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Technical Section Abstracts

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A. Zoology
Only Morning at 9:45 am
SATURDAY, APRIL 27, 1991
University Hall 024
Miles Coburn, Presiding

9:45
AMPHIBIANS AND REPTILES OF FOUR HAMILTON COUNTY PARKS. David Rubin, Department of Biology, Central State University, Wilminton, OH 45896.

From 1986 to 1990, four Hamilton County parks were surveyed for amphibians and reptiles. Field work was supplemented by library search, examination of museum specimens, and personal interviews. Parks studied were Embshoff Woods (1226 acres), Shawnee Lookout Park above the Lawrenceburg Road (773 acres), Woodland Mound Park (920 acres), and Miami-Whitewater Forest (2262 acres). Numbers of species recorded were 10, 14, 20, and 27 respectively. Herpetological diversity was positively correlated with park size and general ecological diversity. The cave salamander (Eurycea lucifuga), endangered in Ohio, was recorded from Embshoff Woods and from several sites in Miami-Whitewater Forest. Other significant records include dusky (Desmognathus fuscus) and slimy (Plethodon glutinosus) salamanders at Woodland Mound Park and the worm snake (Carphophis amoenus) at Miami-Whitewater Forest.

10:00
THE DISTRIBUTION OF CAMBARUS (JUGICAMBARUS) MONONGALENSIS ORTMANN (DECAPODA: CAMBARIDAE) WITH COMMENTS ON ITS TAKSONOMIC STATUS, LIFE HISTORY, AND HABITAT. G. Whitney Stocker, 13773 Bodle Rd., NE, and Raymond F. Jezerske, The Ohio State University at Newark, University Dr., Newark, OH 43055.

Two distinct populations of Cambarus (J.) monongaleensis exist. One population is confined to the mountains of West Virginia and Virginia and the other to the Appalachian Plateau in West Virginia and Pennsylvania. Though 178 specimens were examined, there were no statistically significant morphometric (13) or meristic (2) characters that differentiated the populations other than size. The plateau populations tended to have larger chelae, longer dactyls, shorter palms, and the areola is longer and narrower than the mountain populations. The populations on the plateau also have either an obtuse or an absent suborbital angle and the ventrolateral margin of the merus of the first pereiopod usually has one spine, whereas the mountain populations usually have an acute suborbital angle and the merus usually has two or three spines. The mountain populations inhabit springs and seeps, whereas the plateau populations inhabit wooded hillside seeps. First form males are probably present year round and the majority of males probably extrude their eggs sometime between January and April, but can be as late as July. The plateau populations collect leaves of deciduous trees and herbaceous plants as food. The diet of the mountain population is unknown.

10:15
A NEW SUBGENUS AND NEW SPECIES OF CRAYFISH (DECAPODA: CAMBARIDAE) WITH AN ACCOMPANYING DESCRIPTION OF THE SUBGENUS LACUNICAMBARUS. Raymond F. Jezerske, Department of Zoology, The Ohio State University at Newark, University Drive, Newark, OH 43055.

A new subgenus of crayfish and a new species are described. The new subgenus differs from the subgenus Laucanacambatus in having one-third to one-fourth of the pala of the chelae studed with tubercles, the dactyl to pala length is always < 1.8, and a subpalmar tubercle is usually absent. The new species is most closely related to Cambarus (Laucanacambatus) acanthurus but differs from it in that the distomedian spine on the mesial ramus of the uropod does not overreach the rounded margin of the ramus and the merus always has a well developed spiniform tubercle on the anterior ventral articulation rim. The species occurs in Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia.

10:30
SYSTEMATICS OF Notropis volucellus AND Notropis wickliffi (CYPRINIDAE: PISCES) FROM OHIO WATERS. Livin Gong and Ted M. Cavender, Museum of Zoology, The Ohio State University, 1813 North High Street, Columbus, OH 43210.

Since its description, the channel shiner, Notropis wickliffi, has been considered a subspecies of the mimic shiner, Notropis volucellus. A definitive morphological analysis of the two forms via multivariate and univariate techniques revealed that the two forms are distinct species. Discriminant function analyses classified the two species 96-99% correctly. Within Notropis volucellus, the variation in morphometric and meristic characters was significant among populations of the same major drainage basin and between basin populations. Some characters, such as vertebral number, length of lateral line scales, number of predorsal scales, caudal peduncle depth, and predorsal length, exhibited north-south clines. These were correlated with latitudinal environmental variables such as temperature and light. Due to the great divergence of morphological characters across its range, more taxonomic forms could be revealed within "Notropis volucellus" than currently recognized if a total geographic analysis was conducted.

In Ohio, the two species, Notropis volucellus and Notropis wickliffi, had similar biological characters, such as age and growth, fecundity and reproductive season but possessed distinctly different habitats. The Ohio River was found to be the exclusive domain of N. wickliffi.

10:45
MONITORING FISHES OF THE OHIO RIVER. Ted M. Cavender and Judith K. Cavender, Museum of Zoology, The Ohio State University, 1813 North High Street, Columbus, OH 43210.

Fish collections were made with a bag seine at 105 boat launching ramps distributed along the length of the Ohio River as part of a study to test the ability of ramps sampling to monitor the river's fish populations. Ramps are fairly evenly distributed on both sides of the river in both channel margin and backwater habitats. The technique was especially effective at capturing data on young-of-the-year, was efficient in actual collecting time expended (0.5 man hours per sample) and was rich in information on the distribution and relative abundance of fish taxa. Sixty-seven species and two hybrid combinations were identified from more than 18,000 individuals sampled between two river miles 43.5 and 980. Forty-seven species were recorded upstream from Markland Dam (RM 531.5) and 49 downstream. Significant records include the Mississippi silverside, Menidia beryllina, and the channel shiner, Notropis volucellus. A definitive morphological analysis of the two forms via multivariate and univariate techniques revealed that the two forms are distinct species. Discriminant function analyses classified the two species 96-99% correctly. Within Notropis volucellus, the variation in morphometric and meristic characters was significant among populations of the same major drainage basin and between basin populations. Some characters, such as vertebral number, length of lateral line scales, number of predorsal scales, caudal peduncle depth, and predorsal length, exhibited north-south clines. These were correlated with latitudinal environmental variables such as temperature and light. Due to the great divergence of morphological characters across its range, more taxonomic forms could be revealed within "Notropis volucellus" than currently recognized if a total geographic analysis was conducted.

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ECODYSONE 20-MONOXYGENASE ACTIVITY DURING LARVAL-PUPAL-ADULT DEVELOPMENT OF THE TOBACCO HORNWORM MANDUCA SEXTA. John R. Crooks, Martin J. Mitchel1, Daniel P. Keogh and Stan L. Smith. Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Molting and metamorphosis in insects are regulated in part by ecdysteroids, polyhydroxylated steroidal compounds which function as molting hormones. The principal molting hormones in insects are ecdysones, the secretory product of the prothoracic glands, and its more physiologically active metabolite 20-hydroxyecdysone. The enzyme system responsible for the conversion of ecdysonome to 20-hydroxyecdysone is a cytochrome P-450 dependent steroid hydroxylase called ecdysone 20-monooxygenase. Using a radioassay, we have measured the levels of ecdysonome 20-monooxygenase activity in the fat body and midgut during the early larval, mid larval, and pupal stages of development.

Although steroid hydroxylases are low during embryogenesis, significantly high levels of ecdysonome 20-monooxygenase activity were found in the fat body and midgut of the postembryonic stages. A single major peak of activity in the fat body enzyme activity was noted for both tissues in each of the stadia, but these fluctuations were tissue specific and not temporally coincident with one another or the major fluctuations in the hemolymph ecdysteroid titer. Accordingly, it would appear that the role of ecdysone 20-monooxygenase in ecdysteroid titer regulation, as well as the regulation of this enzyme system, is tissue specific and reasonably complex. Supported by NIH (AI20604), OBOR, FRC, BioMed, and Sigma Xi grants.

2:30
EFFECTS OF DIBUTYRYL CYCLIC AMP, DIBUTYRYL CYCLIC GMP AND CALCIUM IONS ON INSECT CYTOCHROME P-450 DEPENDENT STEROID HYDROXYLASE ACTIVITY. Daniel P. Keogh, Ekem T. Efuet and Stan L. Smith. Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Ecdysone 20-monooxygenase is the cytochrome P-450 dependent steroid hydroxylase responsible for the conversion of the insect molting hormone ecdysonome to its more physiologically active metabolite 20-hydroxyecdysone. Similar to the vertebrate cholesterol side chain cleavage system, this insect P-450 system appears to be regulated in a tissue specific fashion by transcriptional, translational and posttranslational factors and processes. In this study we examined the effects of dibutyryl cyclic AMP, dibutyryl cyclic GMP, calcium ions, and calcium ionophore A23187 (alone and in combination) on midgut ecdysonome 20-monooxygenase activity during larval-pupal development of the tobacco hornworm, Manduca sexta. Preincubation of midgut tissue with dibutyryl cyclic AMP increased enzyme activity; calcium ions (both alone and in combination) were without effect. By contrast, calcium ions coadministered with either dibutyryl cyclic AMP or calcium ionophore elicited dramatic decreases in enzyme activity; and calcium ions coinjected with dibutyryl cyclic GMP abolished the cyclic GMP increase. These data are consistent with a model that dibutyryl cyclic GMP exerts a stimulatory effect on midgut monooxygenase activity, whereas calcium ions exert an inhibitory effect. Dibutyryl cyclic AMP, A23187, or dibutyryl cyclic GMP presumably mediate this calcium inhibition by facilitating the entrance of this ion into the intact midgut cell. Supported by NIH (AI20604), OBOR, FRC, BioMed, and Sigma Xi grants.
significant increase in egg production. The steroid treatment predictably decreased the size of egg laying. These results indicate that yohimbine HCl not only inhibits alpha-adrenergic antagonists, but may also mimic or stimulate gonadotropins. Alternatively, muscle mass increases may result from enhanced peripheral circulation. The exact mechanisms behind these results are still unknown.

Board B
@ 10:00
TEMPERATURE EFFECTS ON REPRODUCTION IN THE RED-SPOTTED NEWT. (NOTOPHTHALMUS VIRIDESCENS).

C. J. V. Smith, Mira Lee, and Linda L. Baranowski-Smith.
The University of Toledo, Toledo, OH 43606.

Ifft (Biol. Bull. 33:111-128, 1942) reported that environmental temperature is important in regulating reproduction in the red-spotted newt. Male newts collected in May (pond temp. 15°C) and placed at room temperature (20-25°C) showed increased spermatogenesis, while the testes of newts placed at low temperatures (1.5-8°C) showed no change. We repeated some of Ifft's work and also examined the possible role of fat-bodies in testicular growth. Eighty-six male newts were collected in mid-April (water temp. 10°C). Six animals were euthanatized as an initial control group. The remaining animals were distributed into two groups, one kept at 10°C and the other at 20°C. Half of each group were fed and half were starved. Within each subgroup the fat-bodies were removed from half of the newts. The animals were maintained for 5 weeks after which they were euthanatized, measured and weighed. Fat-bodies and gonads were removed and weighed. Considerable variation was evident within each experimental group. Gonadal weight was not significantly affected by food availability, temperature, or the presence of fat-bodies. Trends in fat-body and gonadal weight were evident and will be discussed.

Board C
@ 10:00
INVENTORY OF THE NITIDULID BEETLES AT THREE NATURAL PRESERVES IN PORTAGE COUNTY. Roger N. Williams, Jackie Blackmer, Douglas S. Richardson, and Me. E. S. Ellis.
Department of Entomology, Ohio Agricultural Research and Development Center of The Ohio State University, Wooster, OH 44691.

A comparative study among three habitat types was conducted from early May through late October of 1990 to determine if habitat type influenced the abundance and number of nitidulid species. The sites were Grotto Fen, a calcareous marsh; Kent Bog, an acid peat bog; and Tinker's Creek, a large marsh and swamp forest. Eight collecting techniques were utilized to document the population of sap beetles (Coleoptera: Nitidulidae) at each site. Of the approximately 33 species collected, a few are awaiting determinations. A total of nearly 20,000 nitidulid beetles frequented the traps during the study. Most species (ca. 25) were obtained at Kent Bog, 19 at Tinker's Creek, and 14 at Grotto Fen: this was also true for the number of specimens taken at each site. New species were considered rare (where less than 5 specimens were collected in all habitats combined over the entire season).

B. Plant Sciences
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 056
Allison Snow, Presiding

9:00 FACTS AND FICTION ABOUT GAMETOPHYTE SELECTION IN PLANTS. Allison A. Snow and Timothy P. Spira.
Department of Plant Biology, Ohio State University, 1735 Neil Ave., Columbus, OH 43210; Department of Biology, Georgia Southern University, Statesboro, GA 30460.

Studies of cultivated plants suggest that pollen tube competition fosters selection for more vigorous progeny genotypes. The mechanisms involved are not well understood, but many investigators now assume that gametophytic selection has been important in angiosperm evolution, and continues to operate in existing populations. I will review the evidence for and against this assumption, and discuss a new approach for investigating the role of pollen tube competition in natural populations. This process could either promote, neutralize, or suppress effects on sporophytic vigor, but because individuals with fast-growing pollen tubes sire more seeds those with slower ones do not.

9:30 EFFECT OF SOIL NUTRIENT LEVEL ON SIZE DISTRIBUTION IN AN EXPERIMENTAL RADISH POPULATION.
Robert A. Klips, Dept. of Plant Biology, The Ohio State University, Columbus, OH 43210.

A greenhouse experiment was conducted to test the hypothesis that dominance and suppression, resulting in the establishment of a size hierarchy, are more likely to occur in a plant population having an adequate supply of soil nutrients. The distribution of fresh mass was compared for radish plants grown at 2 densities and two levels of fertilizer application at three successive harvests. As measured using the Gini coefficient, inequality in size distribution increased over time for all combinations of fertilizer and density, suggesting that a size hierarchy may be attributable to intrinsic variability among individuals in lognormal growth rate. However, the highest Gini coefficient occurred under conditions of high density with high nutrient availability that skewed size distribution, presumably due to competition for light, is most likely to occur when members of the population are restricted by resources other than light may often be present at suboptimal levels, dominance and suppression in natural communities may be less common than is generally believed.

9:45 CONTROL OF NUTRIENT RETRANSLLOCATION IN WILD CRANESBILL (GERANIUM MACULATUM). Ralph E. J., Boerner, Department of Plant Biology, Ohio State University, 1735 Neil Avenue, Columbus, OH 43210.

Retranslocation of nitrogen and phosphorus from leaves prior to litterfall is an important process for conserving often scarce nutrients. Although prior studies have demonstrated decreasing retranslocation with decreasing soil fertility in a number of canopy species, understory species are subject to limitation by both light and nutrient availability. Those factors which most strongly influence retranslocation in understory species, Geranium maculatum plants were grown in a factorial design with high and low nutrient supply rates. Phosphorus retranslocation was lowest in mycorrhizal sun plants of nutrient restricted species. Mycorrhizal shade plants given low nutrient supply had the highest P retranslocation rates. Complete hierarchic analyses of N and P retranslocation in relation to these factors will be presented and the implications for ecophysiological strategies discussed.

10:00 THE COMPARATIVE GROWTH RATE OF JUGLANS NIGRA (BLACK WALNUT TRIGES) AS AFFECTED BY SUPPLEMENTAL NITROGEN, BORON, AND MANGANESE.
Spencer David Gron, 10017 Scott Road, Bryan, OH 43506.

The surviving fifty plants of a 20 year old planting of J. Nigra plus walnut seeds were observed to vary widely in their growth rate. Soil and foliar analysis determined that one nutrient (nitrogen) was deficient, and that two micro-nutrients (boron and manganese) had high correlation coefficients (.980, and .805) with growth rate. Varying supplemental amounts of these three nutrients were applied to attempt to determine the optimum rate of application. The micro-nutrients either alone, or together, retarded the growth, but nitrogen alone affected increased growth rate. Nitrogen in combination with specific amounts of the micro-nutrients effected even greater growth.
Although the impact of tropospheric ozone and acidic deposition on woody plant species has been studied over the last decade, there is still a lack of understanding of how plants perceive and respond to interactive stresses. We hypothesized that the long-term, interactive effects of ozone and nitrate deposition may result in reductions in allocation of carbon to roots and mycorrhizae, and reduce end-of-season carbohydrate stores. In addition, increases in leaf and root nitrate reductase activity and leaf peroxidase activity would increase the expenditure of root carbohydrate reserves. Such reductions in allocation of carbon to roots can result in reduced growth and overall fitness and increased susceptibility to drought and nutrient stress. To test these hypotheses, sugar maple seedlings were fumigated with ozone and treated with nitrate deposition in a 4x3 factorial design for two growing seasons. Ozone treatments included charcoal filtered air, ambient ozone, or ambient ozone plus 40 kg ha⁻¹ yr⁻¹ of nitrate deposition. One half of the nitrate was added in the spring to simulate winter deposition. The remaining portion was applied in equal doses spread throughout the growing season. At the end of the second growing season, subsamples of fresh leaf and root tissue were used to determine nitrate reductase and peroxidase activities. The remaining tissues were dried and used for biomass determination and root carbohydrate analysis. Results of these experiments will be presented.

10:45

**ALLYL ISOTHIOCYANATE RELEASE AND THE ALLELOPATHIC POTENTIAL OF BRASSICA NAPUS L.** Devi N. Choessin and R.E.J. Boerner. Department of Plant Biology, The Ohio State University, Columbus, OH 43210.

The allelopathic potential of Brassica species has been attributed to its production of mustards, a group of glucosinolates which upon hydrolysis yield compounds with strong antibiotic properties. The objective of this study was to assess whether Brassica napus is capable of allelopathic interference, and, if so, whether its glucosine derivative, allyl isothiocyanate (AI), is capable of producing this interference. Wild-type (W) and recessive (w) mutant b. napus were grown at low and high P and S levels. P significantly influenced growth whereas genotype and S supply influenced AI release. Wild type plants released more AI than mutants. Growth of the target plant, Medicago sativa, was not affected by additions of AI to soils at concentrations similar to those found in b. napus soils. In replacement series, two b. napus genotypes and a suppressed growth of M. sativa equally despite differences in AI release rate. The two b. napus genotypes were equal competitors intraspecifically. Under our experimental conditions, B. NAPUS showed no indication of being allelopathic and AI concentrations typical of soils around B. napus did not inhibit target plants.

9:15

**RESPONSE OF WHEAT GROWTH AND CO₂ ASSIMILATION TO ALTERING ROOT-ZONE TEMPERATURE.** S. H. Al-Hamdani and D. A. Francko, Department of Botany, Miami University, Oxford, OH 45056.

Wheat plants (Triticum aestivum L. var. Chisholm) grown at an air temperature of 23°C and a root-zone temperature of 18°C exhibited a significant difference in shoot dry weight and leaf area compared to plants grown at a root-zone temperature of 23°C. This reduction was correlated with a significantly lower CO₂ assimilation rate that was associated with lower leaf conductance, lower internal CO₂ concentration, and more negative water potential. Low CO₂ assimilation rate was also associated with high starch and total soluble sugar levels in the leaves, less transpiration of photosynthate, and possibly less sink demand. Leaf chlorophyll concentration was not affected by altering the root-zone temperature, whereas water use efficiency of plants grown at a root-zone temperature of 23°C was as much as 1.5 times higher as those grown at 23°C.

9:30

**CHARACTERISTICS OF CUTICULAR PROTEIN IN OONOTOTAENIUM DICJNCTUS.** Louis J. Swalek and Eric Nelson, Ohio Northern University, Ada, OH 45801; Stephen I. Cauderand and Rebecca Schisivone, University of Dayton Research Institute, 300 College Park, Dayton, OH 45469-0168.

Previous studies have evaluated the cuticle of Oonototaenium dicipunctus and compared it to castor bean and coconut. Both consist of fibers embedded in a matrix which can be crosslinked (thermosets). Unlike man-made composites, the cuticula are partially degraded in the opposite manner, revealing the morphological characteristics of the composite cuticle as a whole. Elytra of O. dicipunctus were analyzed by normal and fluorescent light microscopy, and compared to the characteristics of the matrix and epicuticular material. A novel thin-sectioning technique was used in conjunction with Nallory-Reidenhain’s stain to differentiate the matrix. Insect species were evaluated using two methods of fluorescence light. Results indicate that the most dense portion of the matrix lies directly below the epicuticle. The epicuticular material, distinctly different and more dense than the matrix, extends through the tracheae which are surrounded by chitin fibers.

9:45

**EFFECT OF PROTEINS FROM MAIZE LEAVES ON THE ACTIVITY OF THE HOST-SPECIFIC TOXIN PRODUCED BY THE FUNGUS BIOPARIS RAYENSIS RACE T.** T. M. O. Garaway, Department of Plant Pathology, The Ohio State University and CRREC, Columbus, OH 43210.

Polypeptides were present with other metabolites in leaf extracts from infected leaves of normal (N) and Texas male sterile (T) cytoplasm maize lines, which were determined to be resistant and susceptible, respectively, to the fungus Bipolaris maydis race T (BMT). More of these constituents leaked from detached T cytoplasm, than from N cytoplasm, leaves following infiltration with the host-specific toxin (BMT-toxin) produced by the fungus. The activity of polypeptides from maize leaves on the activity of BMT-toxin was studied by measuring electrolyte leakage from detached infiltrated T cytoplasm leaves. Infiltration of leaves with BMT-toxin reduced malate protein (4.7 μg/ml) or other polypeptides including Bovine serum albumin (66 kD) and myoglobin (14-16 kD) significantly reduced BMT-toxin activity, indicating that reduction in size of these polypeptides could be involved. Also, dialysis experiments with Bovine serum albumin indicated that inhibition of BMT-toxin activity may involve non-specific binding of toxin to proteins.
Definitive morphology is lacking in anamorphs of Rhizoctonia and teleomorphs may include isolates with a range of pathogenic and cultural types. Anastomosis groupings (AG) have been systematized by others and have a genetic basis in intraspecific groups (ISG). Five fungal isolates from diseased Romaine, green leaf, red leaf lettuce and escarole crops at Celeryville were paired with standard AG tester isolates and the kinds and numbers of ISG were assessed: 34 AG-1-1B, 10 AG-1-1C, 2 AG-2-2 and 3 AG-4. Isolates were assayed for virulence on three lettuce types (Romaine, Boston and red leaf) in two greenhouse tests differing in plant age (28 vs. 14 d) at infestation of 5. In the putative pathogens, ANOV indicated plant age effects were N.S. On a 1-3 disease rating scale (DR), Romaine was the most susceptible, DR=1.24; Boston, DR=1.10; and red leaf, DR=1.75 least susceptible to all isolates. The 5 isolates were grouped into six virulence ranges: maximum, high, moderate, weak, minimum and avirulent. AG-1-1B isolates included the most virulent (34 in max range), but as with the other AG some occurred in other categories. Rankings of the other AG (by highest virulence values) were AG-2-2 > AG-1-1C > AG-4. Source of AG-1-1B, considered a southern (warm climate) U.S.A. group, is being investigated.

Field populations of Graminella nigripolys (GN), the principal vector of maize chlorotic dwarf virus (MCDV), were monitored during twenty growing seasons. GN were monitored with a Johnson Taylor trap, modified with an 18-inch blacklight. The natural spread of MCDV was monitored with a row of 50 pots of infected 21-day-old O2BZ core plants placed between two rows of 25 each of 14-day-old O2BZ trap plants and exposed for weekly intervals in a field plot for 16-20 weeks. Temperature and rainfall affected GN the number of GN caught and the spread of MCDV reflected this population change. Few GN were trapped in the summer drought of 1988, resulting in a 20-fold reduction of GN (14/day) trapped when compared to the previous year. All GN were caught when temperatures were below 50°F or during rainy periods when rains occurred in late afternoons to early evenings. MCDV spread generally peaked at 30% infections in July-August, and this coincided with the increase in numbers of GN which peaked at 31-103/day in late July to early August.
Dissenter family of the middling classes engaged in the cutlery business.

Henry Shaw, born in Sheffield, England in 1800, grew up in a country estate with a large garden. By 1859, those plans had changed because he had listed this species as "erroneously reported from Ohio". Subsequent to the discovery of the historical specimen, active search for this plant by the Museum Botany Department resulted in discovery of extant populations at Penn Line Domp, Ashkelon Co. in 1987 and Dollar Lake, Portage Co. in 1989. At both sites this species was found on Johnson Flats. Concurrent Museum field surveys yielded ten populations in northeastern Pennsylvania.

Coreopsis, and greater than that of the rare endemic, Coreopsis intermedia. The genetic diversity in two populations of the rare endemic, Coreopsis intermedia (section Coreopsis), was measured using electrophoresis. Coreopsis intermedia contains greater genetic diversity than has been reported for many other narrowly distributed species. Levels of genetic variation in C. intermedia are similar to those of the other eight species in section Coreopsis, and greater than that of the rare congener, C. latifolia (section Silphium). Phylogenetic history may account for the high genetic diversity within C. intermedia. The two populations, which are of greatly different numbers of individuals, contained comparable levels of genetic diversity.

Carex disperma, Dewey, a native species of boreal regions to the north of Ohio, was added to the flora of Ohio in 1987 when a previously unreported 19th century specimen was found under the Carex herbarium at the Cleveland Museum of Natural History while merging that collection into the Herbarium of The Cleveland Museum of Natural History. Until recently acquired by The Ohio State University Herbarium using 9,000 specimen, historic CAREX collection had been inaccessible to researchers for decades. The CWU specimen of Carex disperma was collected at Sippo Lake in Stark Co. by Edo Clausdson in 1896. Braun, in The Monocolieaeoideae (1967), had listed this species as "erroneously reported from Ohio". Following the discovery of the historical specimen, active search for this plant by the Museum Botany Department resulted in discovery of extant populations at Penn Line Domp, Ashkelon Co. in 1987 and Dollar Lake, Portage Co. in 1989. At both sites this sedge was found on Johnson Flats. Concurrent Museum field surveys yielded ten populations in northeastern Pennsylvania.

Henry Shaw, born in Sheffield, England in 1800, grew up in a Dissenter family of the middling classes engaged in the cutlery business. Industrial Sheffield was dirty, and often depressed in his childhood. As a teenager he attended the new Dissenter public school, Mill Hill School, near London, which had been Peter Collinson's 18th century estate, and still returned some exotic trees planted by him. Shaw cultivated a garden at the school that influenced his later interest in gardens. As an immigrant to St. Louis in 1819 Shaw established a profitable hardware business using his family connections for supplies, and the newly expanded river traffic from New Orleans to deliver goods for the ever enlarging St. Louis market. Retiring from active business in 1840, he began plans for a country estate with a large garden. By 1859, those plans had changed because he had listed this species as "erroneously reported from Ohio". Subsequent to the discovery of the historical specimen, active search for this plant by the Museum Botany Department resulted in discovery of extant populations at Penn Line Domp, Ashkelon Co. in 1987 and Dollar Lake, Portage Co. in 1989. At both sites this sedge was found on Johnson Flats. Concurrent Museum field surveys yielded ten populations in northeastern Pennsylvania.

Coreopsis, and greater than that of the rare endemic, Coreopsis intermedia. The genetic diversity in two populations of the rare endemic, Coreopsis intermedia (section Coreopsis), was measured using electrophoresis. Coreopsis intermedia contains greater genetic diversity than has been reported for many other narrowly distributed species. Levels of genetic variation in C. intermedia are similar to those of the other eight species in section Coreopsis, and greater than that of the rare congener, C. latifolia (section Silphium). Phylogenetic history may account for the high genetic diversity within C. intermedia. The two populations, which are of greatly different numbers of individuals, contained comparable levels of genetic diversity.

