaning of identification of dynamic systems and will take the researcher from basic identification techniques to the most recent ones. It will not cover all techniques available, but will help the new researcher to build a strong understanding of the concept of identification and opens the way for advanced research.

2:15PM SATURDAY, MAY 4, 1996  CATTLE LIBRARY 46  ROBERT M. CIKRAJ - PRESIDING

2:15 IDENTIFICATION OF DYNAMIC SYSTEMS: A GUIDE FOR THE NEW RESEARCHER. TAN S. EL-ALI, WILBERFORCE UNIVERSITY, DIVISION OF ENGINEERING AND COMPUTER SCIENCE, WILBERFORCE OH 45384.

The subject of system identification covers many areas in engineering and science. One can find system identification techniques applied in civil engineering, electrical engineering, mechanical engineering, physics, and many other fields. Within each field the process of identification takes different approaches. Some approaches deal with real-time identification while others deal with frequency domain identification. Within each approach different techniques are used and systems with single-input single-output and multi-input multi-output are visited. This paper will make it easy for the new researcher in the field of system identification. It will discuss the meaning of identification of dynamic systems and will take the researcher from basic identification techniques to the most recent ones. It will not cover all techniques available, but will help the new researcher to build a strong understanding of the concept of identification and opens the way for advanced research.
2:15 POSSIBLE ORIGINS OF THE DARK BANDS ON THE SIDESCAN RECORDS FROM LAKE ERIE'S CENTRAL BASIN. J. AUTUMN SPEAK, 3709 SCOTTLEY DRIVE, SANDUSKY OH 44870.

The distribution of the dark bands on sidescan radar from records from the central basin of Lake Erie was investigated to assist in understanding the origin of the bands. Records representing about 500 nautical miles of track line from Ohio's portion of the basin were analyzed and the following classifications were made: band width, length orientation and depth of occurrence. Natural gas seepage along joint patterns is one of the source suggestions. Orientation data suggests that there are two preferential alignments (71° and 106°). These do not align well with the regional joint patterns in the Ohio shale (130°) which is the bedrock in most of the region, nor with the 60° or 85° of the Columbus joint patterns. Joint orientation in the fills have not been documented well enough to eliminate them as a source. Distribution data suggest that the bands are not preferentially associated with shipping channels. The 71° azimuth almost parallels the major axis of the lake and also the prevailing SW wind direction. This correlation suggests that the orientation may be best associated with iceberg scours of the bottom. Cross correlation of depth and occurrence suggest that the majority of the bands occur in water depths between 10m and 22m. The sidescan sonar records are part of the Ohio Geological Survey and US Geological Survey cooperative study of the coastal area of the Ohio Portion of Lake Erie.

2:00 ELECTROPHORESIS OF COMPLEX ORGANIC DYES. ANDREW J. SAUER, 5185 RED BIRD LANE, INDIAN SPRINGS OH 45011.

This project tested the electrophoretic mobility of Bromophenol blue, Methylene blue, and Xylene cyanol FF at varying buffer concentrations. A 1.1 percent agarose gel, and a tris/borate/EDTA buffer at 0.25, 0.5, 0.75, 1.0, 1.25, 1.5 and 1.75 x concentrations were used. Each buffer concentration was used in three tests, and each test included two wells of each dye. The dyes moved farther at higher concentrations, as expected, but it was also found that the difference in the distance that the dyes moved between tests was lower at higher concentrations. A hypothesis was made that at a higher concentration, there were enough ions in the buffer to counter the effect of the fluctuation of the electrical charges of the dyes. For this hypothesis to hold true, the dyes would have to be separated by molecular size, meaning that Methylene blue would move farthest, Xylene cyanol FF an intermediate distance, and Bromophenol blue the smallest distance. A problem arose with this hypothesis; Bromophenol blue moved the intermediate distance, and Xylene cyanol FF moved the smallest distance after further research, it was found that borate reacts with glycol compounds, giving a possible explanation to the problem. This year, a tris/glycine buffer is being used and the experiment is being repeated to test the hypothesis. This year's results are nearly the same as last year's, disproving the hypothesis.