Modern mapping of large regions for planning and management purposes involves the use of many developing technologies. Satellite imagery has been shown to be extremely useful, for it provides timely visual data over large areas with little image distortion. SPOT satellite imagery was chosen for this study because it provides a high degree of spatial resolution (20m) while supplying enough spectral diversity to be useful in differentiating land cover, particularly vegetation classes. Vegetation classification using satellite imagery does not replace quality ground analysis; rather, it furnishes a more generalized view of an area, and once representative plant communities are identified, can be further examined by more traditional ecological approaches. This paper examines the use of satellite imagery in classifying and mapping specific plant communities in and around The Nature Conservancy's Edge of Appalachia preserve system in Adams County, Ohio. Data obtained through this study are to be incorporated into a broader GIS preserve design analysis for this biologically rich area of Ohio.

The wildflower populations of Blacklick Metropolitan Park were studied to obtain information on flowering dates, species present and their location in the park. The wildflowers were identified, their positions mapped and the dates recorded. No endangered or rare species were found. Extensive deer browsing damage was observed on some species. Several maps will be distributed showing habitat, flowering and location. With the current data and earlier studies it is possible to determine where the wildflowers will be in future years and when they are likely to occur, especially in woodland areas.
B. Plant Sciences
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board D
A COMPARISON OF AUXIN AND ABSICIC ACID
@ 10:00
TRANSPORT PATTERNS IN GRAVISTIMULATED ROOTS
OF NAZIE. L.N. Young and M.L. Evans.
Department of Biological Sciences, Ohio Northern Uni-
versity, Ada, OH 45810 and Department of Plant Biology,
The Ohio State University, 1735 Bell Ave., Columbus, OH
43210.
There is a strong correlation between asymmetric auxin movement across the cap and the rate of gravicur-
toration of IAA across the tips of vertical roots was non-polar
and about 2-fold greater than lateral movement of 3H-IAA
(also non-polar). The greater movement of IAA was not
due to greater uptake since the uptake of 3H-IAA was 5-
fold greater than uptake of 3H-AAB. Basipetal movement
of IAA and ABA was compared by measuring activity in
successive 1 mm sections behind the tip. IAA accumulated
in the first mm (peak of application) while IAA ac-
ulated 2-6 mm from the tip. The poor basipetal move-
ment of IAA may explain the large lateral movement of
ABA described above. The data indicate that tip applied
IAA is readily transported basipetally, and the stimula-
tion favors movement of IAA toward the lower side of the
cap. In contrast, basipetal movement of ABA in poor
and stimulation does not induce asymmetric lateral move-
ment of this hormone. These results are consistent with
the hypothesis that IAA mediates root gravitropism.

Board E
EFFECTS OF CHILLING ON GLUTATHIONE AND
@ 10:00
NAD(P)H LEVELS IN TWO VARIETIES OF SOYBEAN
AND ALASKAN PEA LEAVES
Thomas L. Vierheller & Ivan K. Smith, Department of
Botany, Ohio University, Athens, OH 45701.
Previous studies have shown that a chill-sensitive cultivar (FFR 332) of soybean (Glycine max (L) Merr) accumu-
lates oxidized glutathione when exposed to chilling tem-
peratures (5°C) for 3 weeks, despite the presence of
large amounts of glutathione reductase. A less
chill-sensitive soybean variety from Switzerland (Silvia)
also accumulated higher levels of oxidized glutathione.
This is in contrast to peas (Pisum sativum (L) Alaska),
in which chilling increased total glutathione two-fold
but did not lower the GS/GSS ratio. In both varieties of
soybean and pea plants total micromole adenine
dinucleotide phosphate levels decreased in chill and
control growing conditions; however, the NADP/NADP+
ratio was not significantly affected.

Board F
CALCIUM EFFLUX IN CORN ROOT MICROSOMES
@ 10:00
PREPARED FROM BOTH FROZEN AND FRESH
VESICLES. J.S. McCormick and L.N. Young.
Department of Biological Sciences, Ohio Northern
University, Ada, OH 45810.
There is considerable evidence supporting a role for
calcium in root gravitropism. This is a report on the
progress made to date on an experiment which examined
the effect of calcimodulin antagonists (chlorpromazine
(CPZ) and calmidazolium (CMZ) on Ca++ and auxin (IAA)
flux patterns in root microsomes (prepared from fresh
and frozen root tissue). This was accomplished via
monitoring 45Ca++ and 3H-IAA flux transport, respect-
ively. In the presence of CPZ, higher 45Ca++ movement
was observed. Similar results were seen in the presence of
CPZ. The movement of 3H-IAA in the presence of
CPZ and in the presence of CPZ was less than control
3H-IAA efflux.

Board G
GYPSY MOTH CONSUMPTION OF OZONE-FUMIGATED
@ 10:00
WHITE OAK FOILAGE.
W. N. Cannon, Jr. and J. H. Bargers.
USDA Forest Service, 359 Main Road, Delaware, OH 43015.
White oak, Quercus alba L., seedlings were exposed to
simulated ozone treatment regimens based on 1988 ambient
ozone concentrations at Parsons, WV. The targeted
treatments were charcoal-filtered air (CFA); 0.85X, 1X,
and 1.15X the Parsons ozone levels. Leaf discs, taken 6
times between late June and mid August, were fed for 48h
to 2nd-instar gypsy moth larvae, Lymantria dispar (L.).
The leaf area consumed was measured with a leaf area
meter, and compared with the ozone doses received by
the seedlings. The stimulated ozone regimens proved to
have no effect on the area of leaf tissue consumed by
the gypsy moth larvae. There was an expected decrease
in leaf area consumed as the leaf tissue matured. This was
not altered by any of the ozone treatments.

C. Geology
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 082
John Szabo, Presiding

THE LA ROCQUE LEGACY 1909-1990 - THE EARLY
YEARS
Mark J. Camp Department of Geology of University of Toledo,
Toledo, OH 43606
A son was born to Marie-Aimee Haspeck and Joseph Alfred La Rocque April
26, 1909 in a house on St. Patrick St. in Ottawa, Ontario.
Aurele La Rocque received his first lessons in natural history in the
third class Guigues School. He then spent four years at LaSalle Academy
where he was introduced to the mollusks when one of the teachers gave him
a small collection of freshwater shells. The slides included
specimens prepared by such pioneers of Canadian geology and paleontology
as G.M. Dawson, W.E. Logan, F.I. Whiteaves, and Elkanah Billings. The
unpacking, sorting, labeling, and filing of summer field specimens for Dr.’s
Wilson, Kindle, McLeam, and W.A. Bolt, became Aurele’s second museum
task. Another early job was the sorting and filing of Dr. Kindle’s extensive
reprint collection. Observations of all types of restorative techniques used by
museum personnel were to play an important part in shaping Aurele’s own
contributions to the field of paleontology.
Dr. Aurele La Rocque passed away November 5, 1990.

EARLY PALEOBOTANICAL RESEARCH IN OHIO.
Aureal T. Cross, Department of Geological Sciences, Michigan
State University, East Lansing, MI 48824-1115
E. Granger first reported fossil plants from near Zanesville, Ohio in 1821.
These were mainly from Putnam Hill locality Tiemosta-Brookville coal interval.
Additional specimens along with drawings were sent by Granger and W.A. Adams to Adolph
Bronsgrui in Paris, who illustrated several of them in his 1822 classic “Histoire de
Vegetaux Fossiles”. Many more were illustrated by S. G. Morton in S. P. Hildreth’s
“Observations on the Bituminous Coal of the Valley of the Ohio ..”, along with
species from several other localities. Hildreth also illustrated, with a classic woodcut,
described the “Groot of Plants”, early Dunkard age, near Marietta, in that
volume. He had reported on fossil trees from near Gallipolis in 1827. S. Gazlay
reported widely distributed Platicea wood in lakeland near Springfield and
Cincinnati in 1833. Silicified tree fern trunks (Psaronius), abundant along Shade
Ridges characteristic of Glyptopleura. Large collections of Glyptopleura costata (McCoy)
from the Maxville Limestone of central Ohio contain five instars, including adults.
The instars provide a basis for understanding the development of the complex ornamentation
of ridges characteristic of Glyptopleura. Dimorphism is prominent with heteromorphs and
tectomorphs readily identifiable, primarily in the adult instar. Progressive development of the ornamentation in juvenile instars, significant variation in adults, and dimorphism has resulted in proliferation of proposed taxa.

9:45 RECENT SCIENTIFIC CORE DRILLING IN WESTERN OHIO: SIGNIFICANCE OF THE OXFORD AND ELKHORN CORES FOR THE INTERPRETATION OF THE EVOLUTION AND NATURE OF THE TACOIN OROCENE. Stig M. Bergström, Dept. of Geol. Sci., The Ohio State Univ., Columbus, OH 43210; Gregory Schumacher, Ohio Geol. Surv., Fountain Sq., Columbus, OH 43224; and Charles E. Mitchell, Dept. of Geol., SURF at Buffalo, NY 14260.

The Sebree Trough is a more than 900 km long, linear feature that can be traced in its subcrop from central Ohio through southeastern Indiana and western Kentucky to northwestern Tennessee. It is located just northeast of, and is subparallel to, the Cincinnati Arch-Jessamine Range-Nashville Dome. The trough rocks consist of deeply weathered, siliciclastic rocks that lack benthic fossils, and these rocks differ strikingly from the shallow-water carbonates with rich benthic faunas in the arch and dome areas. As a part of a joint project between The Ohio State University and the Ohio Geological Survey, two wells were drilled in the central part of the trough to study its evolution.

Analysis of the cores, combined with data from other Ohio and Indiana wells and cores that the Sebree Trough became established in the middle of the Last Glacial Maximum and ended in the early Holocene. The data at hand suggest that the trough may have been a freshwater lake basin on the continental shelf or the deep coastal margin of central North America that experienced rapid sea-level change.

10:00 PETROGRAPHIC EXAMINATION OF VERTICAL SEQUENCES OF MODERATE-CURRENT LAGONIC SEDIMENTS, GRAHAM'S HARBOR, SAN SALVADOR, BAHAMAS. Carney, C, Folda, C, Dept. of Geological Sciences, Wright State University, Dayton, Ohio 45435; Boardman, M, Dept. of Geology, and Cummings, M, School of Interdisciplinary Studies, Miami Univ., Oxford, OH 45056.

Graham's Harbor is a lagoon located on the northeast margin of San Salvador, Bahamas. Two sediment cores, each approximately 2.7 m in length, were collected from two distinct environments and record the lagoon sedimentary response to the Holocene rise of sea level. Each core was impregnated with epoxy and sliced into thin sections. Based on the composition of the sedimentary components, a zone of high permeability referred to as the "Newburg zone" is present within the Middle to Late Silurian carbonate rocks in Ohio. Although noted for hydrocarbon presence and industrial growth, the Ohio Geological Survey, under the leadership of Dr. Joseph Ison, has conducted research in western Ohio to determine the origin and extent of the carbonate rock.

10:15 TAPHONOMIC SIGNATURES AND ENVIRONMENTAL TRANSITIONS IN A HOLOCENE LAGOON, GRAHAM'S HARBOR, SAN SALVADOR, BAHAMAS. Ward, Heather, CUMMINS, Hays, School of Interdisciplinary Studies and BOARDMAN, Michael, Mark, Dept. of Geology, Miami University, Oxford, Ohio 45056.

It is critically important to establish the degree to which the fossil assemblage seen in the rocks is an accurate reflection of the original biologic community. Two important questions are (1) How much of the original preservable community is preserved? and (2) Are there fundamental differences in the preservation potential of carbonate and terrigenous environments? In part to address these questions, we have sampled at three month intervals, the life and death assemblages from a variety of environments in a shallow, high-energy carbonate lagoon located in the eastern Bahamas. Differences in preservation potential of carbonate and clastic environments can be determined by comparing size frequency distributions (SFDs) of death assemblages from both clastic and carbonate environments. Recent studies in Holocene, clastic environments have found that molluscan death assemblage SFDs were more a reflection of taphonomic processes than population dynamics and that the rate of taphonomic loss of shell material, particularly in the smallest size classes, was very rapid. In the smallest size classes, the resulting time-averaged SFDs were under-represented in the clastic environments but not in the carbonate environments of Graham's Harbor. If these initial findings hold up, the carbonate fossil record, at least in shallower lagoon environments, may indeed provide a better record of past community inhabitants than suggested by clastic environments.

10:45 PREDATION IN MOLLUSCAN DEATH ASSEMBLAGES, GRAHAM'S HARBOR, SAN SALVADOR, BAHAMAS. Ison, Joseph, Dept. of Zoology, Miami University, CUMMINS, Hays, School of Interdisciplinary Studies, Miami University, and BOARDMAN, Mark, Dept. of Geology, Miami University, Oxford, Ohio 45056.

One goal of paleocommunity analysis is to reconstruct energy flow and trophic structure of a seasonally varying living community from a time-averaged fossil assemblage. In part to address the question of trophic structure reconstruction, we have sampled, at three month intervals, the life and death assemblages from a variety of environments in a shallow, high-energy carbonate lagoon in the eastern Bahamas. The frequency of sampling permits the detection of temporal variability in predator abundance in the living community as well as potential changes in the composition of the death assemblage. Accurate comparisons of trophic structure of both the living community and time-averaged death assemblage can then be made.

Predators play an important role in community structure. In the molluscan death assemblage in Graham's Harbor, evidence of past predation consists primarily of bored holes in shells by carnivorous gastropods. Predatory gastropods selectively bore near the center below the umbilicus of bivalve shells and on the body whorl of gastropods. Few shells contain more than one bore, and hole size is proportional to prey size. The size frequency distribution of prey is related to molluscan size - fewer numbers of bore holes are found in the smallest and largest size classes. This is certainly an important factor when understanding the trophic structure of a community.

C. Geology
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 086
Michael Angle, Presiding


The demand for ground-water supplies to accommodate population and industrial growth in Ohio has led to the need for continued exploration for sources of potable water in carbonate rocks. The zone of carbonate rocks in the "Newburg zone" is present within the Middle to Late Silurian carbonates in Ohio. Although noted for hydrocarbon and brine resources in the eastern part of the State, the
Newbury zone is a widespread source of water over much of east-central Ohio and a potential source of additional ground-water supplies. Whether the Newbury zone is interpreted as a single, continuous geologic unit across the state or as numerous unconfined and/or inter-connected units, the extent and unconfined origins depend largely on an understanding of the origin of the zone. Theories of the origin of the Newbury zone include (1) dissolution of fossils associated with Silurian conodonts; (2) deposition of unconsolidated material on an occlusal surface; (3) thrust faulting associated with tectonic activity of the Appalachian Mountains, and (4) a combination of two or more of these processes. Available data support the fourth alternative—that the Newbury zone is not a single, continuous unit but is the result of multiple processes that formed regionally unconfined zones of high permeability in coasts of Miami and Lake Erie in Ohio.

9:15 HYDROGEOLOGY OF THE SENECA CAVERN AREA, THORPSON TOWNSHIP, SENECA COUNTY, OHIO. Wayne Jones, James M. Raab, Ohio Department of Natural Resources, Division of Water, Ground Water Resources Section, 1939 Fountain Square, Columbus, Ohio 43224.

Thompson Township, Seneca County contains over 250 known dolines. Identification of at least 25 newly formed dolines in the past year illustrates the dynamic nature of the system. Because of poor land use practices, the ground water has become contaminated with nitrates and bacteria. To better understand this area, the Division of Water has undertaken a hydrogeologic study as part of a nonpoint source implementation grant. The dolines present in north central Ohio are confined to the Newborn-age Columbus Limestone, which is the major outcropping karstified unit throughout Ohio. Studies conducted thus far indicated a general northerly flow of ground water. Fracture trace analyses show a preferred orientation of lineaments in a N45°E direction and a conjugate set in a N15°E direction. Downhole camera surveys reveal the existence of fractures that are controlled by the regional geology. Correlation of precipitation data and geologic cross sections, static water levels, and dye tracing indicate that the water levels decreased with time. Dye trace analysis and borehole geophysics will be implemented at a later stage of the study. This hydrogeologic study will be used to determine ground water monitoring locations to verify the effectiveness of best management practices around certain dolines.

9:30 DAYTON-MIAMI WELL FIELD DEWATERING. Julianne Fiskura and Michael Halfrichs, Ohio Department of Natural Resources, Division of Water, Ground-Water Resources Section, Fountain Square, Building E-1, Columbus, Ohio 43224.

Beginning in the early 1980's, residents in the upland region east of Dayton's Miami well field have complained of well dewatering problems. The purpose of this study is to determine if the well field is geologically and hydrologically connected to the residential wells east of the well field and to determine if the well field had any effect on the water table in the upland region. Parameters examined included geologic cross sections, static water levels, precipitation and production data. The geologic cross sections indicate that the sand and gravel deposits in the uplands are geologically connected to those in the valley. Potentiometric surface maps show an increase in the size of the well field zone of depression over time. Data from monitored domestic wells indicates that the water levels decreased with time. Monthly production data from the well field are increasing and are independent of monthly precipitation totals.

9:45 THE FUTURE OF REGULATORY GEOLOGY - RESEARCH, PREVENTION & REMEDIATION. Clark L. Schererse, Ohio Department of Natural Resources, Division of Oil and Gas, 4435 Fountain Square, Columbus, Ohio 43224.

Current activity by regulatory geologists and hydrologists consists primarily of providing regulatory reviews, and investigations of problem situations after contamination has occurred. There is a growing trend for researching means to prevent contamination before it occurs. The local geologic conditions. Examples of this new emphasis include the following: 1) special permit conditions for oil and gas wells in sensitive areas, 2) wellhead protection programs for public water supplies, 3) geohydrologic review of siting proposals for new or expanded sanitary landfills and deep injection disposal wells. These programs allow tailoring of protection efforts and costs to the relative environmental hazard. Since no direct profit can be realized in the private sector for such research, Federal and State government funding will be necessary to expand those programs. In order to preserve and expand programs, the environmental benefits must be clearly communicated to an increasingly concerned public. Alternate funding sources should be explored, perhaps including bond issue authorization for geologic hazard research like the geologic bond issue passed in 1985 in Ohio. Future research activities will provide career opportunities directly in government service and indirectly in consultant contracts.

10:00 USE OF THE GEONICS EM-31 AND EM-34 TO DETECT A CONTAMINATION PLUME CAUSED BY UNAUTHORIZED ANNULAR DISPOSAL OF BRINE. Janine Wilke, Ohio Department of Natural Resources, Division of Oil and Gas, 4435 Fountain Square, Columbus, Ohio 43224.

Earth electromagnetic conductivity is a surface geophysical method which is becoming more widely known for its quick and accurate delineation of contamination plumes. One type of electromagnetic or earth conductivity instruments enabled the ODNR, Division of Oil and Gas (Division) to determine the intensity and areal extent of contamination caused by unauthorized annular disposal of brine. The Geonics EM-31 earth conductivity meter was used to trace a contaminant plume which had affected three water wells in Salt lick Township of Perry County, Ohio. The Geonics EM-31 defined subsurface contamination in the vicinity of the oil well and the tank battery. Evidence which supports these findings includes isochlor and isoconductance maps which illustrate the contaminant plume which could be traced at a distance. Additional information, such as local stratigraphic and water well records, Division records and inspections, and water quality analyses in concert with electromagnetic conductivity, enabled the Division to enact orders for the replacement of the two long-term affected water supplies.

10:15 AN EVALUATION OF ANNULAR DISPOSAL WELLS IN OHIO. Thomas E. Tannstik & Mark E. Wolfe, Ohio Department of Natural Resources, Division of Oil and Gas, 4435 Fountain Square, Columbus, Ohio 43224.

Annular disposal is a brine disposal method in which produced brine from oil and gas wells is emplaced into the annular space under hydrostatic conditions between the surface casing and production casing in oil and gas wells. The Ohio Division of Oil and Gas has recently completed a systematic study of this disposal method and its effect on underground sources of drinking water. The surface casing and clay sealant quality of 100 oil and gas wells were evaluated when these wells were plugged and abandoned. Ninety-seven wells did not have sufficient water above the surface casing to prevent migration of fluids behind the casing. Twenty-nine of these wells showed evidence of casing integrity failure. Hydrogeologic investigations were conducted on 27 wells which exhibited evidence of mechanical integrity failure. Damage case histories were prepared for three documented incidents of groundwater contamination in which the Division determined that annular disposal was the probable cause of the contamination.

Study findings support the amended rules enacted in June of 1969 which strengthen construction and testing requirements for annular disposal wells.

10:30 DRASTIC AND PESTICIDE DRASTIC: ANGLE, M. P., O.D.N.R., Division of Water, 1939 Fountain Sq. Drive, Columbus, Ohio 43224.

The Division of Water, Ground Water Resources Section has been utilizing the DRASTIC system for Ground Water Pollution Potential Mapping throughout Ohio. DRASTIC is an acronym for the seven parameters used in the evaluation of pollution potential: depth to water, net recharge, aquifer media, soil, typography, impact of the vadose zone, and hydraulic conductivity of the aquifer. During 1990, both general DRASTIC and pesticide DRASTIC were utilized for mapping in four counties in conjunction with a Non-Point Source Pilot Project. Ross, Knox, Portage, and Sandusky Counties were selected as representing a broad range of geologic, geographic, and soil conditions. Pesticide DRASTIC puts a much heavier emphasis on soils and topography (slope) than does general DRASTIC. Attenuation within the upper few feet of the surface is considered as being critical for pesticides. Values for Pesticide DRASTIC range from slightly to much higher than for general DRASTIC; the typical increase is about 25 to 35 points. Change between the two maps indicates the varying influence of the geology, topography, and soil type within each county.
In a series of long- and short-term investigations, sampling and analytical methods have been adapted for the investigation of microbial populations and biofouling in a carbonate-aquifer well. Methods have been screened and modified for use in relatively routine groundwater quality studies and the diagnosis of iron- and sulfur-related biofouling, taking an appropriate approach. The purpose has been to develop methods and tools that would allow for practical field studies of the microbial component in the aquifer for a more complete understanding of the aquifer environment.

Experience in these studies has shown that sampling has to be adapted for the purpose of the study. Pumice sampling required lengthy purging to gather bacteria typical of the aquifer biota. Analytical methods and biofouling benefits from sampling using immersed collection surfaces such as glass slides or other coupons. Exposure of slides to well water generally requires some days or weeks, and the time has to be determined by experimentation.

Methods for sampling are at present suitable for diagnostic purposes and probably provide reasonably representative samples. The search for identification methods currently available is still open to question. Interpretation should be in the context of other data.

C. Geology

First Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 082
Michael Angle, Presiding

2:00 SUCCESSFUL SHALLOW GEOPHYSICAL METHODS FOR DELINEATING BURIED RIVER VALLEYS
Harry C. Bircher and Dr. Benjamin H. Richard
Department of Geological Sciences, Wright State University, Dayton, Ohio 45435

Over the past several years a number of Master's theses completed in the Department of Geological Sciences at Wright State University have been concerned with employing various shallow geophysical methods to delineate buried valleys in southwestern Ohio. The methods used in these studies included gravity, magnetics, ground penetrating radar, DC resistivity, shallow seismic reflection and refraction have proven to be the most successful methods for delineating buried valleys. Both gravity and magnetics have high contrast between the bedrock and valley fill-material making the valley easily detected. Both methods currently available is still open to question. Interpretation should be in the context of other data.

2:15 STATISTICAL MODELING OF EROSION AT THE BLUFF TOE ALONG THE SOUTH SHORE OF LAKE ERIE
Theodore M. Shaw, Department of Mathematics, The University of Akron-Wayne College, Orrville OH 44667, and Charles H. Carter, Department of Geology, The University of Akron, Akron, OH 44325

Maximum water level (M.), storm duration (DUR), wave set-up (W), beach width (B), and the amount of erosion (Y) were recorded at two week intervals and after storms during 1976-1980 at five sites from Sandusky Bay to Vermilion. Analysis of variance shows the importance of ML to erosion of the bluff toe. ML has a high response on the linear regression model for erosion at all sites except in Oberlin Beach. R^2 = 0.606, n=45; Oberlin Beach, Y = -1.226 + 0.202(ML), MSE = 0.018, R^2 = 0.675, n=15; Sandusky Bay, Y = 0.2237(ML) - 0.779(GS), MSE = 0.077, R^2 = 0.621, n=32; and Showse Park, Y = -0.2546 + 0.043(DUR) + 0.090(WS), R^2 = 0.012, MSE = 0.285, n=9. These results show higher R^2 values than those obtained in a similar study in Chesapeake Bay.

2:15 THE HYDROGEOLOGY AND HYDROCHEMISTRY OF THE YELLOW SPRINGS, MANSFIELD TOWNSHIP, GREENE COUNTY, OHIO
Michael Evers, Soungh Cheng, Robert Ritzi, Jr., Kenneth Kramer, Dept of Geological Sciences, Wright State Univ., Dayton, OH 45435

The Yellow Spring, located in the Glen Helen Nature Preserve (Sec. 14, R.R. T. 4), is characterized by very little seasonal variation in temperature, chemical quality or discharge. The distinct yellow-orange staining at the spring face is caused by oxidation of ferrous iron, which forms a ferric iron hydroxide precipitate. The spring is oversaturated with respect to calcite, which precipitates upon contact with the atmosphere forming a large white mound at the spring's base. Discharge from the spring is relatively pristine, showing little impact from human activity. Comparison of Yellow Spring water with surface and ground water in the area shows less nitrate and chloride ion in the Yellow Spring than in other local waters. Data from wells in the area were used to construct a water table map, which indicates that the Yellow Spring receives recharge from outside the immediate Glen Helen area. Recharge to the spring appears to occur in an area which is agriculturally active and also contains numerous septic tanks. Discharge-recharge relationships suggest that the water from the Yellow Spring has been modified for tens of thousands of years. Tritium, a radioactive isotope of hydrogen, was used to date the spring water. The stable isotopes of oxygen and hydrogen were also studied to delineate seasonal recharge to the spring. At the time of this writing, isotopic data is currently being analyzed.
The Beaver Creek Wetlands are an approximately 1000-acre minerotrophic wetlands located in Greene County, Ohio. The Wetlands occupy a narrow corridor of land at the base of the valley along Beaver Creek and extend continually for approximately five miles to the Little Miami River. Believed to be approximately 10,000 to 12,000 years old, the Wetlands are fed primarily by ground water, and become the main source of water feeding Beaver Creek. The underlying aquifer system also is the primary source of drinking water for the area. An extensive residential well water level survey was performed and a preliminary ground water flow map was constructed from the hydraulic head data. The indicated flow directions were used to select appropriate residential wells for sampling and chemical analysis. Four piezometer nests were installed within the Wetlands, consisting of two piezometers each at depths of approximately two and ten feet into the underlying aquifer material. Hydraulic heads measured from the piezometers suggest primary lateral ground water flow, at least to these depths. Preliminary chemical data reveal a distinction in chemical composition from the waters along the eastern, western, and northern flow paths of the valley. These results will be used to determine the relative contribution of discharge to the wetlands from the various recharge areas.

HYDROGEOCHEMICAL STUDIES OF SOIL WATER AT SYCAMORE FARM, MONTGOMERY COUNTY, OHIO Weilin Huang, Songlin Cheng, Ronald Schmidt, Department of Geological Sciences, Wright State University 45435

Sycamore Farm, located 10 miles west of Dayton in Madison Township in Montgomery County, is an experimental agricultural watershed for the study of the impact of farm chemicals on ground water quality. The goal of this study is to characterize the hydrogeochemical process in the vadose zone. Lysimeters were installed at depths of 1.5, 3.0, 5.0 ft in a soybean field. A negative pressure of -10 to -15 psi was applied to each lysimeter to collect soil water approximately 48 hours later. The temperature, pH, and conductivity were measured in the field. Preliminary results show that significant changes in soil water chemistry occur in the upper 3 feet; alkalinities increase from 160 to more than 500 mg/L; conductivity increases from 400 to about 1000 uS/cm; measured pH decreases from 9.1 to about 7.5. We believe that measured pH values could change considerably from original soil water as a result of CO₂ outgassing during sampling process. Peroxide at different depths will be measured so that a correction can be made to the measured pH values. Analyses for major ions, chemistry, mineralogy, and physical parameters of soil are in progress and will be used to characterize the water-air-soil interaction in this complex system.