3:00 THE AMERICANS WITH DISABILITY ACT AND ITS APPLICABILITY TO THE MENTALLY ILL, HUMAN IMMUNODEFICIENCY VIRUS AND ACQUIRED IMMUNE DEFICIENCY SYNDROME POPULATIONS: A STATISTICAL ANALYSIS. ROBERT M. CRKRAJ, 15 MILLER HALL, ASHLAND UNIVERSITY, ASHLAND OH 44805.

The Americans with Disabilities Act, enacted into law in 1990, became effective July 26, 1992. The law prohibits employers, state and local governments, employment agencies and labor unions from discriminating against qualified individuals with physical or mental disabilities in the application for employment, hiring,-discharging, advancement, compensation, job training and other terms and conditions of employment. An analysis of fillings with the Equal Employment Opportunity Commission and federal court cases evidence a parallel between individuals with a disability of major mental illness and those with diagnoses of Human Immunodeficiency Virus, AIDS Related Complex and Acquired Immune Deficiency Syndrome. Both populations are disproportionately represented within the regulatory and legal system. These cases and new federal interpretations and legal definitions require additional examination of the term "accommodation" pursuant to The Americans with Disabilities Act.
curiosity. The purpose of my project was to test the learning abilities of seven different varieties of chickens under two different breed categories of different price ranges. An additional question was if the sex of the animal made an impact or not. I decided to teach them tricks. After working for twenty minutes a day for 119 days, each one of the fourteen chicks could sit inside of a hoop, ride in a carriage, perch on my shoulder, and take a bath. I found that each chicken required a different number of tries for each trick before it understood the concept. The averaged data proved that the hatchery was using a form of propaganda. Regardless of the variety or sex, they all learned relatively (within two tries) equally.


The purpose of my research was to determine if there was a viable alternative thermal insulation to be used in small applications. To determine this I constructed three double-walled testing chambers. Each chamber consists of a six-inch cube in which is suspended a four-inch cube equally spaced from all walls. In the four-inch cube is a light bulb acting as a heat source. The cavity formed by the walls of the two cubes is then filled with the insulating material to be tested. As the heat source warms the air in the four-inch cube to a consistent thermostat-controlled temperature of 32.3 Degrees Celsius (90 Degrees Fahrenheit), the thermal energy flows toward the outer wall of the chamber. The insulating material restricts this movement. The less restrictive the insulating material, the more time the heat source is on, maintaining the set temperature, and using energy, which is measured in Watt-hours. The efficiency of each material is then calculated by comparing the energy consumed by the control chamber in a set amount of time to the energy consumed by the individual testing chamber in that same amount of time. After several test sequences, I came to the conclusion that the tile-type insulation (a substitute for glass fiber-type insulations).


Farms are often seen as a source of non-point pollution. This study examined the impact of dairy farming on water quality in Conser Run and Sandy Creek, third and fourth order streams, respectively. Water quality was determined on the basis of BOD (Biological Oxygen Demand), nitrate, ammonia, and phosphate concentration. The samples were taken at eight bridges along each of the streams. Between sites two and four on Conser Run there are five farms and a total of 860 cows. One site two miles upstream from the farms provided reference levels for nutrients and BOD before the water passed the farms. Nitrate, ammonia, and phosphate concentrations were determined spectrophotometrically using a Tcator flow injection analyzer. Oxygen concentrations were determined using a Clark polarographic electrode. The results showed that on the average, ammonia concentrations were near detection limits in the farm area but increased downstream. Average nitrate concentrations stayed the same throughout all the sample sites. Phosphate levels were at the limit of detection at all the test sites. Average BOD levels (72 hr at 20°C) were initially at one part per million and rose to two parts per million in the farm area and then rose to three parts per million farther downstream. All levels for nutrients and BOD were well below safe levels. However, the test results showed an average increase in nutrients and BOD levels as the water moved farther downstream, thus showing that something other than the farms are polluting the streams.