Ground water has been collected from 14 wells and 5 springs within the study area. Chemical analyses are for major ions. Six wells monitor ground water within glacial overburden, and 5 wells monitor the underlying Brackenridge Limestone. The remaining 3 wells monitor water within the Elkhorn Shale. An investigation into the flow and chemistry of a limestone spring was initiated in June, 1990. To date, spring discharge has been observed to vary between 7 and 80 gpm, with little change in water chemistry with time. The variation in flow is believed to be attributable to recharge through vertical fractures in the bedrock, which transmit water into the basement, porous section of the limestone. The lack of variation in spring water chemistry may be due to the travel time from the recharge area to the spring. Water table and spring data collected to date indicate that the flow of ground water within the limestone is occurring predominantly through small scale secondary openings and along bedding planes enlarged by solution. Some movement of water through larger scale fractures is evident from spring flow observations after a significant recharge event, but this type of flow is believed to play a relatively minor role in the overall movement of ground water through bedrock. Chemical analyses indicate that ground water within the overburden and limestone have essentially identical chemistries, although data has yet to be collected from the overburden within the recharge area. This data will be collected in 1991.

LITHOSTRATIGRAPHY OF QUATERNARY SEDIMENTS IN GREENE COUNTY, OHIO Dominico, D.F., S.K. Pookel, and A.G. Cole, Department of Geological Sciences, Wright State University, Dayton, OH 45435

Unconsolidated glacial and post-glacial deposits in Southeastern Ohio are economically important because they are a source of construction material and groundwater supplies as well as the material through which pollutants travel. The areal distribution and vertical sequence of these deposits are also critical in understanding the local and regional history of glacial retreat. We have begun a detailed study of the stratigraphy of unconsolidated sediments in Greene County, Ohio, utilizing subsurface and surface information.

The bulk of subsurface information comes from lithologic logs made by water well drillers and filed with ODNR. Although these logs vary in their reliability, standardizing lithologies into 5 categories (lithofacies) and correlating to nearby wells allow us to map the lithofacies which are most reliable. This large (> 500 wells/township) data base is augmented with more-accurate test borings and surface information (outcrops, quarries). This data, representing the three-dimensional distribution of lithofacies, is stored in a computer database which is accessed by searching and mapping software and which allows continual updating.

Initial analysis of the data indicates that sand and gravel lithofacies are abundant and separated by more laterally continuous, impermeable clay plus silt (gravels diamictons) lithofacies. In many areas, sand and gravel lithofacies are most extensive on the margins of bedrock valleys. Although extensive, the diamicton lithofacies cannot be easily correlated as tabular units of till and some occurrences can be better interpreted as glaciolacustrine in origin.
Peletocene ice certainly accentuated their relief. In late-glacial times, Wisconsinan ice covered the future Islands from about 25,000 to 14,000 years BP, followed by their complete submergence during the Pleniglacial, the late-glacial lake history until about 12,500 years BP, when lowered lake level (Lake Grassmere, at 195 m 640 ft) exposed their summits. Subsequent ice retreat diverted incoming glacial waters to the north, and also allowed Erle-basin waters to drain away abruptly to the east over the isostatically low Buffalo sill, creating rocky hills above the newly exposed lake bottom. Isostatic recovery of the Buffalo sill raised and expanded lake waters, which first reached the hills about 9,000 years BP, and eventually created the islands and shoals of today. Data from these early islands is scanty, but was probably mainly spruce, birch, and elder; replaced later by jack pine, poplars, and red and white cedars; and eventually by oaks, maples, hop hornbeam, ashes, and hickory.

2:15 GEOLOGIC SIGNIFICANCE OF GIANTIC ASH FALLS IN THE ORDOVICIAN OF NORTH AMERICA AND NORTHEASTERN EUROPE. Stig M. Bergström, Dept. of Geol. Sciences, The Ohio State University, Columbus, OH 43210; Dennis R. Kolata, Illinois State Geological Survey, Champaign, IL 61820; and Warren D. Huff, Dept. of Geology, University of Cincinnati, Cincinnati, OH 43221.

Many beds of volcanic ash (K-bentonites) are present in Middle and Upper Ordovician successions over more than 1.3 million km2 of many countries in the Americas and Europe. One of the most prominent beds, the Millbrig, has the same isotopic age (ab. 455 m.y.) and biostratigraphic position (upper A. tvurenens Zone) as the thickest and most persistent bed in Baltoscandia, and we suspect that this bed may represent the same eruption(s). Although the precise location of the source volcano(s) remains enigmatic, it was evidently in the Iapetus Laurentian and Baltic plates. Hence a large volume of ash also must have been deposited in the Iapetus Ocean. We speculate that the total volume of the Millbrig alone in North America, and the incipient bed in Baltoscandia, is 15,000 to 20,000 cubic km. The truly enormous size of these ash falls is illustrated by the fact that the combined volume of the Krakatoa, St. Helena, Pompei, Tambore, and Mt. Katmai eruptions is estimates to be only about 65 cubic km.

2:30 LITHOSTRATIGRAPHY OF FIVE BEDROCK CORES OF SOME UPPER, MIDDLE, AND LOWER ORDOVICIAN AGE ROCKS IN CINCINNATI, OHIO. C. Mac Swinford, Ohio Department of Natural Resources, Division of Geological Survey, 4303 Fountain Sq. Dr., Columbus, OH 43224.

The ODNR, Division of Geological Survey in cooperation with the Metropolitan Sewer District of Greater Cincinnati drilled five continuous cores in Cincinnati, Hamilton County, Ohio. The project was part of a feasibility study to investigate the construction of a mine/tunnel to be used for temporary storage of overflow wastewater. Information gathered from the cores provided subsurface data for the Survey's bedrock geologic mapping program in southwestern Ohio. The stratigraphic interval penetrated by the five cores, ranging in depth from 50 to 200 feet, includes the interval between the Kope Formation and the upper 80 feet of the Knox Dolomite. The drill holes were geographically logged and the cores were described to identify the lithologies of the beds and chemical analyses were performed on the rock to help plan for mine/tunnel placement and construction. The mine/tunnel, if built, is envisioned to enclose the 15-km long Black River Group between approximately 400 and 800 feet beneath the Mill Creek valley. Engineering and chemical analyses indicate that the Black River Group is suitable for tunneling, and the high calcium limestone could be marketed to partially offset the cost of mine/tunnel construction.

2:45 TEXTURE OF GOLD NUGGETS FROM PENNSYLVANIA MOUNTAIN PARK, PARK COUNTY, COLORADO, AND IMPLICATIONS FOR GOLD NUGGET GROWTH BY CHEMICAL ACCRETION. KENAE, Christopher, Ecology and Geography Dept., Denison Univ., Granville, OH 43023.

Several current articles attribute the gold-rich rims found on many placer gold grains to precipitation of gold from aqueous solutions. These gold-rich overgrowths suggest that at least some gold nugget growth occurs by precipitation of gold onto existing gold grains. I suspect that the importance of this process has been significantly underestimated in gold nugget and placer formation.

Gold nuggets have not traveled far at Pennsylvania Mountain Park. Gold nuggets have been collected from the close neighborhood of the gold vein source and the placer gold deposits. Two nugget types are present. One type is characterized by interstitial gold between interlocking quartz grains. The second nugget type exhibits delicate surface textures on irregularly shaped nuggets. Close examination (10×60×) of this type reveals the gold is smeared or spread out on most of the surface. The interstitial gold is expected in gold-bearing veins. The second nugget type exhibits delicate surface textures on irregularly shaped nuggets. Close examination (10×60×) of this type reveals the gold is smeared or spread out on most of the surface. The interstitial gold is expected in gold-bearing veins.

3:00 INVESTIGATION OF PORPHYRY, BASE, AND PRECIOUS METAL ANOMALIES OVER THE CROW SPRINGS IGNEOUS COMPLEX, NEVADA: A GIS APPROACH. MERRILL, John M., and PIEDE, Douglas E., Department of Geological Sciences, The Ohio State University, 104 W. 19th Avenue, Columbus, OH 43210; KRUMM, Christopher W., Roy F. Weston, Inc., 100 Corporate North, Bannockburn, IL 60015.

Mineralization in the Crow Springs area was generated during emplacement of a 202 m.y. quartz monzonite igneous complex, which metamorphosed inherited calc-alkaline andesites. Quantitative data were collected for Cu, Mo, Pb, Zn, and Ag in soil samples from a 17×17 grid with a quarter mile spacing. The geochemistry was recorded at each sample point, and these data and the element concentrations were mapped, classified, and displayed using the OSU Map Analysis Package GIS. Metal anomalies were isolated by subtracting threshold values for each element; and single element, total metal, Cu+Mo, Pb+Zn, Cu+Mo, and Pb:Zn were plotted to emphasize metal anomalies with respect to geology. The raw data were edge enhanced, directionally filtered, "sliced," and reclassified to highlight trends in element concentrations that might correlate with faulting in the region.

Anomalous Cu, Mo, and Pb, and Zn are present over the quartz monzonite complex, and over the contact between the porphyry and the metamorphosed Mina Formation. Geochemical products support the contention that a Cu-Mo-Pb-Zn rich complex that also spanned Pb-Ag (Au) veinage was emplaced in the Crow Springs area—rock samples contain Au and Ag.


A three-body numerical integration code with an energy-dissipation subroutine is used to study the effects of close gravitational interactions between an earth-like planet and planetoid. Near-circular orbits and mutual inclinations to the planet's equator are used. The mass of a planetoid orbiting an earth-like planet is allowed to vary, and the effects of this mass on the energy capture in the planetoid and the planet are studied. The work we have identified a stable capture window which extends from 250 to 330 degrees of earth anomaly. Within this zone any encounter in which sufficient energy is dissipated for planetoid capture results in an orbital orientation which is stable relative to solar perturbations. The planet anomaly (starting point of the earth-like planet) for this set of calculations is 200 degrees and the planetoid anomalies are 200 degrees.

The energy sink for gravitational capture is dissipation by tidal deformation of the planet and planetoid. Our theoretical planets all have the same density (3.34 g/cm3) and deformational characteristics. When the distance of closest approach is 1.43 earth radii, the displacement love numbers (an index of the necessary energy dissipation) in the planetoid and planet are two orders of magnitude larger than the two standard no deformation) for capture are 0.04, 0.25, and 0.16 for planetoid masses of 0.5, 1.0, and 2.0, respectively. The conclusion is that given similar deformational parameters of the planets and the planetoid, the theoretical planets all have a very high probability for gravitational capture.

3:45 HEAVY MINERAL ASSEMBLAGES IN PREMIMCINNAN (ILLINOIAN?) TILLs OF NORTHERN OHIO. John P. Szabo, Geology Department, University of Akron, Akron, OH 44326-4101.

The Granville and Southern Superior provinces of Canada influenced the composition of heavy mineral assemblages in the 0.125-0.250 mm fraction of pre-Mississippian till and post-Mississippian till sampled in central Ohio. Heavy minerals were separated from samples of tills from sections at Swine Creek (Grand River basin), Cedar Hill Circle (Cuyahoga basin), Millbrook...
The bedrock topography of eight counties in southwest Ohio has been evaluated using contouring techniques. This method is rapid, and allows for continued updating of the mapping as more data are obtained. Additionally, it should be mapped by the time of this presentation. While mapping of new areas and acquisition of new data may change these results, analysis of the bedrock topography maps produced by this method suggest that:

1. The ancestral Miami River and its tributaries drained south, towards Cincinnati, and may have left the state along the Whitewater River system. This system was pirated by the ancestral Miami River at Madison, Indiana, and the valleys were then deeply incised.

2. The "buried Teays" in western Ohio flows across the Cincinnati Arch, an unlikely location for a preglacial river, and it has no major tributaries. It may have formed as an ice-frontal drainage, when a series of north and northwest flowing rivers were dammed and diverted by the glaciers. The preglacial Teays may have flowed north or northeast into the Lake Erie Basin.

3. The Little Miami River was formed by the lateral diversion of three tributaries to the Miami River.

D. Medical Sciences
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
Townshend Hall 247
Lee Meserve, Presiding

9:00 AIDS AND SEXUAL BEHAVIOR IN A COLLEGE FRESHMAN POPULATION. Judy L. Adams, Department of Medical Technology, Bowling Green State University, Bowling Green, OH 43403

Exposure to the rapidly spreading Human Immunodeficiency Virus (HIV) is no longer confined to "high risk" groups. The incidence of the HIV antibody in a college population of a Midwestern "conservative" community has not been reported. Behavior and attitudes of college students determine the impact on the probability of an increase in sexually transmitted HIV in the heterosexual community. Knowledge of HIV transmission, sexual behaviors, and habits of entering freshmen in a Midwestern university with about 17,000 students was examined using a questionnaire to establish demographic characteristics and to answer questions about behavior and knowledge of sexually transmitted diseases, i.e., AIDS. The questionnaire was randomly distributed to 1,450 students; of the 941 completed questionnaires, 97.8% were freshmen. Less than 1/3 reported never having had intercourse; of the sexually active, nearly 82% had had intercourse by age 18. Most were aware of HIV and its transmission, although very few reported using recommended means to avoid exposure to the virus. Data suggest that current educational programs regarding sex and HIV/AIDS are not impacting on these young people. These results reveal a need for educational programs about safer sex and age levels or a major change in the current methods.


Polychlorinated biphenyl (PCB) is a common pollutant, the ingestion of which is harmful to a number of physiological systems in adult animals. Previous studies in our lab have demonstrated that incorporation of PCB at 250 ppm into the diet of pregnant and lactating rats causes their 15 day old pups to suffer concomitant depression of thyroid status (hypothyroidism) and activity of the neurotransmitter biologically synthesized enzyme choline acetyltransferase (ChAT) in two important brain areas (hippocampus and basal forebrain). Since 250 ppm is a high maternal dosage of PCB, it is of interest to evaluate the effects from the Green (125 ppm, 62.5ppm) on rat pup thyroid status and ChAT activity. Female rats were fed PCB (Aroclor 1254) in standard diet throughout pregnancy and lactation. Fifteen day old pups were decapitated and activity of ChAT in hippocampus and basal forebrain was estimated by the ability of an homogenate to incorporate 14C-labelled acetyl-CoA into acetyl-choline. All PCB doses significantly depressed thyroxine levels but had no influence on Triiodothyronine. When ChAT activity of various PCB levels was expressed as nm labelled...
Ingestion of polychlorinated biphenyl (PCB) by different animal species, including humans, induces hypothyroidism in offspring. Hypothyroidism induced by chemical, surgical, or congenital means is known to disrupt the hormones that control growth, but the effects of PCB on growth-regulating hormones have not been studied. In the study, we also analyzed the presence of Tuftsin, an immuno-potentiating tetrapeptide, in IgG, and is released sequentially by the enzyme TECP. Tuftsin is present in IgG in both sources. Tuftsin was not present in monoclonal IgG, but was in the serum. Results implicate TECP as the enzyme that regulates the amount of endorphins released during the stress reaction. This modulatory mechanism was absent in DI animals.

J.A. Meserve, Dept. of Biol. Sci., BGSU, Bowling Green, OH 43403-0212.

The development of a genetically hypothyroid mouse model (ChRIT/hy) has allowed the investigation of congenital hypothyroidism in experimental animals without the confounding of chemical alteration of thyroid status. To study development in this animal model, the mutant parents must be supplied with dietary thyroid supplements to allow reproductive competence. This study has no previous studies of such dietary supplementation on growth and thyroid status of offspring of these animals. The present study determined body weight and selected organ weights, as well as triiodothyronine levels, in 20 or 30 day old pups of mice supplemented with dietary thyroid powder (0.025% w/w) during pregnancy and lactation. In most cases, but not always, mother mice were of the genotype v/v, and fathers were hy/hy. The study revealed that genetically hypothyroid young could be differentiated from normal pups by depressed thyroid hormone levels at 20 and 25 days, but not at 30. Body and organ weights did not differ at 15 days of age, indicating an early catch-up growth resulting from thyroid supplementation. Since the mice were weaned by the mother between 17-24 days of age, it appears that thyroid hormone levels are determined by genotype before weaning, but that increase in body weight and organ weight are enhanced earlier in life by maternal thyroid supplementation. Investigators using this model should be cautioned that maternal thyroid supplementation may augment pop growth in genetically hypothyroid young.


Tuftsin is an immunopotentiating tetrapeptide (Thr-Lys-Pro-Arg) incorporated in IgG, and is released sequentially by the activity of two enzymes, tuftsin endocarboxypeptidase (TCEP) and leukokinase. TCEP is a proenzyme that splits the spleen because spleenectomy results in immune deficiency; therefore, release of tuftsin should be inhibited when the spleen is removed. Somatotrophin or T3, T4, and somatostatin, which is not released by the normal spleen, are released by the normal spleen. A surgical procedure that mimics spleenectomy is a hepatic autotransplant. The spleen is removed. Hepatic autotransplant is a surgical procedure that provides a vascular environment for spleen regeneration. To test the procedure, serum tuftsin was used as a marker for spleen function in vivo. Hepatic autotransplant and normal rats. The three groups indicated no statistical difference in tuftsin levels. Since tuftsin was present in both sources, the presence of tuftsin in the serum was not due to the presence of TECP, but was in the serum. Results implicate TECP as the initiator for the release of tuftsin, but its presence after spleenectomy was not explained. The data suggest TECP cleavage of IgG, was necessary for tuftsin detection and the spleen may not be the only source of TECF.

Study of tuftsin in normal and hypothyroid animals showed that TECP was necessary for Tuftsin detection in the spleen. TECP may be required for Tuftsin detection and the spleen may not be the only source of TECP.

10:15 MODULATORY EFFECTS OF VASOPRESSIN ON THE PAVLOVIAN CONDITIONING OF IL-1-INDUCED RELEASE OF BETA-ENDOCHOPIN DURING MOTOR ACTIVITY. Tatjana Ruhe, Cyrilla H. Wideman, and Helen M. Murphy. John Carroll University, Cleveland, Ohio 44118.

Brattleboro rats (DI) which are vasopressin-deficient animals and Long-Evans rats (LE) which are vasopressin-containing animals were utilized to determine whether or not vasopressin has a modulating effect on beta-endorphin functioning during the activity-stress paradigm. All rats were housed in activity-wheel cages. Under ad-lib conditions, both DI and LE rats ran similar amounts. However, during food restriction, the LE animals showed a burst of increased running activity which was significantly attenuated in LE rats. This indicates that in LE rats, vasopressin may provide a modulating effect that enables the LE animals to cope more effectively with stress. In order to determine whether the possible modulating effect of vasopressin influenced beta-endorphin levels in LE rats, naltrexone, an opiod antagonist, was administered to the rats. Naltrexone generally increased running activity in both DI and LE rats, having a greater effect on the LE animals. It appears that vasopressin had a modulatory effect on the beta-endorphin levels in the LE animals which enabled them to regulate the amount of endorphins released during the stress reaction. This modulatory mechanism was absent in DI animals.

10:30 THE PAVLOVIAN CONDITIONING OF IL-1-INDUCED GHONADOTROPHIC SECRETION. Robert J. Nowicki, Helen M. Murphy, and Cyrilla H. Wideman. John Carroll University, Cleveland, Ohio 44118.

Recombinant interleukin-1b, which is capable of stimulating the pituitary-adrenal axis to secrete corticosterone, was paired with a saccharin drinking solution and lithium chloride injection in a taste-aversion conditioning paradigm. Mice were injected with 0.5 mg/rat IL-1b 30 min after consuming a novel saccharin solution. Plasma corticosterone levels were measured before conditioning to determine unconditioned steroid levels and 3 and 6 days after training when conditioned and nonconditioned animals were provided with the saccharin solution or plain water, or were left deprived. The pairing of saccharin, IL-1b, and interleukin-1 was effective in inducing a passive avoidance response. There were no differences between the steroid levels of conditioned and nonconditioned animals supplied with plain water or those that remained deprived, which ranged from 140-170 ng/mL. Nonconditioned mice presented with saccharin had steroid levels that did not differ from control values. Conditioned animals presented with saccharin 3 days after training showed an elevation in steroid levels, 1000-1200 ng/mL, which was significantly greater than that observed in any other group; 6 days after training, the corticosterone levels of conditioned animals were slightly lower, 800-1000 ng/mL. These results indicate that the interleukin-1 activation of adrenal cortical secretion can be conditioned to external stimuli.

D. Medical Sciences
Second Morning at 9:00 am SATURDAY, APRIL 27, 1991 Townshend Hall 248 Stan Rittgers, Presiding

9:00 EVALUATION OF A HEMOGLOBIN (HGB) DEVICE IN PATIENTS WITH HIGH WHITE BLOOD COUNTS (WBC). DUCA, Dale J. and MAMS, Caroline. Cleveland Clinic, Lab Hematology, L-30, 9500 Euclid Ave. Cleveland, OH 44195.

In patients with certain types of leukemia high WBCs may falsely elevate the Hgb concentration through turbidity. Correction is time consuming and prone to error. A new Hgb device, Hemoce (TM), which measures absorbance at two wavelengths was tested. Specimens from 96 patients with WBCs from 99 to 4.1 x 10^9/uL were analyzed. Using an automated Coulter S+IV, optical correction was applied. Measurements on the S+IV were subjected to regression analysis. In 50 samples (52%), Hemoce results did not match even the corrected S+IV results on 14 specimens. Of the samples that did not match the corrected S+IV results were less than 70% of the time. Hemoce appears to be convenient and reliable for Hgb measurement in the Cancer Center setting where high WBCs may cause interference.
Buildings
Saturday, April 27, 1991

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190 N. Oval Mall

53 Evans Hall A-4
520 King Ave.

200 Holiday Inn on the Lane I-4
328 W. Lane Ave.

80 Independence Hall F-5
1923 Neil Ave. Mall

201 Parke University Hotel
Off Map
3025 Olentangy River Rd.

183 Townshend Hall E-5
1885 Neil Ave. Mall

184 University Hall F-6
230 N. Oval Mall

Registration
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**Friday, April 26, 1991**

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A model geometry for the HIV-1 and -2 viruses is proposed based on EM observations. Standard geometric shapes are employed to describe the surface membrane, stalk (glycoprotein 41), and knob (glycoprotein 120) of the virus. Based on approximate dimensions for certain features of the virus, estimates are provided for virion surface area and volume in both budding and mature stages, stalk-knob assembly surface area and volume, surface membrane area, surface membrane radius, and the ratio for surface area in the budding and mature virus. Such estimates may be useful in the quest for compounds that inhibit virus replication.

Evidence, based on the geometric model, shows that the budding virus has 2.3 to 2.7 times more surface area than the mature virus.

HEMODYNAMICS WITHIN MODELED ARTERIAL BYPASS GRAFTS

SE RITTGERS, Ph.D., RB KEYTON, M.B., CH BUNNHIAN, B.S. and MC BH NIU, Ph.D., Department of Biomedical Engineering, The University of Akron, Akron, OH 44325

Over one million vascular bypass grafts have been implanted to revascularize diseased arteries but 40% of these fail within five years. Some investigators attribute graft failure to endothelial and smooth muscle cell proliferation while others believe that hemodynamics also play a key role. In vitro models with junction angles of 30, 45, and 90° were used to simulate low extremity bypass graft anastomoses. Results using laser Doppler anemometry and ultrasound Doppler Color Flow Mapping have documented anastomotic flow patterns under steady and pulsatile conditions, respectively. In all cases, there is a distinct low flow, separation zone near the inner wall of the artery just beyond the toe of the anastomosis, a very likely site for initiation of intimal hyperplasia. When an artery with total occlusion is bypassed, fluid upstream of the anastomosis is stagnant and responds to the graft inlet flow by circulating in a large vortex pattern, thus becoming an ideal site for thrombus formation.

MAGNETIC RESONANCE, ULTRASOUND, AND HISTOPATHOLOGIC CORRELATION OF ACUTE EQUINE TENDON INJURIES. Jeffrey B. Bass, MD, Ronald Grosser, VMD, James A. Render, DVM PhD, and Errol K. Bellen, MD. MetroHealth Medical Center, Department of Radiology, 3395 Scranton Road, Cleveland, Ohio 44109.

The histologic basis for the abnormalities observed by MRI and US in the injured tendon are not well defined in either the horse or human. This study was undertaken to assess the role of the athletic horse in a model for human injury and to correlate the imaging and histopathology.

Five horses with acute tendon injuries were studied one to seven weeks after injury. US was performed just prior to euthanasia. MRI was performed immediately post mortem. The tendons were preserved en bloc and histologic preparations made. Correlations were made between histology and imaging at multiple stages in the healing process.

The lesions were readily seen by US and MRI which correlated well. Lesions characterized by edema and/or cellular infiltration were of decreased echogenicity compared with normal tendon, and of increased signal on MRI. With healing, US MRI signal returned to normal. The injured athletic horse is a useful experimental model for the study of tendon injury imaging.

LIPROTEIN BINDING AFFINITY OF TIN-ETIOPURPURIN, A SENSITIZER FOR PHOTODYNAMIC THERAPY, M. Nistriozzani and C.M. Carbo. Dept. Chemistry, University of Toledo, Toledo, OH 43606

Photodynamic therapy (PDT) is an evolving modality for cancer treatment which combines the use of a systemically administered sensitizer and the application of light. Tin-etio-purpurin(SnET2) is a second generation sensitizer which has been shown to be very effective following photoactivation for treatment of transplantable bladder tumor in rats. It has been reported that lipoproteins (especially LDL) seem to be the in vivo physiological carriers to the tumor for some of the sensitizers proposed for PDT. In this study the binding properties of SnET2 to the separated lipoprotein classes were examined. Lipoproteins were separated from dog plasma by gradient ultracentrifugation on the basis of density determination. Sensitizer (1x10-6 mol/L tin-etiopurpurin in phosphate buffer saline) was incubated with increasing amounts of each lipoprotein fraction and the fluorescence intensity of SnET2 measured. The progressive increase in fluorescence intensity was due to lipoproteins binding andnon fluorescenting. In addition, the emission peak showed a noticeable redshift indicating a change in the dye microenvironment. LDL showed a higher affinity for SnET2 since saturation was reached at higher concentration of this lipoprotein class; using published methods, it was calculated that each molecule of LDL binds 65 molecules of SnET2 while each HDL molecule binds 8 molecules of sensitizer. These results are in agreement with those reported for other sensitizers and therefore appear to confirm the importance of the LDL lipoprotein class in vivo for photodynamic therapy (supported by NEI Grant ROI-EY07953).

THE INFLUENCE OF WOUND HEALING ON URINARY NITRATE LEVELS IN RATS. Michael J. Dunphy*, Laurie N. Strang*, Michael A. Mastroianni*, and Daniel J. Smith†. "Dow" Department of Natural Sciences, Wash College, N. Canton, Ohio 44720, †Department of Chemistry, The University of Akron, Akron, Ohio 44325, ‡Department of Biological Chemistry, The University of Michigan, Ann Arbor, Michigan, 48109.

Activated macrophages are involved in the biochemistry of wound healing and nitric oxide (NO) production. Thus, macrophage-derived NO may be important in wound healing and repair. In vitro, nitrate and nitrite levels were determined in normal rats and in rats with total occlusion. Level and wound closure profiles were determined in wounded or non-infected and wounded rats infected with S. aureus or P. morganii. Rats were fed custom low-nitrate diets, allowed to reach basal low urinary nitrate output, given full-thickness circular dorsal wounds and 24 h urine samples were collected throughout the wound healing period. Wound closure was assessed by computerized video imaging and urinary nitrate, an oxidation product of metabolic NO, was measured by liquid chromatography. Normal rats show a prompt increase in urinary nitrate output the second day post-wounding. This baseline model was used to determine the effects of drug administration on wound healing. Infection significantly reduced basal urinary nitrate level, and this cesin was confirmed by pre-infection urinary nitrate levels

H. Westcott Vayo, Department of Mathematics, Dept. Chemistry, University of Toledo, Toledo, OH 43606

The University of Toledo, Toledo, Ohio 43606.
The purpose of the following study was to determine fluctuations in systemic arterial blood pressure (BP) - brought on by routine daily behaviors and acute stress situations. Black racers chronically fitted with dorsal aorta catheters were exposed to a 24-hr cycle inside large cages in which they were free to move about. BP in resting snakes was 20-30 mmHg, but there were large differences between control and stress responses. The data suggest that stress significantly increased BP, and its magnitude depended on the experimental conditions. Thus, the objective of this study was to determine if snake BP is dependent on the presence of estrogen receptor. We have inferred that if this is also true in other species, the steroid sulfatase gene may be involved in the development of hypertension. The elevation in STS activity in the SHR is due to increased amounts of enzyme present in these tissues rather than a kinetically different STS form. Steroids and glucose intolerance are important factors in the development of hypertension. The elevation in STS activity observed occurs coincident with the rapid increase in blood pressure in the SHR at an age when the increase in enzyme activity is still present. Our results suggest that the presence of the estrogen receptor increases the injury response. Testosterone may interact with a gene product from the male Y chromosome to increase the blood pressure.

A NEW ANIMAL MODEL TO STUDY THE INTERACTION OF TESTOSTERONE AND HIGH BLOOD PRESSURE. M. Turner and M. Johnson. The University of Akron, Akron, OH 44325.

The objective of this study was to determine if male rats with normal blood pressure and a deficient androgen receptor would develop high blood pressure when crossed with a high blood pressure parent. Female Holtzman rats (n=15) carrying the testicular feminization (TFM) gene were crossed with male Holtzmann rats. TFM males and TFM females were also followed for the same time period. The BP of the offspring was measured at 11 weeks of age. Both F1 hybrid males and females and TFM males and females were normal. BP of control Holtzmann males and females and TFM males and females were also followed for the same time period. There was a significant difference in systolic BP (12 weeks) of 190 ± 8 vs. 175 ± 8 mmHg of the TFM hybrid males and TFM hybrid females, respectively. Female F1 hybrid rats showed a trend above female controls (155 ± 8 mmHg vs. 110 ± 8 mmHg). Stiffness was very sensitive in the SHR and blood pressure (BP) was measured weekly from 3-15 weeks in F1 hybrid males. Approximately 50% of the F1 hybrid males were males and 50% were females. There was no significant difference in cataract formation or development of hypertension. The elevation in STS activity observed occurs coincident with the rapid increase in blood pressure in the SHR at this age. Our results suggest an important role for the steroid sulfatase gene in the development of hypertension.


Steroid sulfatase (STS) is an important enzyme involved in the conversion of several inactive steroid sulfates, including glucocorticoid sulfates, to their hydroxylated catechol analogs. We have found that the level of STS enzyme activity in the testis, adrenal, liver, kidney, hypothalamus and heart of the spontaneously hypertensive rat (SHR) is not significantly different from the normotensive Wistar-Kyoto (WKY) rat. On the other hand, the only significant difference in STS activity was a 0.75-fold lower level in the SHR adrenal gland. At 12 weeks of age the STS activity in adrenals and testis of the SHR was significantly elevated (5.2-5.8 fold) compared to the WKY rat. For one substrate, estrone-sulfate, was determined and found to be the same in the 12 week SHR and WKY rat testis (31.3 and 34.6 uM) and adrenal (35.4 and 37.9 uM). This suggests that the increased STS activity in the SHR is due to increased amounts of enzyme present in these tissues rather than a kinetically different STS form. Steroids and glucose intolerance are important factors in the development of hypertension. The elevation in STS activity observed occurs coincident with the rapid increase in blood pressure in the SHR at this age. Our results suggest an important role for the steroid sulfatase gene in the development of hypertension.


Previous results had reported a 100% incidence of nuclear cataract formation in the Spontaneously Hypertensive Rat (SHR). However, the parental Wistar Kyoto strain (WKY) was not assayed as to cataract formation. The present study cataract development was studied in WKY, SHR, and hybrid strains between SHR and WKY. Offspring of crosses between SHR and Holtzmann rats were obtained and checked for cataract formation. Cataract development and severity in the SHR strain was age dependent. All strains were characterized at 5 months of age. There was no significant difference in cataract formation or severity between SHR and WKY or any of the hybrid strains derived from SHR and WKY. The Holtzmann strain had no cataract formation, while all the offspring of the SHR X Holtzmann cross had cataract formation. Since cataract formation in the WKY and SHR strains are dominant and incompletely penetrant in the SHR background.

ENHANCEMENT OF SHORT-TERM HEART PRESERVATION USING AN IRON OXIDIZER. GALI DUNPHY AND D. ELY. Dept. of Biology, The University of Akron, Akron, OH 44325.

During short-term, 1 hour in vitro ischemic heart preservation and reperfusion, irreversible tissue damage occurs caused by reactive oxygen intermediates, such as superoxide, singlet oxygen, hydrogen peroxide, hydroperoxyl, and hydroxyl radicals. Reduction of the related oxidative damage of preserved ischemic tissue by...
iron chelators are of primary importance in maintaining heart function. We assessed the activity of mimosine (30mg/L), an iron chelator, added to a Krebs-Henseleit solution maintained heart function in the Langendorff isolated rat heart. A group (n=6) of male spontaneously hypertensive rats (SHR) had the hearts removed and perfused with Krebs-Henseleit and served as controls and another group (n=8) of male SHR had mimosine added to the Krebs-Henseleit solution. The mimosine treated hearts had significantly better left ventricular function than the control hearts after 1 hour of global ischemia. Diastolic pressure was 62 lower, systolic pressure was 12% higher, and there was no loss of coronary flow. The data suggest that mimosine may be an effective perfluoro additive to prevent iron mediated damage in both short and long term hypertension. Further studies will examine the dose-response effects and potential enhancement of 24 hour preservation.

1:00 THE EFFECTS OF ANESTHETICS ON BIOGENIC AMINE RELEASE DURING ELECTROCONVULSIVE THERAPY IN DEPRESSED SUBJECTS. Byron Petraitis, Bruce Massau, Bajinikanth Kochari & Daniel Ely*. Aultman Hospital, Canton, OH 44710 and * Dept. of Biology, The University of Akron, Akron, OH 44325-3908.

In severe depression electroconvulsive therapy (ECT) has been used as a primary means of treatment for 40 years. The principal reason for ECT is the efficacy in relieving depression with equal or better results than other therapies (60-90% effective). The mode of action of ECT appears to be through the release of endogenous amines and hypothalamic peptides in the brain. Heart arrhythmias from autonomic nervous system imbalance do occur with ECT. Therefore, the objectives of the following study were to: 1) determine the peripheral levels of serotonin, norepinephrine, dopamine and epinephrine during and after exposure to ECT in depressed patients and 2) evaluate the effects of three anesthetics upon the ability to stabilize the autonomic nervous system to prevent heart irregularities. The patients with clinical depression were studied. Three anesthetics were evaluated for their ability to stabilize the sympathetic nerves: methohexital, thiopental, and propofol and atropine was used in all patients to reduce parasympathetic activity. In 5/6 patients the biogenic amines increased 4-6X within 3 minutes after ECT, the increase was less and the peak slightly delayed with propofol as compared to the other anesthetics. The comparative effects of the propofol may have advantages in protecting the cardiovascular system during the intense stimulation of ECT.

4:15 IMPRIMAINE IN PANIC DISORDER: DOSES/RESPONSE RELATIONSHIPS. Matig R. Mavissakalian and James M. Perel, The Ohio State University, College of Medicine, Department of Psychiatry, 473 West 12th Avenue, Columbus, OH 43210-1228, U.S.A.

Fifty-five patients with panic disorder, with agoraphobia, without depression, completed a double-blind, randomized, placebo-controlled dose-response study of eight weeks duration. Treatment consisted of four identical tablets at bedtime and no instructions or encouragement for self-directed exposure to phobic situations. Treatment conditions included placebo (N = 14) and three weight-adjusted imipramine dosages: 0.0, 0.5 mg./kg./day (N = 14; X = 37.1 + 9.7 mg./day; 1.5 mg./kg./day (N = 15; X = 98.3 + 19.5 mg./day; 102 + 70.2 mg./ml and 3.0 mg./kg./day (N = 17; X = 198.8 + 33.7 mg./day; 164.6 + 55.5 mg/ml. Compliance, as assessed by pill counts and plasma tricyclic levels/dose ratios, was high. The data provided strong support for a positive dose relationship for panic and phobic symptoms and revealed significant correlations between the bioavailability of the drug and improvement, in particular between panic and the plasma/tricyclic component. The results provide incontrovertible evidence for a specific pharmacological effect within this disorder and implicate the serotoninergic drug and improvement, in particular between panic and the weeks' duration. Treatment consisted of four identical-
Tuftsin (Thr-Lys-Pro-Arg) is a tetrapeptide responsible for many stimulatory effects on the immune system. Lack of tuftsin can result in a patient being severely immunocompromised, which is why a serum assay for tuftsin is necessary to determine in vivo activity. Tuftsin is detectable and quantifiable using reverse-phase high-performance liquid chromatography (RP-HPLC). A previously described method employed RP-HPLC as a filtering device and crudely quantified tuftsin using mass spectrometry (MS). MS was eliminated and RP-HPLC detection was optimized to simplify the procedure. Tuftsin is similar to another oligopeptide, angiotensin. The RP-HPLC isolation procedure for angiotensin was adapted to tuftsin (DeSilva, et al., Anal. Biochem., 174:80-7, 1988). The new method reduces interference by serum proteins. Retention time is confirmed with kentisn (Thr-Pro-Arg-Lys) and fragment 1-3 (Thr-Lys-Pro). Although recovery of tuftsin is 100%, sensitivity of the assay is 1-10 nmoles/ml, which exceeds requirements for normal serum tuftsin levels. Quantitation is possible using a solution and processed tuftsin standard curve. Simplification and optimization of the tuftsin procedure should promote use and research of tuftsin in clinical and pharmacologic applications for stimulation of compromised immune systems.

3:00 ERGOGENIC AIDS EMPLOYED BY COLLEGIATE ATHLETES. D.M. Spillman, Nutrition and Food Systems, 164 McCuffy Hall, Miami University, Oxford, Ohio. 45056

This three year study of collegiate athletes includes dancers, football, basketball and hockey players, weight lifters, and body builders. Dancers, weight lifters and body builders utilized large amounts of protein, often as much as 65% of the caloric daily intake. Body builders celled heavily on the use of lecione, isoleucine and valine for "bulking agents". At the time of body shows the body builders took large amounts of condensed sweets or alcohol to aggravate vein extension. During training periods, football players, weight lifters and body builders utilized Diamabol (methandienolone), Winstrall (stanzolol), Anabol (methandroil), Creatin and Androcin T (testosterone). All of these agents are "bulkers" and add muscle to the lean body mass. Caffeine was heavily used by the basketball players and the dancers. Tablets as well as popular drinks were consumed in large amounts prior to performance. The dancers also used soda (NaHCO3) to speed recovery of aerobes. These aids worked in varying degrees of success and harm. The use of soda results in diarrhea, while the caffeine can deplete the available glucose before the competition. The taking of "bulkers" results in altered ego, taste change and susceptibility to fatigue and infection.


A total of 28 filamentous fungi were tested for susceptibility to the imidazoles itraconazole (1) and fluconazole (7). The testing method, reported previously by the author, used media impregnated disks placed on plates containing antibiotic, and tested for fungal growth. Results were reported as the mean of MFC's for six runs. Six species of the genus Aspergillus were tested. Results for I were 1.3, 1.5, 1.3, 2, 1.4, and 0.5, reported as µg/ml. For F the results were 0.7, 0.4, 1.0, 1.1, 1.8, and 0.5. Three species of Alternaria were tested. For I the results were 0.15, 0.1, 0.4. For F the results were 0.05, 1.0, and 1.2. Three species of Drechslera were tested. Results for I were 3.0, 3.0, and 0.8. For F, results were 0.7, 0.8, and 0.1. Two species of Fusarium were tested and for I the results were 1, 2, and 15. For F the results were 0.25, 0.5, and 1.5. For the three isolates of Munich, tested the results for I were 1, 1.2, 1.3, and 0.2. For F the results were 0.7, 1.2, and 0.5. Two species of Pseudallescheria were tested resulting in I values of 0.9, and 0.9. For F the results were 0.3 and 0.5. Three isolates of Rhizopus were tested with I values of 1.2, 1.3, 1 while F was 0.5, 0.8, and 0.1. Two genera of Paullinallucli-eria were tested showing 5 and 2 for I and 2 and 1 for F. Three isolates of Penicillium were tested showing 2.2, 4, and 50 for I and 4, 2, 100 for F. Usually F was superior to I.
Junbe, a mixture of traditional Chinese herbs, was prepared by Zhu Liangchun, an expert in Chinese medicine. Junbe has been used widely in China to treat rheumatoid arthritis (RA) and has proven to be clinically effective. In order to explore the pharmacological mechanism of action of Junbe in the treatment of RA, 40 Wistar rats were divided into two groups: control group (CG) and Junbe group (JG). All rats were injected intradermally with 0.2mg of a mixture of type II collagen and incomplete Freund adjuvant around the tail to induce experimental arthritis. Fifteen days later, the rats in JG were given 2.0mg of Junbe solution once a day. One month later, the knee and ankle joints of all animals were examined histologically with a light microscope. The joints of rats in CG showed proliferation of synovial cells, infiltration of lymphocytes in synovial tissue, or fibrosis of synovial tissue. In JG, the Junbe effect on synovial tissue was dramatically reduced. The data from this study supported the hypothesis that the decline in immune competency may be linked with a decrease in antibody-producing cells.

Since copper deficient (CuD) diets impact central nervous system functions, 50 g weanling male Sprague-Dawley rats were fed a CuD diet, 0.6 mg Cu/kg, ad libitum for eight weeks. Control rats were fed a copper adequate (CuA) diet of 0.6 mg Cu/kg. Glu, Gly, Thr, Thr, Tau, Ala, Tyr, and GABA were assayed by high performance liquid chromatography (HPLC), using a reverse-phase column. The primary amines were reacted with beta-mercaptoethanol and o-phthaldehyd. The mobile phase involved Solvent A (10 mM sodium phosphate, 25 mM sodium acetate, 2% tetrahydrofuran, and 0.05 M potassium chloride) and Solvent B (methanol), with a gradient of 22% methanol increasing to 100% methanol. CuD rats exhibited glutamate levels and a complex of glutamate and GABA, while no significant difference was found for the control group. CuD, therefore, may have a very specific role in amino acid metabolism in the brain.

Non-paired nucleotides stabilize the formation of three-way helical DNA junctions. Two or more unpaired nucleotides located in the junction regions enabled the formation of fifteen nucleotides long to assemble, forming conformationally homogeneous junctions, as judged by native gel electrophoresis. The unpaired bases can be present on the same strand or two different strands. CuD rats in inferior colliculus homogenates, and 56% higher glutamine levels in whole brain homogenates, while no significant difference was found for the cochlear nucleus. CuD may have a very specific role in amino acid metabolism in the brain.
and third, I place the findings in a geographical and quality and funds made available to female headed households; on the gender differences, especially regarding housing mutations, resulting in changes in the primary amino acid sequence of the variant protein.

Three variant forms of human red blood cell pyruvate kinase (PK) have been characterized at the kinetic and gene levels and compared to normal human PK controls. Higher Km (PEP) was observed for the PK "Memphis" and PK "Pontotoc" variants. A 32-P labelled, rat PK cDNA clone, followed by autoradiography, was used to identify differences in DNA isolated from the patients with the variant PK's was digested with twelve different restriction enzymes, electrophoresed on 0.8% agarose gels and transferred to nitrocellulose. These filters were hybridized with a 32-P labelled, rat PK cDNA clone, followed by autoradiography to detect PK gene sequences. The results of this analysis suggest that no major insertions or deletions have occurred in these variant genes. The underlying genetic defect appears to involve possible point mutations, resulting in changes in the primary amino acid sequence of the variant protein.

This paper is organized as follows: I first give a brief overview of the federal housing and community development policy the last twenty years; second, I discuss my findings on the gender differences, especially regarding housing quality and background of the original homeowners; and third, I place the findings in a geographical and theoretical perspective.

F. Geography
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 014
Alvar Carlson, Presiding

9:00 HOUSING AND GENDER: A GEOGRAPHY OF HOUSING PROGRAMS IN ATHENS, OHIO. David Swenson, Department of Geography, Ohio University, Athens, Ohio 45701-2979.

The United States' federal policy directed toward the low-income households and regional development has changed dramatically in the last fifteen years, from the Community Development Block Grants of the seventies to state programs and reliance on direct rent subsidies or housing allowances. The tendency is to spend less on this sector altogether. The Reagan administration cut the housing assistance budget by 37 percent from the fiscal year 1984 to the fiscal year 1985. The magnitude and nature of growth have occurred to control levels or higher by some of those compounds without apparent effect on incorporation. Other derivatives had positive effects only on the incorporation of thymidine into DNA. Our results suggest that in addition to effects on DNA synthesis, thymidine may selectively alter membrane transport functions.

10:00 LANDSCAPE AS INDUSTRIAL ARTIFACT: SOUTH EASTERN OHIO REVISITED. Richard Francaviglia, Ohio Historical Society, 1982 Yelma Avenue, Columbus, Ohio 43211.

Today, Southeastern Ohio appears deceptively agrarian, but eighty years ago industry was very much in evidence: Coal and iron mining and refractory industries created a distinctive cultural landscape based on the exploitation of the region's mineral resources. This paper describes aspects of the built environment (including housing, commercial and industrial architecture, and mining-related toponymy) that are tied to the region's industrial past. The paper begins with a look at the regional setting: some topographic features, such as "boom town" commercial architecture, former company housing, abandoned coal tipple, and gob niles, in diagnostic; their location in a setting of natural and social features underscores the region's industrial decline since 1930.

10:15 A VIRGINIA I HOUSE IN SOUTHERN OHIO: THE VERNACULARIZATION OF AN ELITE FORM. Hubert G.H. Wilhelm, Department of Geography, Ohio University, Athens, Ohio 45701-2979.
The settlement of Ohio included diverse American migrant groups from the Northeast, East, and South. Virginians comprised the majority of Southern settlers and they, as well as those from other parts of the country, introduced traditional units into Ohio. Among the most diagnostic of these houses are barns and Shockhorns came with a rich heritage of regional architecture.

One particular house is especially representative of Virginia settlement in Ohio. That type is a stylish I house with double porch, central dormer, low pitched roof, gable-end chimneys, and raised basement or crawl space. This house and its appendances appears to have its roots among the estates of the Tidewater and Piedmont areas of Virginia. Because this house was environmentally well adapted to warmer and humid conditions and was identified with agricultural success and status, it quickly achieved vernacular importance. It can be traced from the Tidewater into the hills of western Virginia (present West Virginia) and eastern Kentucky from where it made its way into Ohio. Today, it survives as a characteristic landscape element representative of Virginia settlement in Southern Ohio.

Two important routes of cultural diffusion crossed eastern Ohio between limits formed by present day Ashtabula and Belmont Counties. One route, through New York and then along the shore of Lake Erie, was an avenue for the westward progression of New Englanders and their influence. The other route, Forb’s Road, the National Road—and the Ohio River provided a route west for people and cultural baggage from the Middle Atlantic. On maps depicting cultural regions, eastern Ohio is generally shown as a transition zone. This paper investigates that transition zone by examining the origin of early settlers, the land alienation process, the establishment of settlements and selected aspect of material culture. The results of the study suggest that the Middle Atlantic may have been a more important cultural imprinter of this region than was previously supposed.
Ohio's first solid waste law was enacted in late 1967 in response to over 670 open dumps in the state and increasing environmental awareness/concern. The law mandated permit and inspection programs for all landfills operating under HB 592 as revised. During this period, the Ohio Environmental Protection Agency (OEPA) was created, replacing the state's Department of Health as the official agency in charge of environmental monitoring. Landfill "tracking" began in 1980 and public awareness increased to a level necessitating more stringent state guidelines. House Bill 592 was signed into law on June 24, 1988 requiring a statewide solid waste management plan, also one joint county solid waste management districts, and adherence to a specific implementation timetable. Three levels of implementation based on district population determined the time allowed for the submission of management plans with less populated districts in the lead. The goals of HB 592 are 1) reduced reliance on landfills and 2) the three r's of modern waste management - reduction, recycling, and reuse. Implementation of this law will impact every household, agency, and firm in Ohio based on their location and the configuration and size of the surrounding management district. While the law is uniform across the state, location has significant and measurable impacts on actual solid waste management practices.

PROBLEMS IN THE APPLICATION OF AERIAL PHOTOGRAPHY TO CULTURAL LANDSCAPE ANALYSIS: THE EXAMPLE OF AMISH FARMSTEDS

Brian Okey, Dept. of Geography, Miami University, Oxford, OH 45056

Research was undertaken to determine the degree to which Amish farmsteads are distinguishable on aerial photographs. Specifically, normal color 35mm ASCS slides were utilized. Eastern Holmes County, the original site of Amish colonization in Ohio, and Darby Township in northern Madison County, location of an offshoot of the Holmes County settlement, were chosen as study areas. Both contain Old Order Amish, the most conservative branch of Anabaptists and the least open to modern technology.

Amish landscape features associated with manual and horse-driven labor, self-sufficiency, and diversity, and barn and building styles were evaluated as interpretive indicators. However, several of these traits are exhibited by non-Amish neighbors as well. Furthermore, limitations of the slides themselves present additional hurdles. Equipment and building detail is inadequate without extreme enlargement. ASCS inventory flights take place once annually, and thus, miss many distinctively Amish activities such as those occurring during harvest. It was found that color slides alone are insufficient in accurately locating Amish farmsteads.

ARE WE LOST? GEOGRAPHY LITERACY IN AMERICA AND AT WAYNE COLLEGE.

Gary Graham, 2256 Christmas Run Blvd., Wooster, OH 44691

One in seven Americans can't identify where they live on a world map. One in four can't distinguish between the Pacific and Atlantic Oceans. In a Gallup poll, America ranked sixth out of nine countries tested on map identification. The 19-26 year-old age group from America scored lowest among all tested. A replica of the Gallup National Geographic test was administered to 100 students at Wayne College – The University of Akron in order to compare their geographic skills to the original test group. Like the Gallup findings, Wayne College scores were high in proximity identification (no one incorrectly identified Canada and only one respondent misidentified Mexico). Countries most frequently misidentified by Wayne College students were Sweden (70%) and Germany (66%). Ironically, Sweden in the 18-26 age bracket scored higher on the original Gallup survey. Only 5% of Wayne College students could identify Vietnam on a map; in contrast, only 38% of Russians polled could identify Afghanistan on a map, despite their lengthy war in that country. Wayne College students identified 73% of the countries correctly (the American average was 54%).
standing of the technological impact of innovation on business as well as understanding of quantitative modeling techniques. Individual firms try to discover and manage their comparative advantage with respect to product offerings in the market place through a logistics system. This paper emphasized the spatial components of operations logistics rather than the temporal demand concerns. Both the theory of polynomial trend surface and double fourier series analyses were developed as well as the use of appropriate computer software, to illustrate modeling techniques applied to logistics systems. The case study utilizes management science techniques to trend-fitting motor carrier transportation costs.

3:00 THE GARMENT INDUSTRY IN TAIWAN—PAST, PRESENT, AND FUTURE. Stephen S. Chang, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403.

The garment industry has been vital to the economic development of Taiwan. From the mid-1960's, with the opening of its first Export Processing Zone in Kaohsiung, Taiwan's garment industry grew rapidly. This growth was to a large extent a result of the influx of foreign investment, namely from Hong Kong, and with it know-how. By the end of the 1960's, Taiwan was one of the major garment producers in the world along with Hong Kong and South Korea. Throughout the decade of the 1970's and into the mid-1980's, competition between these three producers continued and was gradually challenged by other countries, especially China. At the present time, garment manufacturing represents a declining industry and will continue to shrink in the decade of the 1990's.

This paper examines the adjustments, changes, and fortunes of the apparel industry in Taiwan in the context of the evolving interrelationships of import supply and cost, manufacturing know-how, quality of production, import quotas, available production capacity and international economics and competition.

3:15 DIVERSIFICATION AND COCOA IN BELIZE. Michael Eich 217 Shideler Hall, Miami University, Oxford, Ohio 45056

The newly independent nation of Belize (1981) is severely economically underdeveloped. Historically the Belizean economy was based on lumbering, but this industry has all but disappeared. The agricultural sector has been dominated by sugar for the past thirty years, but recent lowering of market prices has been disastrous to this industry. The Belizean agricultural sector has suffered markedly in the past because of reliance on one crop. Diversification can protect the economy from total collapse in the future. One crop which has a role in the diversification of the Belizean economy is cocoa. It was originally grown by pre-colonial Mayan farmers in the area. Since 1977, Hershey Foods Corporation has owned and operated a cocoa farm which is located in the Sibun River Valley south of Belmopan and is over 1800 acres. Hershey has also implemented an educational campaign with the goal of expanding local cocoa cultivation. In this paper I will discuss botanical aspects of cocoa farming as well as world market trends. I will then discuss the effects cocoa has on the Belizean economy including local employment and possibilities for expansion in the future.

3:30 SOURCE AREAS FOR BLACK STUDENTS ATTENDING STATE-ASSISTED UNIVERSITIES IN OHIO, 1989. Joseph G. Spinelli and Bruce W. Smith, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403

Earlier studies undertaken by the authors using 1982 and 1988 data on all students attending state-assisted universities in Ohio revealed spatial patterns reflecting a distance-decay factor at work. Each university was shown to have a "core" hinterland and where it grew more than its proportional share of students. By using the same technique (a "market penetration index") for black students, the authors show that the prime hinterlands for Ohio's schools are more as clear-cut, mostly as a result of the small numbers of black students in attendance at the twelve institutions under study. A gain or loss of only a few black students from a particular county to a particular university can skew the results of the market analysis.

3:45 BLACK COUNTRIES OF THE WORLD: A PRELIMINARY GEOGRAPHICAL REVIEW. Thomas D. Anderson, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403.

This examination of countries with largely black populations is part of a wider study of prospects for greater democracy around the world. Black means Congoid in race and includes people with African and Melanesian origins. The racial proportions for each country are derived from CIA assessments. Countries with 40 percent or more black or black-mixed peoples number 64 countries and 12 political dependencies. The populations of these countries totaled 515,815,000, with another 1,317,000 in dependencies. These political entities are examined and classified on the basis of a number of characteristics. These include: location, area, racial and ethnic diversity, population total, infant mortality rate, language, percent of literacy, per capita GDP, date of independence, and type of government. Several generalizations are part of a brief summary.

4:00 THE GEOGRAPHY OF THE ATTAC descriptor. Virginia S. Kerkheide, 6099 Landers Road, Charmin Falls, OH 44022

The migration of Africans to the New World was begun by the Portuguese who had used Africans as slaves on sugar plantations on Madeira and Sao Thomé in the Atlantic and then extended the slave trade to Brazil. As the demand for sugar increased in Europe, and the native American labor was devastated by European diseases to which they had no immunity, the need for African labor was greatly accelerated. The majority of the slaves came from the West Coast of Africa, an area similar in climate to tropical South America. Further, Africans were a agricultural people skilled in field work and easily adapted to the cultivation of sugar, tobacco, indigo, rice, and cotton. From approximately 1600 to 1850, upwards of 12 million Africans were forcibly transported to Brazil, Northern South America, the West Indies, and the United States. The number of African immigrants outnumbered Europeans by a ratio of 2 to 1. The products of their labor contributed to the wealth of the planters and European manufacturers, and helped to finance the Industrial Revolution. A comparison of each of the slave areas as to conditions of servitude, slave uprisings and revolts, the establishment of runaway communities, and the events which led to emancipation reveals interesting contrasts, and sets the stage for the integration of persons of African ancestry into the economic, social, cultural fabric of the Western Hemisphere in the 20th Century.