My project involved research to develop a biological battery using Sewage Sludge Compost as the primary ingredient. The compost came from the City of Columbus (aerated static pile procedure) and the City of Akron (enclosed vessel procedure). The two resulting products are indistinguishable in composition and appearance. In my battery, I discovered that there are aerobic and anaerobic bacterial activity; heavy metals present such as lead, cadmium, and zinc; and organic acids from the bacteria. I made an open wet cell by adding 5% NH4Cl and a sealed dry cell by replacing commercial battery ingredients with Sewage Sludge Compost in various proportions. The electrodes used were a carbon rod (the cathode where reduction occurs) and zinc (the anode where oxidation occurs). The difference in potential between the electrodes was 1.5 volts. I have applied for a US patent, and a patent is pending.

INTERDISCIPLINARY TEAM RESEARCH

3:15PM SATURDAY, MAY 4, 1996

OSBORN HALL 21

RICHARD STORCK - PRESIDING

PRESENTING SIX WINNING TEAM PROJECTS

The Ohio Academy of Science Senior Academy Council has selected six projects, based on the abstracts submitted, as the best representatives we have this year of interdisciplinary team process and content. These are our winning projects. In this session, each team will highlight the interdisciplinary approaches they found useful. They will also identify the interdisciplinary issues and problems that they encountered. Please note that the research findings will not be emphasized in this session since they will have been presented in earlier sessions. The purposes of this session are:

1. To provide an opportunity for each project to review their research objective and procedures from the perspectives/methodologies of the various disciplines involved with the project.
2. To enable selected discussants to highlight the advantages and disadvantages associated with interdisciplinary team research in the sciences.
3. To enable the audience to offer their own experiences and to formulate ideas and strategies to help the Academy foster interdisciplinary research in Ohio.

Chair: Mr. Richard Storck, Wooster High School
Discussants: Selected team representatives
Recorder: Dr. Ayres D'Costa, The Ohio State University

Session Schedule:
A. Brief presentations by Winning Project Leaders

3:10 PROTECTING WATER QUALITY THROUGH THE SUCCESSFUL INTEGRATION OF RESEARCH AND EDUCATION. N.L. Watermier and L.C. Brown, Agricultural Engineering Department, The Ohio State University, Columbus OH 43210-1057. SEE PAGE 32 FOR ABSTRACT.
3:20 SOURCES OF PERSISTENT AND BIOACCUMULATIVE POLLUTANTS DISCHARGED TO LAKE ERIE FROM OHIO POINT SOURCES. J.R. Beaver1, L. Yeomans2, and B.A. Schaberg3, 1University of Akron, Department of Biology, ASC, Akron OH 44325, 2Citizens Policy Center/Ohio Citizen Action, 402 Terminal Tower, Cleveland OH 44113, 3Beaver Schaberg Associates, Inc., 3620 Ingleside Road, Shaker Heights OH. See page 33 for abstract.

3:30 IMPACTS OF EROSION ON THE BENTHIC MACROINVERTEBRATE COMMUNITY OF THE EAST BRANCH OF NIMISHILLEN CREEK DURING WINTER. T.R. Paulus1 and J.R. Beaver2, 1Stark County Health Department, 3951 Convenience Circle NW, Canton OH, 44718, 2University of Akron, Department of Biology, ASC, Akron OH 44325. See page 13 for abstract.


4:00 NEW MAP OF OHIO ECOREGIONS DELINEATES 19 AREAS LARGER THAN 1000 SQ.KM. C. Scott Brockman, Ohio Geological Survey, 4383 Fountain Square Dr., Columbus OH 43224. See page 10 for abstract.

4:15 - 5:00 B. Discussion of Interdisciplinary Issues

5:00 - 5:30 C. Summary formulation of ideas and strategies by audience.

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**Preliminary Call for Papers**

Don't miss the 106th Annual Meeting of The Ohio Academy of Science to be hosted by

**Bowling Green State University**

April 4-5-6, 1997

Abstract deadline: Postmarked by November 15, 1996

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