G. Centennial Symposium

Forensic Sciences Symposium

Part 2 at 2:00 pm

SATURDAY, APRIL 27, 1991
Evans Hall Conference Room
Dr. James Y. Tong, Presiding

G. Centennial Symposium

Computers as Tutors at 9:00 am

SATURDAY, APRIL 27, 1991
Park University Hotel
Dr. Michael Klapper, Presiding

G. Chemistry

Only Morning & Business Mtg. at 9:00 am

SATURDAY, APRIL 27, 1991
Evans Hall Conference Room
Dr. James Y. Tong, Presiding

9:00 URINALYSIS FOR DRUGS IN THE WORKPLACE — MORAL AND EMPLOYER RELATIONS CONSIDERATIONS. Gary B. Sprague, Technical Support Inc., 234 Oakland Park Ave., Columbus OH 43214-4122.

Psychoactive drug abuse by the American workforce is
deprotonation reactions in the presence of displacement reactions; Ti-N group, amine metal amide complexes. More importantly, the coordination sphere about Ti can accommodate crystallography. The steric bulk of the t-Bu examples of organometallic early transition group is evident from both its orientation and characterized by NMR, FTIR, and X-ray, were prepared in 80-90% yield from R=H, CH₃.

These compounds stems in part from their being "drug-free". Unlike alcohol determination in biological samples, the confirmed positive results of urinalysis for drugs do not indicate impairment. Given the relatively low value of information obtained from testing, widespread use of urinalysis in the workplace raises ethical questions as to misapplication of chemical science in our society. Drug testing might undermine the mutual respect and personal consideration that is to be strived for in an employment relationship.

9:15 PRESSURE DEPENDENCE OF THE DOUBLE ACCEPTOR Ga₅⁻ AND RELATED CENTERS IN Ga-RICH GROWN GaAs. A. Kangarlu, H. Guarriello, R. Barney, University of Dayton, Department of Physics, Dayton, Ohio 45469-2314

Photoluminescence (PL) spectroscopy measurements have been carried out on LEC grown p-type GaAs under hydrostatic pressure. One of the samples, B, was intentionally Si doped. We observed peaks due to Ga₅⁻ in two samples, A and B, which were grown under Ga-rich conditions. In addition to that, in both samples another peak at 200 meV (in sample B) and 234 meV (in sample A) below the band edge has been observed at atmospheric pressure. The pressure dependence of all the observed peaks in both samples is measured. The analysis of the PL peaks indicates that the pressure induced shifts are linearly dependent on the energy separation from the GaAs I-conduction band edge. All the pressure coefficients are consistently lower for the deeper centers for pressures up to 1-X crossover. We believe that the two deep centers (200 meV and 234 meV) are associated with the Ga₅⁻ defects. Their pressure dependence indicates association with the GaAs I-conduction band edge.

9:30 TIME RESOLVED INFRARED SPECTROSCOPY USING A LINEAR ARRAY DETECTOR. Theresa Mooney, Hugh H. Richardson, Department of Chemistry Ohio University, Athens, Ohio 45701

A dispersive infrared spectrometer has been constructed which utilizes a 32-element InSb linear array detector to obtain real-time spectra. Spectra have been collected with 20 nm resolution and 1 cm⁻¹ resolution for a 4 μs collection period when using a 14 signal. This spectrometer is now being used to study the flash photolysis of acetonitrile. Gas-phase acetonitrile is photolyzed with a laser beam in order to obtain kinetic information of the CO formed.

9:45 SYNTHETIC AND REACTION CHEMISTRY OF (RC₅H₄)Ti(CD₅)₂(t-BuBH); R=H, CH₃; Dean M. Giolando, Lisa Graves and Kristin Kirschbaum, Department of Chemistry, University of Toledo, Toledo OH 43606-3390.

The title compounds, (RC₅H₄)Ti(CD₅)₂(t-BuBH); R=H, CH₃, were prepared in 80-90% yield from the reaction of (RC₅H₄)TiCl₂ and Li(t-BuBH), and characterized by NMR, FTIR, and X-ray. The steric bulk of the t-Bu group is evident from both its orientation away from the Cp ligand and that the coordination sphere about Ti can accommodate only a single t-BuBH ligand. Our interest in these compounds stems in part from their being examples of organometallic early transition metal amide complexes. More importantly, the variety of functional groups offers a rich reaction chemistry: Ti-CI group, nuclophilic displacement reactions; Ti-N group,amine elimination reactions; and H group, deprotonation reactions in the presence of other functional groups.

G. Chemistry

POSTER SESSION SATURDAY, APRIL 27, 1991 University Hall Lobby

Board I DERIVATIVE NEOPOLAROGRAPHIC DETERMINATION OF CHLORIDE AT A HANGING MERCURY DROP ELECTRODE. Otis Evans, U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268

The polarographic reduction behavior of chloride is investigated in Britton-Robinson buffer in the range of pH 3-12. The optimum pH for the determination of chloride is approximately 3.5 to 4.5. The peak potentials for the reduction of chloride at the hanging mercury drop electrode (HMDE) are an S-shaped function of pH. From pH 7.5 to pH 12.0 the polarographic peak potential is virtually constant at approximately -1.10 V vs. saturated Ag/AgCl reference electrode. The current response from pH 4-12 is also an S-shaped function of pH and is the sigmoidal complement of the peak potential pH curve. In addition to defining its behavior, chloride is determined in various aqueous solutions. The effects of metals, complexing agents and chloride dioxide on chloride determinations are presented.


Semisynthetic fluorohydrolases have been prepared by conformational modification of bovine pancreatic ribonuclease (RNase). After perturbing the structure of the protein by exposure to pH 3.0, RNase was modified with hexamethylphosphoramide (HMPA) followed by crosslinking with dimidates of various chain lengths. The maximum fluorohydrolase activity was measured when dimethyl pimelimidate was used as the crosslinker. This semi-synthetic enzyme hydrolyzed both phenylmethylsulfonfluoride (PMSF) and diisopropylfluorophosphate (DFP).

Board K EFFECT OF PH ON THE DEGRADATION OF ATRACURIUM. @ 10:00 David Balshas and John Lutton. Chemistry Department, Kenyon College, Gambier, OH 43022

The rate of degradation of atracurium, a non-depolarizing neuromuscular blocking drug, was investigated as a function of pH using reverse phase HPLC with fluorescence and UV detectors. Present evidence supports two possible modes of degradation: enzymatic hydrolysis by serum esterase or a non-enzymatic Hofmann elimination reaction. Both the rates of the esterase reaction and of the Hofmann elimination reaction were followed in model serum systems. At physiological pH, the observed rate constant for the esterase reaction was approximately four times greater than that of the Hofmann elimination reaction. However, at pHs below 6.6 or above 8.0, the Hofmann elimination reaction became the predominant mode of degradation of atracurium. In summary, the evidence supports the contention that atracurium is predominantly metabolized by an esterase mechanism and not by a Hofmann elimination reaction.

Board L IN VITRO FERMENTATION OF HIGH PROTEIN CONCENTRATES CAUSING BOVINE BLOAT. Lorrie Reeves, 10699 Payton Lane, Leesburg, Ohio 45135

Bovine feeding programs with little roughage have been tried with varying degrees of success. However, they all have been troubled with bloat and founders that are associated with high protein concentrate, low roughage Bovine diets. A three step experiment was conducted by in vitro fermentation using the natural digestive fluids collected from slaughtered bovine. Actual gases were produced and then measured by water displacement. First a control was established in order to determine the normal amount of gas produced in the rumen. Next three different ratios of cracked corn and high protein concentrate were
tested. The three different ratios are: one to four, one to seven, and one to twelve. In the last step, the results were compared. The results were surprising. The one to four and one to twelve ratios produced huge amounts of gas. Amazing enough, the test showed the one to seven ratio produced the best amount of gas. Possibly too much, as well as not enough protein could lead to excess gas production. The results are interesting and unexpected. Further research is needed.

H. Science Education
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 047
Rebecca Stricklin, Presiding

9:00 "JUMP-START" ELEMENTARY SCIENCE EDUCATION
Paul Cover, 392 Ridgewood Dr., Hilliard OH 43026

If your reliable, old car fails to start on a cold morning, you can appreciate the value of a transient burst of added energy. So it may be for elementary teachers who want to initiate "science literacy" in future scientists, or even voters.

Such bursts of energy from scientists may be recruited among local businesses. Many firms employ scientists and engineers. They are waiting for invitations to share their talents with school children. (A local example is the Columbus "Adopt-A-School" program.)

Most of these volunteer speakers have immense knowledge and are anxious to convey their enthusiasm for science and mathematics. This contagious joy (i.e., FUN) from creating new knowledge or structures is rarely revealed in the busy classroom.

However, with only brief responsibilities, these speakers may spark a rare interest for either the need or the pleasures of scientific literacy!

Please: Recruit evangelists for science!

9:30 SCIENCE & READING: IT'S IN THE BAG
Terressa Dennis and Arthur Vorhies
Ohio University-Chillicothe, 571 West Fifth St.
Chillicothe, Ohio 45601

To facilitate the teaching of hands-on science in the elementary school, a former fifth grade teacher and a university science teacher have created science learning kits for classroom use. Elementary teachers often feel uncomfortable teaching science and have difficulty integrating science with other disciplines. Each reading-science kit includes trade books, science activities, and materials related to a specific scientific concept. By using the kits, students are applying reading strategies and skills while learning science. The materials and activities included allow the students to experiment and see for themselves how the concept works.

In many cases elementary teachers are exposed to teaching science in one under-graduate methods course. Many science activities require materials that are not readily available in the classrooms. Although accessible and inexpensive, the materials require time to assemble. Often, with preparation in many subjects necessary, there isn't time to gather these materials and science becomes a textbook subject. With the reading-science kit everything is ready for the teacher and/or student to become an active hands-on science learner.

9:45 AN INNOVATIVE EXPERIMENTAL SCIENCE CLASS FOR GIFTED AND TALENTED STUDENTS
Miles Free, 275 Rustic Road, Chippewa Lake, Ohio 44215

Encounters in Experimental Science was developed to bring the fun and excitement of hands-on science experiments to the students participating in the Brunswick City Schools Pipeline for Gifted and Talented Program. The Encounter class gave the students the opportunity to demonstrate and prove scientific principles using commonly available materials such as string, beans bags, mousetrap, newspaper, yardsticks, steel wool, jars, balloons, rubber bands, toy cars, plastic straws, paper and Bart Simpson dolls.

Students created partial vacuums, made balances for comparing weights, and performed many other experiments.

Students enjoyed particularly making mousetrap powered vehicles, paper airplanes, and paper chromatography. Also a favorite experiment was a demonstration of seat belt effectiveness using an inclined ramp, a doll baby buggy, a rope tied to the axle, and the Bart Simpson doll.

A highlight of the class was the taking of high speed photos of balloons breaking.

Lesson plans, materials list, and a bibliography are available.

10:00 WOMEN IN THE SCIENCES - MARIELLA COLLEGE
George Benziger, Office of Continuing Education
Marietta College, Marietta, OH 45750-3031

In 1988 Marietta College, in cooperation with Marietta City Schools initiated a program called Women in the Sciences (WITS), which targeted high-ability female students and teachers of grades 5-12. About 101 students and 21 teachers participated in 8 day-long sessions, consisting of discipline-focused discovery labs and coordinated sessions on math, careers, and adaptive skills. The program was designed to enhance interest and skills of young females in science and engineering and contained the following elements: The use of math as a gatekeeping skill to science and engineering, a small-college setting, hands-on activities with in-depth science projects, and cooperative learning. A 1-year follow-up evaluation indicated noticeable impact of the program in interest in science careers and on skills used in math and science classes. In 1988-89 teacher inservice sessions on instructing females in science and math were held. Summer sessions for students in grades 5-9 were conducted in 1989 & 1990 and sustaining activities during the school year have been arranged. A recipient of two grants each from the Ohio Board of Regents and the M.H. Jennings Foundation, WITS was the 1989 winner of our outstanding non-credit programs from the North American Association of Summer Sessions, a two-time finalist in the education excellence award of the Consolidated Natural Gas Foundation, and a finalist in the Merck Foundation Centennial Award.

10:15 OHIO UNIVERSITY-CHILlicoTHE: A SCIENCE EDUCATION RESOURCE CENTER
Arthur Vorhies and Terressa Dennis
Ohio University-Chillicothe, 571 W. 5th St., Chillicothe OH 45601

As part of a strategic plan for Ohio University-Chillicothe to become a regional resource center, a science education resource center for area public schools has been developed with funds provided by an Ohio Board of Regents Academic Challenge Grant. The purpose of this science resource center is to provide area schools with a liaison from a major university, thus providing public schools and their faculty with shared expertise, equipment and/or supplies not normally within the budget of these schools. The focus of this science resource center is on elementary and middle schools. The purpose is to enhance science education by assisting faculty in these grade levels to prevent isolation, prepare discipline difficulties, and overall "educator burn-out" in the science areas. Major features of this program are: university faculty assistance to public school faculty, preparation of requested labs, weekly delivery, set-up and pick-up credit programs from the North American Association of Summer Sessions, a two-time finalist in the education excellence award of the Consolidated Natural Gas Foundation, and a finalist in the Merck Foundation Centennial Award.

10:30 THE MUSKINGUM COLLEGE EARTH SCIENCE FIELD EXPERIENCE, 1990
KOVACH, Jack, and Eric LAW,
Geology Department, Muskingum College, New Concord, OH 43762

In August 1990, with financial support from the Ohio Board of Regents, the Muskingum College Geology Department conducted a 10-day program (Earth Science Field Experience, 1990) in which 17 science teachers in elementary and secondary schools in southeastern Ohio were afforded the opportunity to obtain hands-on experience in geological field methods and to gain a better understanding and appreciation of the geology and geologic history of Ohio and the Appalachian Mountain region.
The program, modified only slightly from a similar, and very successful, program conducted in 1987, began with 2 days of classroom work directed toward review/overview and discussion of fundamental geological principles and processes and a summary of the geologic history of Ohio. The remainder of the program was conducted in the field during the course of 5 days of field trips in Ohio and a 3-day trip through the central Appalachian Mountains.

The overall evaluation of the program by the participants was excellent, and we were encouraged by participants to continue to offer programs of this or similar nature.

H. Science Education
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 051
Richard Benz, Presiding

9:00  SEEDLING GROWTH CAN BE MONITORED WITH A STUDENT-MADE BALANCE. Robert S. Platt, Dept. of Plant Biology, Ohio State Univ., Columbus, OH 43210.

There was a time when building your own measuring instrument was an important part of most scientific endeavors, but this art is different from the liberal arts curriculum, especially for non-science majors. The study of seedlings, e.g., mung bean sprouts, and growth controlling factors, e.g., light and nutrients, are opportunities for students first, to build their own analytical balance, and then to use it to measure plant growth under various conditions. A pedestal for the balance is a plastic bottle stabilized on a plaster base. The beam is cut from a thin wooden ruler 30 cm long, marked in millimeters. A fine sawing needle glued across the beam forms the fulcrum. Riders weighing 1, 2 and 4 gm may be cut from 12-gage Cu wire: 3.46 gm weight 1 gm. A can cut from thin aluminum is suspended by a 28-gage wire bridge. Sensitivity is controlled by the distance between the fulcrum and the center of gravity of the beam. With the fulcrum needle fixed near the top edge of the beam this balance can weigh up to several gm with a sensitivity near 1%. For larger weights (with larger riders) the sensitivity can be increased by adding ballast to the bottom of the beam. After taking aliquot fresh weights, the seedlings can be wrapped in Al foil, heated in an oven and weighed again to determine dry weights, which of course decrease for a week or more of "growth".

9:15  ECOLOGY SCAVENGER HUNT
Emily Rock, The University of Akron, Wayne College, 10470 Smucker Road, Orrville, OH 44667

The ecology scavenger hunt is an outdoor exercise designed for use in freshmen level courses for biology majors. The objective is to further student appreciation of the elements and organization of ecosystems. Students are given a list of terms taken from course lecture material. The exercise site is a rural setting with diverse terrain including several ponds. Students are allowed one hour to locate specific examples for 18 of the 22 terms. Answers must include a description of the example and the reasoning behind the choice. Collection of actual examples is also accepted. Students are encouraged to include a description of the factors contributing to the niche of any species of their choice. Terms used in the exercise will be provided to the audience. Supervision and grading of the exercise will be discussed.


OCEAN FOCUS is a 3-year National Science Foundation funded teacher enhancement program providing marine education study for 40 teachers each year in Northwest Ohio. A successful pilot project and needs assessment study demonstrated the interest among inland teachers for this marine study.

OCEAN FOCUS provides intense coursework in introductory oceanography-marine biology, marine closed-systems, summer field study at Lake Erie (Stone Lab) and the Florida Keys, and a curriculum development workshop. Each teacher set up a classroom saltwater aquarium and wrote a curriculum unit during their year of study. During the fall, the grant staff visited each classroom to observe how the teachers integrated their new knowledge into their curriculum. Continued interaction during the school year has provided numerous examples of this exciting infusion of marine science into inland classrooms.

Both the teachers and their students will gain an increased excitement about science through "bringing the ocean into the classroom." This project will contribute toward alleviating the critical shortage of qualified precollege science teachers as well as a critical lack of understanding of marine sciences among inland teachers.

10:00  USING EVERYDAY PLANTS IN TEACHING BOTANICAL PERSPECTIVES. George K. Rogers, Cox Arboretum, 6733 Springboro Pike, Dayton, Ohio 45449

Even the most prosaic of sidewalk, vacant lot, and streetside plants can demonstrate surprising and eye-opening aspects of the plant world. In virtually any setting inhabited with plants occur species useful for showing adaptations related to light & water needs, pollination, dispersal, competition & herbivory, symbiotes, succession, and additional ecological phenomena. Everyday species have intriguing histories in human affairs, or wonderous roles in medicine, or potential to cure, feed, fuel, or overturn the world. An alternative angle is to examine through environmentally attuned eyes human effects on the plants around us. This presentation supplies examples from commonly encountered plants in urban southern Ohio with the aim of offering teachers an enriched perspective on the weeds, shrubs, and trees in the schoolyard.

10:30  HOW NONFORMAL EDUCATORS WHO HAVE DEPARTED FORMAL INSTITUTIONS PRECEIVE THE SUCCESS OF SCHOOLS TO PROVIDE HANDS-ON SCIENCE. Betsy Feldkamp, 1438 Waterworks Road, Newport, Kentucky 41071

A national survey was given to nonformal educators who once taught in formal institutions on their attitude of the feasibility of formal institutions to provide hands-on science activities for students. There is a great deal of encouragement for formal institutions, public and private schools, to have these types of experiences to improve cognitive and affective learning. The results have been mixed. Many nonformal institutions, museums and outdoor education centers, etc. have proven success in providing hands-on science in exhibits, demonstrations, and classes. These teachers had the opportunity to observe both formal and nonformal systems in presenting science activities. The teachers felt that formal institutions did not allow sufficient preparation time, facilities, and administrative support. They felt hands-on was possible for formal institutions but not without vast changes in the system of teaching and administrative attitudes.

H. Science Education
First Afternoon & Business Mtg at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 047
Rebecca Stricklin, Presiding

2:30  CHEMCON: THE NEW CHEMISTRY CURRICULUM FOR YOU! STRICKLIN, Rebecca E. Oak Hills High School, 3200 Ebenezer Road, Cincinnati, OH 45248

ChemCon (Chemistry in the Community) is the new curriculum developed by the American Chemical Society and a team of teachers from around the country that is a new approach in both the content and methodology used in teaching chemistry at the high school level. Subject matter is taught around societal issues in a group decision making mode. Participants will practice one of the special activities and receive information on the other new aspects. This is a MUST for teachers who are considering adopting ChemCon or are looking for an STS curriculum. Special handouts, courtesy of Kendall-Hunt Publishers, will be available to participants only.
A heartbeat monitor can be built to interface an Apple computer in the science classroom. The sensor was put together simply by using a bioluminescence emitting diode, (LED) and a phototransistor as IR detector. By touching the sensor properly with a finger, heartbeat is detected by way of the pulsing capillaries inside the finger tip. Good data can be generated by viewing the waveform tracing of the pulse on the screen. Not only one records the heartbeat rate visually, but also one notes the variations in amplitude of the wave that reflects nerve impulses of the individual under test. This sensor can be introduced as an experimental exercise for the physics class while exploring electromagnetic waves and electronics. Biology students can be challenged to use this device testing subjects other than humans. The operation, two versions of circuit, assembly-language software, and the cost of this sensor will be presented and discussed. Our thanks to Dr. Lee Larson of Denison University for his advice.

The development of the hologram was made possible with the invention of the laser in the early 1960's. Holography is the recording, storage, and display of three-dimensional visual information using laser light. White light reflection holograms can be viewed using a bright white light source such as found in a classroom or laboratory setting. The observed reconstructed holographic images represent the exact optical equivalent of the objects originally exposed to laser light. Hologram produce images that distinguish depressions, grooves, or cavities from raised processes such as bumps, ridges, or hairs. Additionally, the hologram can reproduce the reflective or lustrous properties of a shiny surface structure, such as the iridescent markings of various beetle or butterfly species. The images can be examined with high limits under a stereomicroscope without any loss of image quality or spatial detail. White-light viewable holograms are a medium of display for educational purposes that can stimulate student interest in the biological and physical sciences. The utilization of holograms in educational settings can increase the students' "image enhancement" of the subject under study, as well as their appreciation for the anatomical and spatial relationship of identifiable features that characterize an object's structure and shape.

During each quarter, each student in the Life Science course, a component of Shawnee State University's 50 credit hour general education 'Core', has been required to participate in an class-wide data collecting activity, then refine the collated data and develop a three-part (one table, one graph or histogram, and one data presentation of their own choosing) data report which is graded and competitively evaluated for special award. The data collecting activity has changed each quarter; this has served to eliminate copying of past reports, adds freshness and originality to the activity for both students and faculty and emphasizes that real-life application of the scientific method is not something that is "cut-and-dried".

Mathematics should be a means of access to the sciences, not an obstacle. The state of mathematics and science teaching and learning in the schools of the United States is receiving national attention. The general population, as well as the professional engineering community, have become concerned that mathematics, if it is presently taught in most schools, is a barrier for students who wish to enter the fields of science and engineering.

In the traditional mathematics courses, instead of devoting time to learning concepts and ideas that can be applied to science, too much time and energy is expended teaching students algebraic manipulations. Assignments and exams too often depend on students' algebraic skills and not on their aptitude to analyze and solve problems.

Achievement in mathematics for science requires a minimum of two attributes - algebraic skills and the ability to think abstractly. The use of symbolic manipulators - graphic calculators and microcomputers lowers the bookkeeping details of algebra. Released from the burden of computation both teacher and student are able to concentrate their efforts on content, ideas, and problem solving.

H. Science Education
Second Afternoon at 2:00 pm SATURDAY, APRIL 27, 1991
University Hall 051
Richard Benz, Presiding
course will be a seminar in which students and faculty present and discuss topics such as: 1) evolution of human understanding and expression of the natural world, 2) form and patterns in landscapes, 3) form and function in the biosphere -- materials, role of fluids, and environmental adaptations, 4) patterns and processes in geologic materials, 5) interpreting the biogeochemistry with computers, 6) art in the service of science -- botanical, geological, and medical illustration, 7) arts in science education, 8) music, literature, and film in science, and 9) creativity: the process and the product. Names of students will research and communicate a scientific concept in an art form for show.

3:15 AN INTEGRATIVE, REQUIRED, UNDERGRADUATE LIFE SCIENCE COURSE: TWO YEARS OF EXPERIENCE. David Todd, Robert Deal, and Julia Basham. Division of Science and Mathematics, Shawnee State University, Portsmouth, OH 45662.

Shawnee State University has instituted a 50 hour general education requirement for all baccalaureate students. The core courses in this program are integrative in nature with emphasis placed on reading, writing, speaking, computing, and quantitative skills. In addition to these communication skills, the courses are integrated through the common use of the themes of global parameters, cultural contexts, ecological perspectives, ethical foundations, and aesthetic consciousness.

To achieve the above goals, the Life Science Core Course has actively involved students in: reading and discussing essays by Lewis Thomas, Aldo Leopold, and others; collecting, analyzing and presenting data from a variety of real world biologic phenomena using a variety of scientific instruments in both the lab and field settings; and hearing expert presentations from a diverse group of faculty. A combination of large group lectures and small group activities/discussions have been used to deal with the large number of students in the course and the effort to maintain an hands-on and minds-on approach. The course is evolving each quarter as a result of student feedback and efforts by faculty at refinement and improvement.

3:30 A HAZARDOUS MATERIALS MANAGEMENT PLAN FOR SMALL COLLEGES. Mary K. Linde, Ph.D., University of Texas Medical Branch, Department of Medical Technology, 11th and Mechanic Streets, Galveston, Texas, 77550-2774.

Few small colleges or two-year colleges have implemented plans to comply with EPA, OSHA, or state regulations concerning hazardous materials in campus laboratories. Yet, it is expected that by the end of 1991, all state education institutions will be regulated by standards equivalent to or more stringent than those of OSHA. Failure to maintain compliance with these regulations could lead to litigation. However, lack of funds and knowledgeable staff present major concerns for these small colleges.

In this paper, an overall Hazardous Materials Management Plan is reviewed for small colleges. The plan includes identification of responsibilities and liabilities, inventory of hazardous materials, disposal of non-essential hazardous materials, control of procurement, transport and storage, continuous monitoring, and education of personnel and students concerning hazardous materials.


More than 1300 businesses and industries were surveyed by a mailed questionnaire which asked their needs and opinions concerning a two-year Associate Degree program in environmental health/technology. More than 100 responded. Questions asked in the survey included the status of environmental health functions within their companies, the role their professionals have been trained, what post-secondary coursework was desirable in such a professional, and what sort of job availability and remuneration was expected in the Northeast Ohio area over the next five years. From willing respondents, a smaller committee of twenty representatives were invited to give further and in-depth help designing the program. This was done by means of a DACHR validation process of a proposed curriculum. The validation committee further pointed out that there are two sorts of environmental professionals needed—one to administer and ensure compliance with regulatory agencies such as EPA and OSHA, and another to do basic, hands-on testing and sampling of various types of environmental data on site at their facility. Based on this input, the authors have begun to design the degree program.

4:15 SURVEY OF CREDIT REQUIREMENTS IN SCIENCE COURSES AT AMERICAN BUSINESS SCHOOLS. Kenneth A. LaSota and Alan D. Smith, Robert Morris College, Department of Quantitative and Natural Sciences, Pittsburgh, PA 15219-3099.

The competitive advantage many other nations have in the high tech arena, has generated interest as to whether our nation's business leaders are adequately prepared to do battle on this high tech playing field. This report examines the number of science courses apprentice business professionals take during their undergraduate years. Though the number of college credits a student takes is not a direct barometer of their ability to function in their profession, studies focusing on credit requirements for training teachers, for example, have pointed into how teachers function once in the profession. To generate the data base for this study, a sample of 30 schools was selected from among 220 American undergraduate business schools ranked by the Gourman Report (Gourman, 1987). The schools selected were ranked 210 through 201, 100 through 91, 10 through one, and E and F tests were completed. No significant differences in science credit requirements were found. The average number of science courses for all three stratifications of business schools was a minimum of at least two required courses in the bachelor's degree. Nonscalable exceptions were MIT with 16.7 percent of degree program devoted to science courses in the business curricula.

4:30 ENHANCEMENT OF THE MATHEMATICS PROGRAM AT A TWO-YEAR COLLEGE. Monica L. Harrison, Wayne College/The University of Akron, Orrville, OH 44667.

As a branch of the University of Akron, Wayne College offers the first two years of mathematics and engineering courses taught at the University, as well as a remedial math and courses geared specifically for two-year Associate Degree programs. Over the past several years, many changes have occurred in the mathematics curriculum at Wayne College. Math requirements at the university level were stiffened and new courses put into place.

During the same time period, Academic Challenge Funds were made available to all two-year colleges. Wayne College successfully applied for funding for an enhancement of the mathematics program through the creation of a Mathematics/Statistics Center and the hiring of a coordinator. This service is in addition to the tutoring already available to students in the College's Learning Center.

The Math/Stat Center is currently working jointly with a Mathematics Advisory Committee (MAC). Tutoring, workshops, and supplemental materials are provided by the Math/Stat Center. Courses are reviewed by the MAC and the Math/Stat Center. This plan includes identification of responsibilities and liabilities, inventory of hazardous materials, disposal of non-essential hazardous materials, control of procurement, transport and storage, continuous monitoring, and education of personnel and students concerning hazardous materials.

4:45 USING SPREADSHEETS IN MATH AND SCIENCE CLASSES. Tim Vierheller, The University of Akron - Wayne College, 10470 Smucker Road, Orrville, OH 44667.

The use of computer spreadsheet programs in the numerical solution of mathematical problems was examined. These problems included differential equations and their various applications. These include the following: examining the viscoelastic behavior of a polymer under constant strain using the Voigt model and constant stress using the Maxwell model; a copolymer's composition dependence on monomer rate constants and feed composition; and the ecological predator-prey model of Lotka and Volterra.

H. Science Education

Third Afternoon (Symposium) at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 043
Dr. Clifford Schrader, Presiding
H. Science Education  
POSTER SESSION  
SATURDAY, APRIL 27, 1991  
University Hall Lobby

Board K  
@ 2:30  
THE USE OF ONE DAY AND THREE DAY DIETARY RECORDS IN COLLEGIATE CLASSES. D.M. Spillman.  
Nutrition and Food Systems, 164 McCaffrey Hall, Miami University, Oxford, Ohio 45056.

A set of forms has been developed to help students determine their dietary intake and habits. The forms, compiled by the student, help the individual to focus attention on the foods consumed, amounts and the time of consumption. As the student progresses through the forms, they calculate percents of energy nutrients, as well as units of vitamins and minerals and finally to compare their intake to the Recommended Dietary Allowances (RDA). Self evaluations are very positively reviewed by the students, who frequently modify their diets or habits due to this learning experience.

**A SET OF THESE FORMS IS AVAILABLE FREE TO ALL OHIO TEACHERS.**

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I. Anthropology & Sociology  
Only Morning at 9:00 am  
SATURDAY, APRIL 27, 1991  
Bricker Hall 385  
George DeMuth, Presiding

**9:00 BURNOUT, STRESS, COPING STRATEGIES AND HONOR: THEIR PREdictive RELATIONSHIPS IN SOCIAL WORKERS.** Huria Peet, Dolores Payne, Isadore Newman, Marvin Peet. The University of Akron, Departments of Educational Administration and Social Work, Akron, OH 44325-8001.

The study includes Field Instructors for The University of Akron, Department of Social Work and social workers in Social Service Agencies. The purpose of the study is to identify the relationship between Burnout, stress, and coping strategies and honor in social service workers and the intervention potential for administrators in planning staff training and development programs. A questionnaire was administered to the workers, which included the following instrument: Maslach - Burnout Inventory; Family Crisis Oriented Personal, Evaluation Scales (P-COPES); Rotter's Internal - External Locus of Control Scale; Rosenberg's Self-Esteem Scale, and Honor was estimated based upon 3 items from previous research.

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**9:15 A PARENTAL INCENTIVE PROGRAM FOR CINCINNATI PUBLIC SCHOOLS.** Frank T. Page. 3 West Central Oxford, Ohio 45056.

Little has changed over the last three decades in improving upward mobility for Cincinnati public-school children. The percentage of students progressing to the college level remains low, and dropout rates high. An analysis of data provided by Cincinnati Public Schools demonstrates that the lack of parental involvement in monitoring and participating in children's educations is one of the major factors in this unfortunate situation. A parental incentive program is proposed, using funds provided by Proctor and Gamble, that may provide a realistic solution to the problem.

**9:30 RESPITE CARE FOR FAMILIES: PROVIDERS AND USE - AN OVERVIEW.** William F. Laurie, 15787 Forest Hills Blvd. Cleveland, Ohio 44112

Respite care is a new and evolving service. Most respite care services are being provided by state agencies and national organizations through local service providers in the form of personal care, companionship, and sitter services. The federal role has been generally limited to demonstration programs and tax credits.

Program information at the national and state level was limited on program expenditures, numbers and characteristics of families served, and the need for services. However, state officials, service providers, and parents indicated that the demand for services exceeded supply.

Officials suggested improvements: (1) new funds should supplement not supplant existing funds, (2) states should establish local fiscal points for coordinating information and referral for services. Additional details will be presented on the 25 state survey and our synthesis of the literature.

**9:45 PROBLEMS WITH TWIN STUDIES**  
Timothy Coleman  
12770 Westchester Drive  
Pickerington, Ohio 43147

Twin studies promise to control genetic factors while environmental factors vary. Studies involving twins are appropriate experimental designs for sciences that deal with genetic and environmental problems. This study reviews the methodological design and implementation of these results. Twin studies are reviewed to describe these design problems. These problems are illustrated in a critique of studies in this area.

**10:00 LEAD POISONING TRENDS IN THE 20TH CENTURY**  
David Garber and Doreen Chamberlin Griswold  
4891 Clark Station Road  
Greenville, Ohio 45331

Lead poisoning is a disease that has affected both children and adults for centuries. While advances and discoveries have been made and programs implemented, the overall current status is far from satisfactory. The purpose of our study was to collect and analyze data from the 20th century in order to track possible trends of lead poisoning related to historical events that occurred in the United States. Methodology used was in the form of archival data recovery. An analysis of this data was then plotted on a time line against historical events. The on set of the study, we hypothesized that levels of lead poisoning would increase during time of war and industrial climate. Due to the lack of consistent statistics, we were unable to soundly determine if in fact true trends did exist.
Numerous explanations exist that describe adolescent alcoholism. Our research identified three major perspectives for describing the process of entry into alcoholism: Alcohoholics Anonymous, medical, and psychosocial. Literature that described each of the three perspectives differs in how it describes the process of becoming alcoholic. Our results indicate remarkable resemblance between the Alcohoholics Anonymous and medical perspectives according to the properties of statistical operations typify the joint surfaces of each group, and speak to the issue of size gradation between either bipeds or knuckle-walkers. Humans, chimps and humans. Furthermore, it places the suspensory knuckle-walking, or were they suspensory creatures? Did the ancestors of modern bipedal humans locomote by

There is a controversy which exists in paleoanthropology. Feeraan and Thomas Hammond. The University of Akron - Wayne College, 10476 Smucker Dr., Orrville, OH 44667

There is a controversy which exists in paleoanthropology. Did the ancestors of modern bipedal humans locomote by

2:00 "THE WESTERN LAKE ERIE ARCHAEOLOGICAL PROGRAM: A PROTOTYPE FOR THE FUTURE." Nancy Burnard. 103 Vanderbilt Road, Toledo, Ohio 43614

The University of Toledo and its Regional Archaeological Preservation Officer Program, in co-operation with students, community and avocational support groups, has established a highly visible and successful co-operative research and education program which is called the "Western Lake Erie Program". The research program at the University of Toledo, in co-operation with the Sandusky Bay Chapter of the Archaeological Society of Ohio, has in recent years established a model program emphasizing the integration of education and archaeological research. The University of Toledo graduates and undergraduate students, interested community members from northern Ohio and southern Michigan, and members of the Sandusky Bay Chapter have developed a series of programs dealing with field excavation, laboratory workshops, educational lectures and seminar sessions. Recently a co-operative "outreach" program has been established with the Port Clinton High School as a prototype for the establishment of Regional Archaeological Resource Centers. The involvement of community benefactors underwrites the program which encourages participants to extend their research across interdisciplinary lines.

2:15 "AN ARCHAEOLOGICAL IMPLEMENTATION OF THE TRIANGULATION MAPPING METHOD." Jeffery F. Scheff, The University of Toledo Archaeological Research Program, Toledo, Ohio 43606

Triangulation is a process of recording the positions of objects and feature areas in space. This method is especially useful in large areas where precise mapping equipment is lacking. It has recently been found useful as a time saving method in areas where large numbers of features are encountered. The process involves the establishment of two datum points in the field relative to a central fixed permanent datum. From these datum points, distances between each datum point and the feature respectively, are recorded. The resulting lists of numbers acquired in the field are converted to graphic maps using a compass and Triangulation has recently been implemented in excavations of the Peterson Site located in the Portage River valley of Ottawa County, Ohio.

2:30 MAGNETOMETER SURVEYS APPLIED TO PRELIMINARY INVESTIGATIONS OF ARCHAEOLOGICAL SITES IN NORTHERN OHIO Mark F. Zakrzewski, The University of Toledo, Toledo, OH, 43606

Several archaeological sites in northern Ohio have been surveyed with a proton-precession magnetic gradiometer. A magnetic gradiometer measures & records slight variations in the magnetic field near the archaeological sites. Archeological sites may be due to magnetic metal objects buried beneath the surface or other cultural features such as middens, fire pits, or disturbed soil. Such features can sometimes be detected because of their physical & chemical effects on magnetic minerals present in most soils.

Magnetic field surveys of archaeological sites are performed in a regular, grided pattern whenever possible. The data recorded are corrected for temporal variations in the earth's magnetic field and are displayed on a map of the magnetic field intensity. These contour maps can be directed correlated with site maps to assist the archaeologist in locating possible features at the site. In the least, they may be used to identify those areas where the probability of finding large features in the subsurface is low, allowing the excavation efforts to be concentrated in more promising locations.

This geophysical technique has shown promise in its ability to predict the occurrence of several archaeological sites in northern Ohio. Because of rapid data output, this technique may be especially applicable to sites that are in the process of destruction or to those sites where access is limited.

2:45 "THE WEILNAU SITE (UTER280), UNIT S4W3, FEATURE 1: A PROBABLE HABITATION STRUCTURE OF EARLY ARCHAIC AGE." Timothy J. Abel and James R. Haas The Western Lake Erie Archaeological Research Program at the University of Toledo and The Sandusky Bay Chapter, Archaeological Society of Ohio.

Excavations this past fall at the Weilnau Site (UTER 280), located on the Huron River in north-central Ohio, disclosed a large circular feature, surrounded by what are interpreted to be postholes. On the floor of this probable semi-subterranean structure, five projectile points and one surface hearth were found. Four of the five points resemble the St. Albans style common of the 9,000-
Woodland cultures in the Sandusky Bay area.

Excavations this past summer at the Seaman Site(33ER885), located on the Huron River in Erie County, Ohio, provide facts about this site and the Early Woodland Time period. More than 100 pits were excavated during two seasons of excavations, and these pits have proven to be used as storage pits. These pits along with the five Early Woodland houses, and two related drainage trenches, point to a year around occupation.

Intrusive mound: cultural intrusion or cultural continuity? David M. Stoffers (Ph.D.), Director, The University of Toledo, Archaeological Research Program, Toledo, Ohio 43606

Traditional, it has been argued that similar Late Woodland artifact assemblages associated with the Kipp Island phase of New York, the Wayne Mortuary Complex of Michigan and contiguous areas, and the Intrusive Mound Culture of Ohio and contiguous areas, represent the migratory spread of population segments which radiate outward from New York State, to outlying areas of the Northeast and Midwest, so far distant as the Eastern seaboard, the Ohio Valley and Indiana.

Based upon new and previous data an alternate interpretation is forwarded. Instead, it is suggested that these similar artifact assemblages resulted from pan-regional trade and exchange networks which cross-cut multiple archaeological phases, representing local populations who were contemporaneous, but biologically, linguistically and culturally variable and dissimilar. These exchange networks are suggested to represent a continuation and outgrowth from earlier Middle Woodland exchange networks.

Strength of ethnic identity in Southeast Asia: tests of the structuralist view of ethnic identity.

Omar A. Barriga, Dept. of Sociology, Ohio State Univ., Columbus, Ohio 43210

The structuralist view of ethnicity, as described by Hechter, proposes that ethnic identity is the result of the structural conditions of a given society. Two hypotheses that emerge from this position are 1) that the strength of ethnic identity is affected by the political/legal status of ethnic groups in a society, and 2) that different ethnic groups within a society have different levels of strength of ethnic identity. These hypotheses are tested using survey data on ethnic identity for college students in five Southeast Asian countries. The techniques used include analyses of variance and multiple classification analysis. The results are mixed yet interesting. The first hypothesis is supported for females but not for males. The second hypothesis is supported for males but not for females. These findings suggest that the influence of ethnic strength is conditioned by gender. Further studies need to be investigated further in order to develop a better understanding of the factors that affect ethnic identity.

Refugee movements: an exploratory analysis of the causes of, and problems related to data and measurement.

Susanne Schmeidl, Department of Sociology, Ohio State University, Columbus, OH 43210

This study is an exploratory analysis of the causes of refugee movements. Traditionally refugees were considered political refugees disregarding other possible factors causing refugee flow. Recent studies have criticized this monocausal view of refugee movements suggesting that they are caused by several factors. It is hypothesized that besides political indicators, economic and physical quality of life indicators are of importance in the emergence of mass exodus. Several zero-order and partial correlation analysis are conducted in order to test the hypotheses across time. The sample consists of 155 countries. The findings support the basic assumption that refugee movements are correlated with several political indicators. However, economic and quality of life indicators were also found to be important. Further, issues of refugee definition and the collection of refugee data are discussed.

Women working in a men's world: the experiences of female correctional educators.

Richard Tewksbury, Dept. of Sociology, The Ohio State University, Columbus, Ohio 43210

This paper explores the experiences of a sample of post-secondary educators in two close-security prisons in Ohio. Data come from in-depth, semi-structured interviews conducted with 17 female instructors. Analysis focuses on identifying patterns of experiences and perceptions regarding the role of inmate-students and correctional administrators, as well as how recognition of these perceptions contribute to the construction of experience. Results suggest perceptions of stigmatization from institutional authorities and high levels of appreciation and positive regard from inmate-students. It is the general belief of women working in this environment that they provide much needed elements of variation to the interactional experiences of incarcerated college students. Female post-secondary correctional educators report experiencing high levels of satisfaction with their jobs and student interactions, but stress produced by the environmental constraints and attitudes of correctional administrators.

Staying in school: assessing academic persistence beyond the sophomore year.

Canada Keck, Department of Sociology, Ohio State University, Columbus, OH 43210

This study tests a modified version of Tinto's (1987) model of departures from college in contexts where students are based on a survey of college sophomores at a large midwestern public university (N=463). Path analysis is used to explore a theoretical model of actual persistence in college and the sophomore year. Students who persist are compared to those who voluntarily withdraw. College GPA is found to be the best predictor of actual persistence, although social integration and faculty contact also have important influence. While this study found important gender, race, and socio-economic background differences in both integration into the university system and intentions to persist, there were no such significant differences in actual persistence. This theoretical model has been used primarily to explain withdrawal after the freshman year. Results of this study indicate that although this model works reasonably well to explain later persistence/withdrawal decisions, additional factors are possibly overlooked.
values were assigned to several possible policy alterna-
cations, with monetary reasons being second.

The purpose of this study was to explain
these differences in terms of the potential of state aquacul-
ture associations to influence state statutory and ad-
ministrative law. Influence was defined in terms of each
MATERIALS. Daniela Christopher. Wayne College, the
Ohio State University, 10470 Smucker Rd. Orrville, OH 44667.
A survey was conducted concerning attitudes toward house-
hold recycling of commonly discarded materials. It had
a series of closed-ended questions which included:
the amount of disposable garbage produced per household per
week, use of composting, and use and attitudes towards
disposable diapers. It also touched on opinions concerning
mandatory recycling, community recycling efforts, and rates
of participation of respondents. Seventy-five percent of the
people surveyed were college undergraduates, the
remaining were from the general population. Most people
(a range of seventy-seven percent) recycled at least one
item, with metal beverage cans being the most popular, next
was newspaper, then glass, then plastic. Unfortunately the
existence of community recycling projects was not as
high as individual recycling efforts. When asked their reasons
for recycling, most people cited environmental consider-
ations, with monetary reasons being second.

Harry Smith, Presiding
2:00 SECTION J OF THE OHIO ACADEMY OF SCIENCE: ITS
PAST IS PROLOGUE TO WHAT FUTURE? Sherman L.
West and Robert L. Vertrees, School of Natural
Resources, The Ohio State University, Columbus, OH 43210.
Thanks to Professor Ralph W. Dexter's "Conservation and the
Ohio Academy of Sciences-An Historical Review" (Ohio J. Sci.
62(5):274-280), we have an excellent record for the years
1981 through 1961 of the Academy's many accomplishments
pertaining to the science and practice of natural resources
conservation, policy, and management. Since 1950, many of
the Academy's endeavors along these lines have been under-
taken by Section J, entitled Conservation (1950-1986) and
Natural Resources (since 1987). Professor Dexter's article is
being supplemented and updated by analyzing programs of
the Academy's annual meetings since 1950 in order to reveal
characteristics and trends in the Section's activities such as:
the topics of symposia and contributed papers, the
academic disciplinaries or fields of study of those who have
presented papers, and the college, university, or other
organizational affiliation of presenters. Through this his-
torical overview, the authors hopes to stimulate and organize
discussion among Section members and other interested per-
sons of implications that the Section's past has to its pre-
sent status and future goals in terms of its unique and
prognostic role, the size and composition of its membership,
the types of symposia, papers, and other activities it should
courage, and other important matters.

2:30 ZEBRA MUSSEL (DREISSENA POLYMORPHA) MEDIA
COVERAGE: A CASE STUDY. David Toft, Division of
Science and Mathematics, Shawnee State University,
Portsmouth, OH 45662.
The recent zebra mussel, Dreissena polymorpha, introduction to
North America has created a great deal of media interest. This
case study examined coverage of the zebra mussel story from four
sources, national newspapers, national news magazines, local newspapers,
and national television. Comparisons of frequency and content of coverage
were made over a two and one-half year period beginning with the
initial discovery of the zebra mussel presence in Lake St. Clair during the
early summer of 1988.
Overall the zebra mussel story has been covered in an accurate and
scientifically correct manner. Local media coverage is more
significant than national coverage, with the story moving as the zebra
mussels colonize new areas. The coverage seems to be evolving
following a pattern: problems statement -> political involvement -> media
interest -> search for solutions. The newspapers tend toward single issue or
event coverage, while the magazines give broader and more thorough
coverage of the story. There has not been significant national
television coverage of this story.

2:45 CHARACTERISTICS OF CORPORATIONS THAT
UNDERWRITE ENVIRONMENTAL PROGRAMS
ON PUBLIC TELEVISION. Barbara K. Garnett.
The Ohio State University, 209 Ramseyer Hall, 29 W. Woodruff,
Columbus, Ohio 43210.
This study addresses the question of whether there are characteristics common to corporations that underwrite environmental programs on public television. The literature review indicated that there was significant research on corporate giving in general, but that almost nothing is known about corporate underwriting of environmental programs.

An operational definition of ‘environmental programs’ will be developed and corporate underwriters of these programs will be identified. A questionnaire will be sent to each corporation identified and will be completed by corporate social responsibility coordinators.

It is expected that corporations underwriting environmental programs on public television will, among other things, (1) have mission statements that include environmental objectives, (2) believe that environmental program underwriting is an effective way to communicate their corporate social responsibility, and (3) believe that such underwriting enhances their corporate public relations efforts. This study is expected to generate useful information for individuals and organizations interested in identifying new sources of corporate support.

A field experiment to study the establishment of forest stands on surface-mined land evaluated tree species (white pine and green ash), mineral soil types (topsoil and overburden), herbaceous species (grasses and legumes), time of seeding in relation to tree planting and use of chemicals to reduce herbaceous competition to seedlings. Survival, vigor, and annual growth of trees were measured over time in overburden and in topsoil. After two growing seasons green ash, which showed sensitivity to simazine, performed well (97.8 percent survival), but not white pine (36.3 percent). Cast overburden was suitable for establishing ash seedlings and seeded grasses and legumes. Herbaceous ground cover was greatest on topsoil plots but declined on standard graded plots. Herbaceous competition and mineral soil type were the most important factors affecting tree survival.

An ultra-violet (UV) method and a brucine method developed from published procedures were used to determine nitrate levels in river water. Nitrate and organic absorb at 220 nm, but organic also absorb at 276 nm and nitrate does not. Nitrate concentration was determined from a Beer's law plot constructed using standards. The absorbance was that at 220 nm minus the absorbance at 276 nm, subtracting out organic interference. Brucine reacts with nitrate to form a complex that absorbs at 410 nm. Nitrate concentration was determined from a Beer's law plot constructed using standards. The instrumental error for the UV method was 0.025 ppm, but procedural error derived from standards. The instrumental error for the RP4452A Spectrophotometer was 0.006 ppm for absorbance. Although the UV method had an instrumental error of 0.1 ppm, it was found to be highly reproducible. Brucine had an instrumental error of 0.022 ppm, but procedural complexity made it less precise. For the UV method, the average of samples from the Driftless River for October was 0.01 ppm, November-12.8 ppm, December-13.1 ppm. For brucine, the averages were November-12.07 ppm, December-12.67 ppm nitrate. This study shows the UV method to be a precise procedure for determining nitrate levels in Columbus rivers.

This paper explores the policy implications of global atmospheric change with a particular focus on the health impacts of climate change. Over the last decade, atmospheric scientists have developed models which indicate that emissions of gases such as carbon dioxide are changing the planet's climate. Recent studies suggest that a global warming of as much as 5 degrees centigrade may occur over the next 50 to 100 years. These changes may result in adverse impacts on human health. In particular, temperature-related illnesses such as heat attack and stroke may increase, respiratory disease patterns may change as the atmosphere changes, and infectious diseases carried by insects and other species may spread as the range of the carrier grows.

Environmental health scientists must carefully study these potential health threats. In addition, policies designed to reduce the possibility of such threats must be pursued.

K. Genetics and Cell Biology

Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
Townshend Hall 250
Mark Gorman, Presiding
consistent variation between the two species. This would enable a researcher to use a blood test to identify the canine species in question. Using specific stains for each enzyme, the following results were obtained. The three bands of PGI showed four to five cm. apart. PGM were observed. PGI was expressed in three bands, the middle band occurring much broader than the other two. Nearly a dozen bands were visualized for ICD. Aldolase showed three bands four to five cm. apart. PGI was expressed as a single band at about 13 cm from the origin. Towards the end of the study, coyote serum samples were run. Serum samples gave clearer banding patterns than whole blood samples due to dark background staining in the latter case.

9:45 ELECTROPHORETIC ANALYSIS OF POLYMORPHISMS OF HEMOGLOBIN, ALDOSE, LACTATE DEHYDROGENASE, ISOCITRATE DEHYDROGENASE, AND SORBITOL DEHYDROGENASE IN CANTS FAMILIARIS AND CANS LATRANS

Robert L. Schubert and Bonnie L. Lamvermeyer
Department of Biology, Denison University
Granville, Ohio 43023

Polyacrylamide gels (30.0% T, 2.00% C) were run in a Protean II electrophoretic apparatus at approximately 70 mA with 0.025 M Tris pH 8.3, 0.192 M glycine electrode buffer. Specific stains were used to expose the proteins in whole blood samples. Excellent results were achieved with lactate dehydrogenase, with Canis latrans samples (canines) displaying four bands with velocities in cm/hr of 0.31, 0.18, 0.07, and 0.31 centimeters per hour. While most Canis familiaris samples (dogs) showed only the three fastest bands, some dogs displayed a scarcely visible band even with the four and almost coyote bands. Two hemoglobin bands were found to move at 0.50 and 0.53 cm/hr in all samples. Aldolase and isoctrate dehydrogenase each migrated as one band in all samples. These moved at 0.07 and 0.19 cm/hr, respectively. Precipitation studies of sorbitol dehydrogenase showed three bands, 0.011, 0.015, and 0.018 cm/hr.

10:00 ANALYSIS OF ESTERASE, LEUCINE AMINO PEPTIDASE AND GLUCOSE-6-PHOSPHATE DEHYDROGENASE POLYMORPHISMS IN CANIS LATRANS AND CANIS FAMILIARIS

Christine R. Smith and Bonnie L. Lamvermeyer
Department of Biology, Denison University
Granville, Ohio 43023

It is hoped molecular analysis of proteins in the genus Canis can provide better resolution of the origin, distribution, and hybridization of dogs, Canis latrans, and coyotes, Canis ladins. The current method of classification, a morphometric analysis of twenty-five skull measurements to differentiate species is time consuming and requires that the animal be dead. Positive identification of captured predators is useful from a legal standpoint, assessing responsibility for damage, as well as a scientific one, enabling biologists to observe gene flow in populations over time. The amino acid sequence of lactate dehydrogenase, and glucose-6-phosphate dehydrogenase were investigated in a search for species-specific polymorphisms in dog and coyote blood. Molecular separation techniques included isoelectric focusing of proteins in polyacrylamide gels as well as SDS gel electrophoresis. A thorough literature search of esterase, for example, revealed no experimentation on canids, however, polymorphisms were found in other genera such as Alaria maritanae (flatworms), Artemia salina (brine shrimp), E. coli, horses, and chickens.

10:15 GENETIC VARIABILITY IN MEMBERS OF THE GENUS CANIS

Kevin S. Taches and Bonnie L. Lamvermeyer
Department of Biology, Denison University
Granville, Ohio 43023

A literature survey was performed to ascertain the current status of knowledge of genetic variability in four groups representing the genus Canis: dogs, coyotes, wolves, and jackals. We worked with protein polymorphisms of specific enzymes that have been completed on selected groups of Canidae. Specifically, our lab has investigated acid phosphatase, aldolase, esterase, glucose-6-phosphate dehydrogenase, hemoglobin, isocitrate dehydrogenase, lactate dehydrogenase, leucine aminopeptidase, phosphoglucomutase, 6-phosphoglugonate dehydrogenase, phosphoglucone isomerase, and sorbitol dehydrogenase in dogs and coyotes. This work was compared with the technique of divergence among mitochondrial DNA (mtDNA) sequences as inferred from direct sequencing as well as restriction site polymorphisms in jackals and wolves. Experimental work in our lab employed the polymerase chain reaction to sequence the 18s ribosomal RNA gene isolated from Canis familiaris and Canis latrans blood samples.
The bacterium Escherichia coli can grow over a wide range of external pHs (pH 5 to 9), while maintaining a neutral internal pH. The rapid response to extracellular pH suggests that the bacterium has an internal pH regulatory mechanism. A novel alkaline-inducible gene was previously identified in E. coli (Bingham et al., 1990) by screening Mu d1734 (lacZ') operon fusions. The gene was mapped at 57.5 minutes by P1 transduction crosses, and the locus was designated alx. The focus of this project was to further characterize the alx gene, and determine more precisely its E. coli map location.

A genomic library was constructed in Lambda EMBL3, which was screened for lacZ' clones using X-gal indicator. Southern blots of agarose gels of single and double restriction digests of alx clone containing the Mu d1lacZ' fusion were hybridized to a lacZ' probe. An approximately 6 kb EcoRI fragment containing alx was isolated. The EcoRI fragment will be used to probe known clones of the E. coli genome from 60 to 70 minutes.

In another experiment, ten secondary regulatory mutants of alx were isolated with MacConkey selective media. These regulatory mutants were found to be < 2% linked to the alx gene by TnlO::alx PI transduction crosses. The alx regulatory mutants will be further mapped by PI transduction and Hfr mapping.

K. Genetics and Cell Biology
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

§ 9:00 GENETIC MAPPING OF A RIBOSOME EDITING MUTATION BY CLONING OF RIBOSOME PROTEIN GENES INTO PUC18; B. McCaffery and R. F. Alkon.
Department of Biological Sciences, Ohio Northern University, Ada, OH 45810.

In E. coli, a ribosome editing mutation causes a decrease in protein synthesis accuracy and an increase in the affinity of the ribosome for peptidyl-tRNA. Although the mutation has been mapped to one of five genes contained in the S10 ribosome protein operon, the specific mutant ribosomal protein has not been identified. The purpose of this project was to clone fragments of the S10 operon into pUC18. If a recombinant pUC18 vector contained the wild type allele of the mutant gene, its introduction into the mutant strain would cause suppression of the ribosome editing mutation.

Monoclonal antibody MT2 reacts to an antigen present throughout the extracellular matrix of the blastema of regenerating limbs in both newts and Mexican axolotls. During regeneration, the MT2 antigen appears early in the blastema phase, is most abundant during the blastema phase, and then disappears as digits are formed in the late regenerate. In unamputated limbs, the MT2 antigen is found in tendons, peristeum, perichondrium, and as a layer under the epidermis. The MT2 antigen was extracted from the newt blastema using a digitonin buffer, and further purified by immunoprecipitation. In Western blots under nonreducing conditions the MT2 antigen is a large polydisperse substance with a Mr of approximately 1200 kDa; under reducing conditions the MT2 antigen is seen as a major protein subunit of approximately 1200 kDa, and can be used to detect low levels of secreted viral particles in culture medium (<2 x 10^7 viral particles / ml). This technique can be used as an easy and inexpensive method to screen cell lines producing replication competent or replication defective retroviruses.

M. Psychology
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 074
Robert Gandee, Presiding

This study investigates the following: are there alternative methods for grading that will improve estimates of student knowledge; is there...
a correlation between traditional grading approaches (right or wrong) and alternative procedures (partial credit); is there a relationship between alternative grading procedures and GPA; and are students who get feedback of the level of their understanding knowledge more likely to seek correct information.

9:15 GIFTED AND AVERAGE STUDENTS: COMPARISONS OF ACADEMIC BEHAVIORS AND ATTITUDES IN DIFFERENT CLASS SETTINGS. Laura Boester & Aaron Roy Psychology Dept., Ashland University, Ashland, Ohio 44805

Many studies have measured gifted and average students' academic attitudes (e.g., self-esteem) when in classes with primarily gifted or average peers, but few have specifically studied students' behaviors (e.g., asking class questions and note taking) when in different class settings. Forty college freshmen, divided into gifted and average groups on the basis of performance in high school gifted programs, were compared in their high school academic behaviors and attitudes in both gifted classes (with many bright students) and non-gifted classes (with many average students). Twenty-eight questions were read to each subject by an interviewer and answers recorded using a Likert system. Gifted students showed significantly more desirable academic behaviors when in classes with peers than when with average students. Average students reported no differences in behaviors or attitudes when with average or gifted classmates. Comparisons between average students in gifted classes and gifted students in average classes showed the average students to have significantly better attitudes (but without improved behaviors). This difference resulted from academic attitudes that increased in the average students and decreased in the gifted students.

9:30 CHANGES IN INTENTION TO GET A DEGREE DURING THE FIRST WEEK OF COLLEGE: Kate Heaphy, Robin Butler, and Sara Staats. The Ohio State University at Newark, Newark, OH 43055

While factors facilitating student retention have been actively researched, more than 50% of students who enter college still leave without receiving a degree (Astin, 1975; Tinto, 1978). The problem of attrition continues to be a major concern to institutions of higher education, and it is of great concern to students and parents who pay high tuition fees. The present study looks at several aspects of one such cognitive variable, intention to get a degree, in a within-subjects design. Students were surveyed the first week of the quarter and the ninth week of the quarter. At quarter's end 66 of the initial 92 students completed the survey. In terms of test-retest reliability, "intent to get a degree in six years" was most reliable (r = .78, p .001) and "intention to get a degree" was least reliable (r = -.31, p > .01) but the latter measure was most closely related to total points at the end of the quarter. Total points at the quarter end was weakly related to several other intent measures. Intention to get a degree was most related to expected grade in the course measured in the first week, and negatively related to satisfaction with life in general. Results of an intervention will be discussed.

9:45 FORCED RATING EDUCATIONAL REFORM IN THE U.S. Ralph F. Derr Jr. 301 Zook Hall, The University of Akron, Akron, Ohio 44325-4205

Since the mid-1980s when President Reagan first called for reform of the U.S. educational system, many forces inside and outside the educational establishment have conducted studies and proposed recommendations. While the Federal government has been reluctant to provide additional financial resources, various U.S. agencies have attempted to galvanize the states into action. Actual reform at the state level began in 1982 when the governor of Mississippi, signed House Bill 4. Neighboring states soon initiated similar omnibus educational reform acts. By 1987 most states had initiated some type of educational reform legislation. The 1986 Violence: A National/Personal Characteristics as they relate to coping strategies.

10:00 BURNOUT IN EDUCATIONAL ADMINISTRATORS AS IT RELATES TO COPING STRATEGIES: A SUGGESTION FOR INTERVENTION. Cynthia McMillin, The University of Akron, 410 Zook, Akron, Ohio 44325

Burnout is a syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment that can occur among individuals who do "people work" of some kind. Researchers postulate that "burnout not only entails loss on several levels, but is itself in part a response to it" (Price & Murphy, 1984, p.49).

To date the majority of burnout studies in education have focused on the classroom, special education and professional support staff. Studies are needed to focus on administrators, who not only supervise other educators but also provide direct service to students. Furthermore, worker burnout is a costly issue: high worker turnover and low productivity. A strategy to lessen this phenomenon is needed. (Maslach) In their various situations, administrators must develop effective problem-solving attitudes and behaviors which help them respond to the difficulties arising from "people work."

Using the Maslach Burnout Inventory and Family Crisis Oriented Personal Evaluation Scales, the inventory will determine if there is a significant relationship and/or interrelationship between administrator's burnout and organizational/personal characteristics as they relate to coping strategies.

10:15 UNIONIZATION AS A LEADERSHIP AND GOVERNANCE ISSUE IN HUMAN SERVICE ORGANIZATIONS. Robert Deitchman, Department of Social Work, U of Akron, Akron, Ohio 44325-8001

Persons with an internal locus of perceived control believe that what happens to them is to a large extent a result of their own actions (Rotter, 1966). Perceived control has been related positively to physical health, to emotional health, and to one's ability to cope with stress in a wide range of situations (Birren & Livingston, 1985). An increase in perceived control has been achieved in nursing home residents by giving them various responsibilities. However, few attempts have been made to increase the personal control in non-institutionalized older persons through training programs. The present research employed a post-experimental measure of unionization and reduced personal accomplishment that can occur among individuals who do "people work" of some kind. Researchers postulate that "burnout not only entails loss on several levels, but is itself in part a response to it" (Price & Murphy, 1984, p.49).

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10:30 INCREASES IN PERCEIVED CONTROL FOLLOWING TRAINING. Sharon Shook, Mary Lou Gambill, and Sara Staats. The Ohio State University at Newark, Newark, OH 43055

Persons with an internal locus of perceived control believe that what happens to them is to a large extent a result of their own actions (Rotter, 1966). Perceived control has been related positively to physical health, to emotional health, and to one's ability to cope with stress in a wide range of situations (Birren & Livingston, 1985). An increase in perceived control has been achieved in nursing home residents by giving them various responsibilities. However, few attempts have been made to increase the personal control in non-institutionalized older persons through training programs. The present research employed a post-experimental measure of unionization and reduced personal accomplishment that can occur among individuals who do "people work" of some kind. Researchers postulate that "burnout not only entails loss on several levels, but is itself in part a response to it" (Price & Murphy, 1984, p.49).

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Using the Maslach Burnout Inventory and Family Crisis Oriented Personal Evaluation Scales, the inventory will determine if there is a significant relationship and/or interrelationship between administrator's burnout and organizational/personal characteristics as they relate to coping strategies.

10:45 MEMORIC TRAINING EFFECTS ON OLDER ADULTS' RECALL FOR AN EVERYDAY TASK Sandra Caramela-Miller, The University of Akron, Dept. of Psychology, Akron, Ohio 44325

This study demonstrates the effects of imagery through increasing the contextual support in order to optimize recall of younger and older adults. Recipes were used as the everyday task and served to house list-learning (ingredients) in meaningful context (prose reconstructive
Adults, and a main effect of recipe condition was evident. Younger adults recalling more of the recipe than older adults. Younger and older adults utilized equal amounts of study time with a main effect of recipe condition. At one month recall of ingredients and there were no age differences found for errors during the recall of the entire recipe. The purpose of this study was to determine the effects of an active ingredient plus enactive encoding with the recall of the ingredients alone. Age groups performed similarly in reconstructive recall. During reconstructive recall there was no effect of recipe condition and older adults produced more errors. Both age groups produced the same amount of errors during 11st recall of ingredients. Younger adults recalling more of the recipe than older adults, and a main effect of recipe condition was evident.

M. Psychology
Only Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 074
Ralph Darr, Presiding

2:00 A TWO-ITEM (RETROSPECTIVE) INDEX OF THE QUALITY OF HYPNOTIC EXPERIENCES. George W. Handley and Roger A. Page, The Ohio State University/Lima Campus, 4240 Campus Drive, Lima, Ohio 45804.

Several previous studies in our research programs have obtained evidence suggesting that females are more accurate retrospective daters of personal events than males. Data from a recent diary study was used to more precisely determine the reasons underlying this superiority. The data suggest that the effect is likely due to memory processes, not to judgment or estimation processes. That is, when the event dates provided by subjects were inaccurate, both males and females were equally inaccurate. However, females frequency provided exactly correct date estimates than males. The results of a content analysis suggested that this female superiority persisted across event content domains, although there were a few possible areas of male dating superiority.


The purpose of this study was to determine the effects of instruction on ground reaction forces (GRF) in females 18-25 years that were aerobic dancers. Data were collected in the Motion Analysis Laboratory with all the subjects performing six selected dance steps to a standard cadence established by a video. The first set of six steps (Trial 1) was performed without prior instruction. A second set of the same six steps (Trial 2) was performed following instruction and practice using a proper landing technique. Proper landing technique involves the subject landing on the forefoot and coming down on the heels while flexing the knees immediately. GRF data were collected using an AMTI force platform at 500 samples per second for each of the dance steps in Trials 1 and 2. Peak vertical GRF were determined for each step in Trials 1 and 2. Lower GRF were noted in Trial 2. The growth of aerobic dance has been accompanied by an increase in dance injuries. Injury appears to be related to the design and conduct of the program. The implication of this study would support that proper landing instruction during dance routines may minimize the risk of injury.
in order to determine whether their profile differed from the norm, as defined by the California Personality Inventory, Rotter's Internal-External locus of control Scale, and Rosenberg's Self-Concept Scale. A general hypothesis was that there would be a significant difference between the scores of the adult children of alcoholics on the above instruments and those of the normative groups. It was also hypothesized that there would be not one, but multiple personality types which would be identifiable in this sample. It was expected that this information would generate additional research on ways to improve early identification and intervention for this population.

3:30 THE IMPACT OF QUESTION ORDER ON RESPONSES TO PERSONALITY TRAIT QUESTIONS ON THE TOMES: John J. Skowronski, W. Richard Walker, Thomas M. Ostrowski & Andrew L. Betz. The Ohio State University at Newark, Newark, OH 43055.

Two studies were conducted in which subjects first read an ambiguously hostile paragraph about a social target, then made trait judgments about that target. The order of the trait judgments that subjects were asked to make was varied. One group of subjects received the items in a randomly-generated order; a second group of subjects received the questions in a blocked order in which the hostile-related items (hostile, dislikeable, unfriendly) and the anti-hostile-related items (kind, considerate, thoughtful) were separately clustered at the beginning and at the end of the questionnaire; a third group of subjects received the items in a blocked order in which the hostile-related items were clustered with other evaluatively similar, but non-hostile items (kind, considerate, thoughtful, intelligent, interesting). Factor analytic results suggest that question clustering affected the social categories used by subjects to answer the trait questions. Results are discussed in terms of their implications for models of social category structure and use when personality trait judgments are made.

3:45 PERSONAL AGE, SELF-REPORTED HEALTH, AND OTHER MYSTERIES. Kathy Stubble, Christie Partlo, and Sara Staats. The Ohio State University at Newark, Newark, OH 43055.

Because chronological age is an imperfect predictor of human behavior, personal age, or how old a person appears to himself, has been proposed as part of an alternative concept, functional age. A measurement of personal age, the Ages of Me Scale, has yielded data indicating that how old one looks and how one feels are two fairly distinct constructs (Kastenbaum, Vorhein, Sabath, & Antl, 1972). The present research explores other correlates of personal age and self-reported physical health in a group of 249 non-institutionalized persons over 50 years of age. Chronological age was weakly related to all measures of personal age (r ≤ .15). How old one feels was the only item on the Ages of Me Scale that correlated significantly with all four measures of self-reported health. Mood, major life changes, daily uplifts and daily hassles yielded small or insignificant correlations with personal age and self-reported health for the total group. Secondary analyses on groups high or low in self-reported health indicated that age and sex are highly correlated with personal age (r ≤ .15). How old one feels is highly correlated with all measures of personal age (r ≥ .45). Implications for measures of functional age are discussed.

N. Junior Academy
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 038
Amy Elfner, Presiding

9:00 ADDITIONAL ANALYSIS OF THE EFFECTS OF DIFFERENT MASS MEDIA ON THE GROWTH OF A LICHEN SYNTHESIZED FROM SEPARATE ALGAL AND FUNGAL SYMBIOMTS. Amy M. Elfner. 29 Darlington Road, Delaware, OH 43015.

Growth trials have been conducted using a commercially available alga, Trebouxia ericia, and fungus isolated from the native Ohio species of lichen, Cladonia cristatella, collected in Delaware County. The objective of this project was to determine which culture media would produce the most effective growth of a lichen species. The hypothesis was that when the algae and fungi were combined they would grow together as symbionts most effectively on agar with no adding nutrients. Analysis was conducted using a compound light microscope with results recorded by color and black and white photographs. Results from repeated growth trials show that the fungal hyphae were closer together to the algal cells on pure agar than on agar aided by corn syrup. Thus the hypothesis was supported.

9:15 HERBICIDE TOXICITY. Margie Lhamon, 1126 State St., Lima, OH 45805.

This research tested the toxic effects of two herbicides, RoundUp and KleenUp. Experiments were conducted on three different organisms. An avian teratological experiment was conducted by injecting different concentrations of the herbicides into Ham Lophorn chicken eggs. The eggs were opened after 15 days of incubation. RoundUp caused an increase in fetus resorption and deformities, such as missing eyes and crossed-beaks. Deformities were not noticeable with KleenUp.

A microbiological experiment was conducted to determine the zones of inhibition around 6.9mm filter paper disks saturated with the two herbicides. This average zone of inhibition for E. coli treated with KleenUp was 7.18mm and 10.44mm for RoundUp. The average zone of inhibition for Saccharomyces cerevisiae treated with KleenUp was 7.28mm and 10.08mm for RoundUp. An EC50 experiment was conducted on Artemia salina. KleenUp was more toxic on the Artemia salina than RoundUp. The toxicity level data sheets provided by Monsanto were in close agreement with my experimental results. The EC50 for KleenUp at 40 hours was with a 3.2% solution.


This research was designed to investigate the biochemical mechanism behind inhibition of photosynthesis by the azide ion. Because photosynthesis was the structure of the pyrrole ring of chlorophyll A and thus interference with an electron during the light phase of photosynthesis. Chlorophyll A was isolated from the other breakdown products of the chloroplast by using petroleum ether as a nonpolar solvent that put chlorophyll A into solution, while a 95% solution of methanol in water, being slightly more polar than petroleum ether, put chlorophyll B, carotene and xanthophyll into solution. The resulting ether extract was washed repeatedly and the solid divided into three tubes and exposed to .5 and .05 molar concentrations of sodium azide and a control tube, respectively. These solutions in a 97% acetic acid-water solution were allowed to sit for sixty days, after which the chlorophyll A was extracted due to its higher solubility in petroleum ether than acetone and the resulting solution, free of free azide ions, was evaporated and the chlorophyll A was analyzed using an infrared spectrophotometer. The characteristic azide peak was detected, but the samples still showed chlorophyll A's characteristic red fluorescence, suggesting that the phytoester added not the pyrrole ring of the chlorophyll was affected.

10:00 THE INVENTION FOR PREPARING MICROSCOPE BLOOD SLIDES by Andrea Robin Tarrant; UPFR Spring '91; Geneva, Ohio WO1W

* have spent three years in research and development in creating a portable device that is faster and more efficient supplementary method to any other provided techniques of producing blood smears today. Examination of a smear of peripheral blood is one of the most informative and routine examinations laboratory procedure carried out day after day, in both veterinary clinics and medical hospitals. Such tests are used medically to analyze the morphology of the cellular elements contained within the blood itself. Therefore, acceptable blood smears are essential, for no degree of skill, or magnetic ability can interpret, or compensate for poorly made smear. The preparation methods available today are insufficient. Therefore, what have done is created two devices, one manual, and the other automatic, which both produce perfect blood smears every time, thus ending the frustrating, time consuming, and costly dilemma of today's practitioners.
This project's subject is the MCF-7 breast carcinoma cell line, initiated in 1973 by a research team at the Michigan Cancer Foundation with the support of the National Cancer Institute. The cell line has been used in hundreds of published and unpublished experiments around the world. Since then seven cultures of MCF-7 have been obtained from commercial sources by The Ohio State University's Department of Pathology. Each culture, after seventeen years of growth, has expressed one or more of the following differentiators: (a) morphology, (b) growth characteristics, (c) hormone receptivity, and (d) antibiotic resistance to adriamycin. In this project the four cultures were analyzed to determine their origin and genetic profile. To determine the origin, DNA analysis was used. To determine the genetic profile of each culture, DNA "fingerprinting" analysis, a viable method of identification and comparison, was used. To confirm controversial results received from commercial sources by The Ohio State University's Department of Pathology, each culture was analyzed to confirm the possibility of contamination with another cell line, initiated in 1973 by a research team at the Michigan Cancer Foundation.

This a new experimental design and use for the PCR, and the implications of this research are highly significant. One of the products being developed from this technology is a diagnostic reagent to be used for identification and comparison of DNA "fingerprints". The reactions were reversed, and the activity was used to confirm the results. DNA "fingerprinting" analysis is used to confirm the possibility of contamination with another cell line.

The Ohio State University's Department of Pathology.

CULTURES OF MCF-7 BREAST CARCINOMA CELLS. Ilea A. Mathis, Aaron S. Reames. 546 S. Madriver, Bellefontaine, Ohio 43311.

At the present time, biotechnology and genetic engineering are having a tremendous impact on society. One of the products being developed from this technology is plasmids containing specific genes encoding the production of specific proteins. In front of these genes are promoters controlling the amount of production that will occur. Promoters that allow for more rapid production of proteins could be a useful technological tool. Band, Yansura, and Benner at Genentech created two plasmids (pcpHP-3 and pCPP-4) which lack a promoter for a chloramphenicol acetyl transferase (CAT) gene. In front of the ribosome binding site of the CAT gene, they created EcoRI or BamHI sites for DNA fragment insertion. Following the CAT gene is an RNA terminator sequence for the facilitation of strong promoter isolation. Chromosomal DNA of E. coli and B. subtilis was cut by the enzyme corresponding to the specific enzyme site on the plasmid to be used. The DNA fragments were inserted into the plasmid using a T4 ligase and the activity level was detected by placing the cells which were transformed with the plasmids carrying the insert onto media containing different levels of antibiotics.

The highest level of activity was demonstrated in cells which carried pCPP-3 with fragments from B. subtilis.

N. Junior Academy
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 043
Heather VanBuskirk, Presiding

9:00 MAMMAL BLOOD SERUM EVALUATION: GEL CHROMATOGRAPHY AND CELLOULOSE ACETATE ELECTROPHORESIS. Amy Jo Roy, 917 Edgewood Ave. Ashland, Ohio 44805.

Baboon, cat, cow, dog, hog, and rat sera were passed through a gel chromatography column to see if the proteins would separate into bands. A 6.86 pH buffer was combined with Sephadex G-50 (medium) powder to form the gel used in the column. Each sample, which was combined with ninhydrin crystals, was run for approximately 30 minutes at six drops per min. Cellulose acetate electrophoresis, utilizing Sephrose III (celloose polyacetic) strips, was used to detect the proteins in the sera filtered for the chromatography column. An 8.8 pH buffer was used in the cathode chamber. Test runs lasted 40 to 80 mins. and then the Sephrose III strips were placed in a Fconeus s dye solution and three baths of acetic acid. In the chromatography column there were no individual bands of separated serum, only one continuous streak. During electrophoresis with sera that had been passed through the chromatography column, no bands were visible on the cellulose polyacetic strips, but when unfiltered serum was used at least two definite bands of separated proteins were seen.

9:15 SEROLOGIC EVIDENCE OF CRYPTOSPORIDIUM SPP. IN CAPRINE SPP. BY INDIRECT IMMUNOFLUORESCENCE

Rebecca A. Spore, 1332 Carriage Hill Court, Ashland, Ohio 44805.

Protozoan parasites of the genus Cryptosporidium cause a short-term gastroenteritis in several animals. In Ashland County, Ohio, there have been recent out-breaks of Cryptosporidiosis in the goat population. Although Cryptosporidium spp. was first discovered in goats by Raper (1909) using fecal smears, the diagnosis by serologic methods still had not been cited. This paper evaluates an indirect immunofluorescence test for the detection of antibodies specific to Cryptosporidium sp. It also demonstrates the presence of antibodies to Cryptosporidium spp. in different age groups in goat herds.

9:30 PRODUCTION OF THE BACILLUS THURINGIENSIS DELTA-ENDOTOXIN IN SACCHAROMYCES CEREVISIAE

Van Buskirk Benjamin Logan High School 6609 St. Rt. 47 E. Bellefontaine, OH 43311.

Bacillus thuringiensis is a bacterium that produces an insecticidal crystal protein during sporulation. This crystal, the delta-endotoxin, is toxic to many species of Lepidoptera which are serious crop pests. B. thuringiensis is an aerobe and does not grow well in oxygen depleted conditions. The yeast species Saccharomyces cerevisiae can carry out fermentative processes, produce a greater amount of the delta-endotoxin than the bacteri.

This paper deals with the construction of a plasmid which conveys both the gene for the delta-endotoxin and a sequence form B. subtilis. In the shuttle vector, the plasmid to be used. The DNA fragments were inserted using a T4 ligase and the activity level was detected by placing the cells which were transformed with the plasmids carrying the insert onto media containing different levels of antibiotics.

The highest level of activity was demonstrated in cells which carried pCPP-3 with fragments from B. subtilis.
was hypothesized that phenols that often form colored quinones can be converted into colored compounds by reacting with singlet oxygen. Therefore various phenols were used as substrates and were oxidized using Rose Bengal as the sensitizer. Singlet oxygen oxidations were performed with a separated surface sensitizer. The hypothesis was confirmed for 2,7-naphthalenediol. Kinetics analysis showed that color formation was directly proportional to illumination time up to 30 minutes, indicating that this change is a reliable and straightforward way to estimate the amount of singlet oxygen formed. The gas phase lifetime of the agent responsible for the color change in 2,7-naphthalenediol was determined by a distance dependence analysis agreement of the observed lifetime with that expected for singlet oxygen. Under these conditions it was confirmed that singlet oxygen is the agent responsible for the change in color in 2,7-naphthalenediol.

Graphoanalysis is the scientific study of analyzing one's handwriting in order to gain a better insight of this person and their true identity. The purpose of this project is to determine the practicality of graphoanalysis in our society through the use of adolescents (18 and under 21) and adults (21-34 and 35-80). Research included using 60 adolescents and 50 adults. The results indicated that a common level of accuracy within 5 percent of the other. From these results I have concluded that using graphoanalysis as an indicator of one's true identity is practical in our society today, especially in the business world as an indicator of an employee's true attitude and compatibility with other employees. It is also very useful in the court system as an indicator of the attitude of a client.

N. Junior Academy
Only Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 038
Ilia Mathis, Presiding

2:00  THE RISING CASPIAN SEA: OBSERVATIONS DURING A 1990 KARPATHOEXPEDITION. David M. Weaver, Westerville North HS, 950 County Line Road, Westerville, OH 43081.

The objective of this project was to document coastal geomorphic and sedimentologic response to rapid rates of sea-level rise on the Caspian Sea in order to better define characteristics of, and predict long-term consequences of, this process. During the first field season, August 29—Sept. 5, 1990, the team conducted a reconnaissance survey of three north and west basin islands in the Caspian Sea to evaluate the current geomorphic, sedimentologic, and stratigraphic framework. This involved two principal efforts: establishing an initial survey grid and reference system, tied into the local leveling datum (benchmark) for return surveys in future years; and classifying the 1990 coastal sedimentary environments through sampling, aerial reconnaissance, shipborne coring, and geomorphic analysis. Surveying entailed three groups, two onshore groups conducting transect surveys across the salient coastal environments to the open coast, and an offshore group with a fastboat underway and a shallow craft extending the survey transects to water depths of between 5m to 10m. The onshore party completed as many parallel transects as possible each day, all the while sampling the surficial sediments and classifying environments. Various levels of equipment intensive activities were possible, including gouge coring of littoral environments, subbottom acoustic profiling of offshore channels, and their column sampling for suspended sediment. Funded in part by a grant from TRW, Inc.

3:45  CAN A TURTLE BECOME A BIRD?
EXTENDING LOGO'S 2D TURTLE GRAPHICS TO A 3D BIRD GRAPHICS SYSTEM. Jonobie Dale Baker, 5525 Allyn Road, Mantua, OH 44255.

The programming language LOGO provides two-dimensional turtle graphics enabling a user to move a turtle in the plane and see the path of the turtle projected on a computer monitor. This work extends the turtle graphics of LOGO to three dimensions by allowing a user to move a bird in space and project an image of its flight from an observation point onto the monitor. The system is programmed in Apple IIc LOGO and uses mathematics to move a bird and provide a one point projection of the bird's flight path as seen from any observation point on the monitor. The system can be specifically used as an interactive tool for learning three-dimensional geometry and spatial motion. Earlier work by H. Regeini at M.I.T. approaches the extension in a different manner and fails to adhere to the LOGO philosophy in the commands and user interface as this project does.

4:00  ATOMIC SPECTRA I: MEASUREMENT OF THE ELECTRON SPIN-ORBIT INTERACTION IN SODIUM. Jeremy R. Riddell, 3254 Ferry Rd, Bellbrook, OH 45305.

When an excited outer electron in an alkali atom makes a transition from a higher to a lower energy level, the emitted photon energy is determined by the orbital change and whether or not the electron changes spin orientation. This creates what is known as spin-orbit coupling of the electron's orbital angular momentum, L, and its electron spin vector, s. In Sodium, two closely spaced lines are observed that have similar energies, called Doppler Fine Structure. A home-built grating spectrometer equipped with a special micrometer was used to measure wavelength and wavelength difference of six Sodium doublets. Micrometer values were converted into wavelengths by calibrating the spectrometer with Hg and Ne sources. The delta wavelengths of these doublets were then converted into wave numbers and compared with the theoretical separation according to the doublet separation equation:

\[ \Delta \nu = \frac{Ra(Z-S;)^2(Z-S;)}{\eta j(1+j)} \text{ cm}^{-1} \]

An average \(\Delta \nu\) of 16.8 cm\(^{-1}\) was measured, while the actual value is 17.17 cm\(^{-1}\) with an average error of 2.2%.

4:15  USING SOLAR CELLS TO RECYCLE ENERGY. Stanley Dickerson, Box 93, Scioto, Ohio 43988.

The purpose of my project was to show that energy can be recycled by using solar cells. To do this I took six semi-crystalline solar cells and placed them around a light in a hexagon shape. Then I inserted them into a circuit with a lead-acid battery so that the solar cells would charge the battery. To power the light I used another lead-acid battery. Once the battery was longer able to provide power to the light, I then switched power to the battery that was being charged by the solar cells. I covered the solar cells and light bulb with a light-tight box so that the solar cells would only be exposed to the light from the lightbulb. To record the information from my experiment I used a computer. I designed and wrote a computer program that would keep track of all voltages and amperages. This program also had an alarm which signalled that the light had gone out. I was able to show that it is possible to recycle energy with the use of solar cells. My experiment showed an increase in the voltage of the lead-acid battery charged by the solar cells. This increase averaged three millivolts. This method of recycling has an efficiency of about one percent, with the development of new materials it may be possible for the efficiency to increase.


Kepler's second law states that, "The radius vector joining each planet with the Sun describes equal areas in equal times." I hypothesized that if the Sun's gravitational pull on the planets were canceled, so that the planets no longer followed ellipsoidal orbits, that this law would still hold true. Using several scientific facts, and a geometric proof, I was able to prove my hypothesis correct.
Gregory Dante Roulette, 2966 Warrensville Ctr. Rd., Shaker Heights OH 44122

The effect of standing and sitting height on the ability to view a holographic image was tested. A test box which contained a hologram mounted at 30°, 130°, and 180° in relation to the fluorescent light was designed and built. 106 students from Shaker Heights High School were randomly selected for the test. The test box was placed 5.75 cm from the floor. The height of each subject standing and sitting was measured from floor to eyes. The subjects and chair were placed 160 cm from the test box. The results showed the average height of subjects viewing the hologram 130°- 177 cm, 180° - 164.7. The average sitting heights viewing the hologram at 30° - 155 cm, 130°- 180°, 126 cm. The following correlation can be concluded: The taller you are the more obtuse the angle at which the hologram must be mounted. The shorter you are the more acute the angle at which the hologram must be mounted. This information is significant because it proves height must be considered when designing a holographic product.

N. Junior Academy
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board A
ORAL TELESCOPING MOUTH-STICK. Mitch Hager.
2320 Cambridge Blvd. Columbus, Ohio, 43221

This project deals with the modification of a telescoping device invented by Arthur J. Cloran D.D.S. The device was created to help quadriplegics draw, write, type, and do many other things that they could not do otherwise without the telescoping device. The mouth-stick has a mouth-piece attached to a motor which can extend or retract by using one's tongue to flip a switch. However, this mouth-stick was created over twenty years ago and contained heavy, expensive materials that were considered very light and strong for the times. The mouth-piece design, stick materials, construction, microswitch design, and actual implementation will be included in the project. With the use of modern technology the mouth-stick can become the most usable device for the quadriplegics. The goal and purpose of this project is to design the lightest and easiest mouthstick to use by all quadriplegics at an affordable price. A lighter mouth-stick will enable the quadriplegic to use the invention with relative ease, making it more useful in everyday life.

Board B • VIDEO MANIACS. Joshua Scott Emmons, 2035 Buena Vista Dr., Coshocton, Ohio, 43812
2230 Cambridge Blvd. Columbus, Ohio, 43221

The question has been raised of possible harmful effects due to the long number of hours kids spend playing video games. I investigated three areas: eyestrain, stress, and reaction time. My research, which involved the playing of video games by individual subjects for a period of three hours, showed no increase in stress; no evidence of eyestrain in nine out eleven subjects, (when playing under proper lighting conditions); and an improved reaction time in the majority of the subjects.

Board C \ ARH CIGARETTE FILTERS REALLY EFFECTIVE? Shannon Pearson, 8633 W. State Route 163, Oak Harbor, Ohio 43449.

The purpose of this project is to determine the effect of cigarette filters in eliminating nicotine, tar and other harmful substances from entering the body. A clean cotton ball was pushed into the end of a syringe with clear tubing attached, and the narrow end of a tester was snapped into the syringe. A lit cigarette was placed into the opposite end of the clear tubing. The smoking process was simulated by squeezing the lung and repeatedly bringing the lit cigarette to the tubing until the cigarette was smoked. Like the cotton balls from the cigarettes with the filters removed, the cotton balls from the filtered cigarettes were also stained. This experiment proves that filters do not stop the harmful substances from entering the body because all cotton balls were stained.

Board D • EYE ACCESSING QUIES. Elisa Cello, 726 Glacier Heights, Youngstown, Ohio 44509

I did research in the field of Neurolinguistic Programming. My interest focused on a segment known as Eye Accessing Cues. The theory behind Eye Accessing Cues is that one accesses different parts of the brain with certain, specific eye movements. My intent was to prove or disprove this theory.

To do this, I created a questionnaire designed to force the subject to use six specific brain functions; visual remembered images, visual constructed images, auditory remembered, auditory constructed, auditory dialogue and kinaesthetics. I interviewed the subjects from this questionnaire. While testing, I observed and recorded the eye movements of the subjects. After the test, I graphed the times. The appearance and weight caused many quadriplegics to be turned away from purchasing the mouth-stick. But in this age of expensive materials that were considered very light and strong for the times, the mouth-stick was created over twenty years ago, and contained heavy, expensive materials that were considered very light and strong for the times. The smoking process was simulated by squeezing the lung and repeatedly bringing the lit cigarette to the tubing until the cigarette was smoked. Like the cotton balls from the cigarettes with the filters removed, the cotton balls from the filtered cigarettes were also stained. This experiment proves that filters do not stop the harmful substances from entering the body because all cotton balls were stained.

Board E • DOES A SURFACTANT CHANGE THE RATE OF?
Andrew R. Young
308 Cedar Brook Lane, Sandusky, Ohio 44870

Reaction between HCl and Mg?

Chemical reaction rates are ordinarily governed by four common factors: reactant concentration, environmental temperature, pressure, and surface area of reactants. PURPOSE: To determine whether a fifth factor, presence of a surfactant, alters reaction rates. MATERIAL AND METHODS: In the presence of anionic surfactant lauryl sulfate 0.01 g, a 2 cm surface area strip of Mg was immersed in 150 ml 0.75 M HCl. Hydrogen was collected in a eudiometer and timed. Five determinations were made; another five without surfactant served as controls. RESULTS: Virtually identical volumes of hydrogen were produced with and without lauryl sulfate. Reaction time increased by 25 minutes in the presence of lauryl sulfate, which created a large bubble or larger bubble over the Mg. CONCLUSION: Surfactant, a fifth factor, greatly influences (slows) reaction time in this experiment.

Board F • THE EFFECTS OF SMOKING ON THE CIRCULATORY SYSTEM. Mary K. Dennis, 6803 Sunray Ave., Cincinnati, Ohio 45230

In this experiment I charted and tried to understand the effects of smoking on the circulatory system. To do this I ran tests on my father for one week while he was still actively smoking. On the eighth day my results showed that he was still actively smoking. On the eighth day he quit smoking and I ran the same tests for another week. These tests included taking his resting heart rate and blood pressure, then having him run in place for two minutes. Immediately after, I ran the same tests and the results were back to normal. Once I had finished this experiment I compiled all of my information into graphs to show what I had done.

Board G • EFFECTS OF SOLID WASTE ON PLANTS USING MODEL LANDFILLS. Emilie Schmidt, 774 Ward Corner Rd., Loveland, Ohio 45140.

This project shows the effect certain kinds of solid waste (trash) can have on plants. I created mini landfills to show this. I used 2-liter plastic bottles with bottoms cut off, placed upside down in a stand. Each was layered with dirt and rock and each had a philodendron plant in an area placed under it. This was a model for each landfill. Two table spoons of tri-sodium phosphate was added to a second, 1/4 cup motor oil was added to a third, battery acid from a car battery was added to a fourth and the fifth had nothing added. Each had one cup water added every week. My hypothesis: soil with tap water only added and soil with table scrap food added would not affect the plant under it.
Soil with tri-sodium phosphate, motor oil and battery acid would be affected. The results confirmed the hypothesis. Plants under the landfill containing table sugar and music... water or other water were only not affected. Plants under model landfills containing battery acid, motor oil and tri-sodium phosphate died in the order listed. The project shows that some kinds of trash throw out can be harmful to our environment. This trash is placed in landfills and could be harmful our air, soil and water. This suggests we must find safer ways to dispose of trash, including recycling.

Board H

@ 2:30

TESTING THE EFFECTIVENESS OF COMMON BAR SOAPS AS COMPARED WITH A PRETESTED LIQUID HAND SOAP

Reid Perala - 600 Eastwood St., Geneva, Ohio 44041

I tested five commonly used bar soaps and one pretested liquid soap to determine their effectiveness as antimicrobial agents by culturing bacteria collected from my hands in petri dishes before and after washing with each test soap and comparing the amount and type of bacteria that grew.

I also cultured bacteria from each test soap to determine whether the soaps themselves were harboring bacteria. The procedure used included sterilization, contamination, inoculation, disinfection, reincultivation and incubation under strict controls.

I concluded that washing with any soap reduces the amount of bacterial growth on the skin's surface, however soaps containing bacteriostats are most effective.

Each of the bar soaps showed decreasing effectiveness in removal of bacteria in each successive trial while the effectiveness of the liquid soap remained constant.

I concluded that this decrease in effectiveness was due in all probability to contamination of the bars with bacteria during normal use. My research showed that the use of bar soaps is not only an ineffective method for disinfection of skin surfaces, but also washing with in-use bars may actually contaminate skin surfaces with microorganisms deposited on the bars during previous hand washings.

Board I

@ 2:30

"ARE YOU THINKING RIGHT?" Susan E. Collins, Route 1, Box 189B, Malta, Ohio 43758

To prove my hypothesis that "creative" people use the right hemisphere of their brains more, I did three experiments to establish which side of the brain the subjects were using and had each subject answer a questionnaire reflecting their occupations, hobbies, talents and experiences which involve the use of the right hemisphere of the brain. I tested 124 subjects ranging from elementary age students to teachers and other adults. Over three times as many "creative" people (artists, dancers, etc.) used their right hemisphere in the experiments. Interestingly, a connection also appeared between left-handedness and use of the right hemisphere of the brain. Thirty-five percent of left-handers tested used their right brain to do the experiments, while only 16.3% of right-handers tested used their right brain to do the experiments. Therefore, slightly more than twice as many, percentage wise, left-handers used their right brain in my tests. No significant difference was found in my test results in gender and use of the right brain. Only 2.4% more females than males, percentage wise, used their right brain in my experiments.

Board J

@ 2:30

CAN WHEY PROTEIN AND CMC BE USED AS A BINDING AGENT IN A GRANOLA BAR? Pam Daly, 4191 Greensview Dr., Columbus, Ohio 43220

The objective of this project is to discover a feasible high protein food source, that can be utilized to feed the increasing world population. Whey, a dairy by-product, was chosen because it is a superior source of animal protein with both nutritional and functional properties. My research focused on the application of knowledge acquired in the previous three years of research. My past research shows that whey protein enhanced growth 15.5% and has a P.E.R. of .152 on newly weaned rats. The ongoing research involves the recovery of a protein-hydrolysis complex from whey. The CMC will be used as a binding ingredient to form a granola bar high in protein and low in calories. My experimentation deals with extracting the whey protein using CMC, and determining an appropriate composition for a nutritional granola bar. After the amounts of ingredients are determined, I will find the correct proportion of base granola to water and CMC.
Experimental Investigation of the Turbulent Flow Development in the Entrance Region of a Curved Tube Using Laser Anemometry

R. S. Patem, Dept. of Biomedical Engineering, University of Akron, Akron, Ohio 44325. (Optical C. 35)
K. B. Chandran, D.Sc, Dept. of Biomedical Engineering, University of Iowa, Iowa City, Iowa

Details of the flow development in the entrance region of a circular cross-section 90° bend pipe with a curvature ratio of 0.1 were investigated. Components of the velocity in axial and transverse directions were measured by method of laser-Doppler anemometry (LDA) in five cross-sectional planes at 5, 30, 50, 70 and 90 degree angles from the planes of the pipe inlet at Dean number of 161. Results of this study show that when the curvature of the pipe was reduced from the secondary maximum at the plane immediately downstream of the entrance, the flow never becomes fully developed in the secondary flow. The shape of the velocity profiles as well as the comparison of the magnitude of the velocity fluctuations to the magnitude of the mean axial flow prove that the flow is indeed fully turbulent for this Dean number. These results do not support the existence of a four vortex flow. In planes parallel to the plane of symmetry at downstream positions near the inner bend, a double peak velocity was observed which is attributed to the fluid acceleration due to the re-entrance of the secondary flow to the core region.

10:15 AN OVERVIEW ON THE USE OF RECYCLED MATERIALS IN PAVEMENT CONSTRUCTION. Y. J. (Eddie) Chon, Department of Civil Engineering, The University of Toledo, Toledo, Ohio 43606.

The nation's aging highway and street systems will need major rehabilitation in the coming decades. In many areas of the United States, good quality road-building aggregates have become scarce. On the other hand, a huge amount of waste is generated every year. Many of the materials currently go into landfills such as used tires, glass, and plastics are potentially useful as roadbuilding components. Pavement recycling using existing materials has been used by several states. The use of rubber tires in asphalt concrete has shown to be beneficial in reducing its temperature susceptibility which causes low-temperature cracking. Glass, plastics, and fibers may be used as aggregate materials as part of the asphalt concrete. Research efforts are needed in evaluating the structural properties of the recycled materials and in determining the influence of using these materials on pavement behavior. More importantly, techniques that can economically incorporate recycled materials in pavement construction must be developed.

10:30 MEASURE OF EFFECTIVENESS IN TRAFFIC CONTROL THROUGH RUMBLE STRIP INSTALLATION. Jian D. Gupta, Associate Professor of Civil Engineering and Amit Kothari, Graduate Student, The University of Toledo, Toledo, Ohio 43606.

Rumble strip installations have been used in the vicinity of construction sites, approaches to toll plazas, curves, and intersections with inadequate stopping distance caused by vertical or horizontal alignment. The installation of rumble strips serve two purposes, one is to alert drivers of unusual or unexpected traffic conditions and the other is to help in speed reduction. At present there is no set policy standards on the design and placing of rumble strips.

A research study was sponsored by the Ohio Department of Transportation (ODOT) to design rumble strips and various other parameters associated with it. An evaluation of various designs was carried out through installing rumble strips in the field and measuring speed at the rumble strip installation locations.

The analysis of field data indicated that rumble strips do alert drivers. Speed reduction of 12 miles from the initial speed was observed within 300 feet of the first rumble strip pads. The speed was found to be greater than the larger number of pads, as errors in mean response time increases with increasing number of stimuli.

10:45 HIGH VOLTAGE TESTING OF BASEOUS INSULATION. Monir Ahmad, The Pennsylvania State University at Erie, The Behrend College, Station Road, Erie, PA 16563-1200.

This paper presents a new approach to determining impurities in gaseous insulation used for high voltage equipment. High voltage at high frequency when applied to a gas results in ionization and visible glow. Experimental results are presented showing that the intensity of glow depends on the nature and the amount of impurity. If the voltage is suddenly cut off, the glow does not stop instantaneously but, instead, decays to zero over a period of time—a phenomenon called afterglow. It is shown with the help of experiment that the lesser the impurity, the larger the intensity of glow. In addition to this, it is shown that the time of afterglow also decreases with the amount of impurity. A method has been developed for measuring these results for impurity assessment in the insulating gasses. It has been discussed that the method cannot only be employed for determining impurities in gaseous insulation but can also be used for impurity determination in the inert gasses used for other applications.
A generalized hypercube has \( n = 2^r \) nodes, where \( n \) is the dimension of the hypercube and \( r \) is the number of nodes it consists of. A binary hypercube is a special case of generalized hypercube with two processors in each dimension. In a binary hypercube each node/processor is connected to \( \log_2 N \) adjacent neighbors, where \( N \) is the total number of processor nodes in a hypercube. The maximal communication diameter in a hypercube comprising \( N \) nodes is \( \log_2 N \) as compared to \( N/2 \) and \( N \) in similarly sized rings and meshes respectively.

The analysis of various binary algorithms has been done to achieve efficient mapping on the hypercube. \( N \) operand binary algorithms can be done in \( \log_2 \) steps on a hypercube with many operations being done in parallel by the different nodes of the hypercube.

Fast Fourier Transform algorithm for the computation of Discrete Fourier Transform has been analyzed and its mapping on the hypercube is shown along with the speed up achieved in the process. The use of hypercube as a relational database engine is illustrated.

### 10:00

**SELECTING APPROPRIATE EXPERT SYSTEM APPLICATIONS IN THE SCIENCES**

John Duckin, Professor Electrical Engr.
The University of Akron, Akron, OH 44325

Interest in the application of expert systems in the sciences has been growing dramatically during the past decade. Systems have been built to aid engineers in designing electronic circuits, chemists in determining unknown molecular structures, and geologists with interpreting survey data. Other successful systems have been developed but all share one important point; the problem was suited to expert system application.

The history of expert system applications is filled with stories of both successes and failures. Reasons for past failures can often be traced to a misunderstanding of the capabilities and limitations of expert systems. An expert system is valuable tool, no better like any other tool. If misapplied failure is likely.

This paper provides guidelines for choosing appropriate applications of an expert system in the sciences. These guidelines can be used in evaluating a potential expert system project to maximize the likelihood of success. A general introduction is given on expert systems and discusses their value in the sciences. Reference is given to past projects and insight provided into potential future applications of expert systems in the area of science. The paper also provides particular recommendations to organizations considering expert system projects for the first time.

### 10:30

**ON THE HIGH RATE CODING AND DECODING BY USING THE PUNCTURED CODE**

Junghwan Kim, the University of Toledo, Dept. of Electrical Engineering, 2801 W. Bancroft St., Toledo, Ohio 43606

Tries to find an optimal code for the digital communication without bandwith expansion or extra power has been successful in finding the Ungerboeck's TCM code recently. This technique makes full use of the spacing structure of signal. However, the complexity in TCM code for higher gain turns out to be major drawback. The so-called puncture coding technique in a code rate \( r \) produces a fraction of the symbol generated by the rate 1/2 code, but utilizes the same decoder as the latter, with the deleted symbol replaced by erasures. The major advantage of the puncturing is that same decoder can be employed, virtually unchanged other than in its branch metric generation, which inserts erasures for punctured symbol. To obtain the simplified general code/decoder for M-ary signal, mapping the M-ary signal to binary codes then apply to the puncture coder and decoder. This combination can achieve both optimal signal mapping and simplest coding/decoding scheme as rate 1/2 code.

This paper describes the use of P.C. to operate and control the power distribution equipment currently in use. Several types of relays or programmable logic controllers which are being used for the control of power distribution equipment. The approach presented is that all of these devices can be replaced by a central controller which can be easily interfaced with a P.C. using a software technique. The basic functions involved in power distribution are described and classified into appropriate categories, and their implementation with a microprocessor is discussed to develop an efficient control system. The hardware components involved to compose the system are identified and the software required to operate, monitor, and control the system has been proposed. Modular design of hardware and software has been explained for easy expansion and modification to suit a desired application. The proposed scheme is highly reliable, maintenance free, and cost effective compared to the currently used methods.

### 9:15

**SECURITY CONSTRAINED OPTIMAL POWER DISPATCH USING NONLINEAR PROGRAMMING**

Tonic Ahmad, The Pennsylvania State University at Erie, The Behrend College, Station Road, Erie, PA 16563-1200

A simple decoupled approach to solving the overall optimal dispatch problem consisting of both real and reactive power has been presented. The overall problem is solved by sequentially solving two nonlinear subproblems for real and reactive powers separately. Coupling between the power system stabilizers by a simple technique which makes the sequential solution of the subproblems to converge to the solution of the original problem without the necessity of iterating with the load flow solution. The concept of approximating the Jacobian of decoupled equations with constant matrices is used in a general nonlinear optimization process. The decomposition into smaller subproblems reduces computer memory requirements and the use of constant matrices reduces computational time. Two types of objective functions have been discussed for the real power subproblem. The objective of minimizing the system costs for those cases is significant. Successful results on the IEEE 118-bus system have been obtained. A special purpose sparsity oriented code based on this method would produce very fast solutions.

### 9:30

**A CONTINUOUS-TIME SELF TUNING REGULATOR TECHNIQUE FOR POWER SYSTEM STABILIZERS**

Ahmad M. Farhoud, Adel A. Ghandour, Department of Electrical Engineering, The University of Toledo, Toledo OH 43606

A continuous-time self tuning regulator technique which employs a recursive least squares identification and an optimal control design is proposed. The proposed controller has flexible structure which can emulate many practically known structures with proven effectiveness such as conventional and decentralized stabilizers. The controller design is carried out by applying optimal output feedback design technique to the linear identifying model. A linear quadratic performance index is minimized using gradient and line searching techniques. The proposed method outperforms the fixed parameters conventional and the minimum variance stabilizers when applied to a simulated single-machine power system.

### 9:45

**REFLEXIVE MATRICES**

Javad Habibi and James Smith, Department of Math and Computer Science, Muskingum College, New Concord, Ohio 43762

An algebra \( A \) of \( nxn \) matrices over \( K \) is reflexive if every element of \( Mn(K) \) that leaves invariant subspaces of \( A \) is in \( A \). An \( nxn \) matrix \( A \) in \( Mn(K) \) is reflexive if the algebra generated by \( A \) is reflexive. The \( k \) th partial multipliencies of \( \gamma \) is reflexive with respect to \( \gamma \) in case \( k \gamma \geq 1 \).

**THE GAP OF THE GRAPH OF A NORMAL MATRIX.**

Javad F. Habibi, Department of Math and Computer Science, Muskingum College, Mead St., New Concord, Ohio 43762

The gap between two subspaces \( M \) and \( N \) is defined as the norm of \( P \) - \( Q \) where \( P \) and \( Q \) are orthogonal projection on \( M \) and \( N \) respectively. For a \( M \times N \) matrix \( A \) let the graph of \( A \) be the set of all \( (x, Ay) \), where \( x \) is the domain of \( A \). The gap between the graph of a normal matrix \( A \) with a subspace is \( \|A\|^{1/2} \leq 1 \).

### 10:00

**COMPUTER GENERATION OF CATALAN NUMBERS, C(n), BY DETERMINING THE NUMBER OF WAYS TO PARENTHE ALIZATION OF A NON-ASSOCIATIVE PRODUCT.**

Thomas Dosew, Dept. Mathematics, Ashland Univ., Ashland, OH 44805

The Catalan numbers, \( C(n) \), are generated in a variety of ways, usually either directly using binomial coefficients or recursively. Specifically, they appear in parenthesisning nonassociative products of \( n \) factors. We present here an easily programmable algorithm, with emphasis on the gap between successive zeros in a certain binary representation of \( C(n) \). All the different parenthesisings, thus yielding \( C(n) \) as a side result.
O. Engineering
First Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 114
Thomas Hartley, Presiding

2:00 CONTROL SYSTEMS THEORY AND APPLICATIONS AT THE UNIVERSITY OF TOLEDO. James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606-3390.

Control systems theory and applications are important areas of instruction and research in the College of Engineering at UT. Primary activity is in the 18-member Department of Electrical Engineering, where four faculty members constitute the Control group. The 1991-92 Catalog lists four undergraduate and eight graduate courses in control, with numerous additional supporting courses in mathematics and engineering departments. Recent activity has been stimulated by an OBOR Academic Challenge grant in Flexible Manufacturing Systems, shared with the industrial and mechanical engineering departments.

All BSEE students have one required course, Linear Feedback Control, which builds on prior courses in signals and systems. They may choose the Systems and Control specialty for their technical electives, selecting from Control Systems Design I and II, Robotics, and several related courses. Graduate courses include Sampled-Data Control, Discrete-Time Multivariable Control, Nonlinear Control, Adaptive Control, Control of Robotic Systems, Optimal Control Theory I, II and III, and many supporting subjects. Doctoral students may choose Control as one of their Comprehensive Exam areas.

Current research areas include optimal control of robotic systems, robust control design for discrete-time systems, stability and control of power systems, and optimal control of solar heating systems.


The Electrical Engineering Controls Program accounts for about 35% of the graduate student population within the department. Undergraduate students are first introduced to controls via classical and discrete-time control courses. Graduate courses may be taken either as post-baccalaureate or towards the Master's or Ph.D. degrees. A non-thesis Master's option is available. Assistantships are available for full-time students. Part-time students are encouraged to pursue research beneficial to their employer. Course offerings include system theory and simulation, adaptive, robust, nonlinear, optimal, and intelligent control, model reduction, and distributed parameter systems. An additional 10-15 control related graduate courses are offered in Electrical Engineering and other departments. Most courses are offered annually while special topics are offered on demand. Independent studies are also possible.

2:30 CONTROL SYSTEMS EDUCATION IN ELECTRICAL ENGINEERING AT THE OHIO STATE UNIVERSITY

Stephen Yurkovych
Department of Electrical Engineering
The Ohio State University
2015 Neil Ave, Columbus, OH 43210

This presentation provides an overview of control systems education within the Electrical Engineering Department at The Ohio State University. The Control Systems Group is comprised of eight faculty members who regularly teach undergraduate and graduate courses in the control systems area, with approximately 40 graduate student research and teaching assistants. Undergraduates take three courses in their core requirements: Signals and Systems I and II, and the Signals and Systems Laboratory. In addition, as senior electives, undergraduates regularly choose from a selection of eight courses in control systems (also available for graduate credit), covering topics in classical and modern control, digital control, nonlinear control, stochastic systems, and hands-on laboratory work in digital control systems. Advanced topics in Control Theory are offered in eight graduate courses, including linear systems theory, stochastic control, adaptive control, nonlinear and robotic systems, optimal control, large scale systems, advanced frequency domain design, and discrete event systems. As highlighted in the recent article "A Survey of Control System Education in the United States" (IEEE Trans. on Education, August 1990), the Control Systems Group in Electrical Engineering at Ohio State is among the leaders in the country in terms of faculty and numbers of MS and Ph.D. degrees produced annually (averages of 12 MS and 3 Ph.D.). This broad range of courses and active graduate program has placed the Control Systems Group among the leaders in the nation in control systems research productivity, with sponsored research programs for various organizations including NSF, NASA, AFOSR, DARPA, NATO, Livermore Labs, Sandia Labs, General Motors, Ford, and several others.

2:45 STOCHASTIC NOISE IN HIGHLY NONLINEAR CONTROL SYSTEMS. Faisal Abbas, The Pennsylvania State University at Erie Behrend College, Station Road, Erie, PA, 16563-0203, and C. Constantinides, University of Wyoming, Department of Electrical Engineering, Laramie, WY, 82071.

Very often in practical applications, the input to nonlinear control systems is unknown. This is due to the result of random forces acting on the physical system. Such examples are the flight path error of an aircraft caused by wind gusts, and the input results from the imperfect measurement of a physical quantity such as the position of a moving target as determined by radar. A number of design techniques to overcome this problem are available in control engineering literature; however, none of these methods mention the possibility that such stochastic sources could lead some systems to what is now referred to in literature as chaotic motion. In this work, the response of a feedback system to a systematic input corrupted by broadband white noise is heavily investigated on the digital computer. Initial numerical data show that different bands or random white noise, the time of corrupting the system with such noise, and the level of the noise play a drastic role in the behavior of such systems.

3:00 MATHEMATICAL MODELLING AND COMPUTER SIMULATION AND CHAOTIC THEORY. John Jones Jr., Air Force Institute of Technology School of Engineering Wright-Patterson AFB, 45433

The main purpose of this work is to treat the problems of mathematical modeling and computer simulation of dynamical systems which have applications in the fields of medicine, health science, computer science, engineering, mathematics, economics, game theory, population growth, ecology, biology, pollution, highway traffic, algae growth, tidal dynamics, fish harvesting, earth’s magnetic field changes, insect growth, modelling of diseases, etc.

The basic mathematical nonlinear systems of equations which contain multiparameters which must be determined in order to model such diverse systems will be considered. Processing on large scale computer systems is necessary in order to display graphics involved in the various simulations of these diverse areas of research.

3:30 A HIERARCHY FOR MODELING HIGH SPEED PROPULSION SYSTEMS. Tom T. Hartley, Department of Electrical Engineering, The University of Akron, Akron, OH 44325.

Advanced aerospace design concepts require propulsion systems which operate at very high speeds. These high speed propulsion systems are typified by supersonic inlets, ramjets, scramjets, and nozzles. Controlling these systems is a very difficult task. This is true, in part, due to the difficulty associated with obtaining an accurate, yet useful, model of the system. A modeling hierarchy is given below to help the propulsion system designer in choosing an appropriate model. All of the modeling methods are based on the 1-D Euler equations of non-viscous, compressible flow.

CFD/CFD Based Models:
- Large perturbation linear models, high order
  - High Accuracy: Implicit, Multidimensional
  - Medium Accuracy: Explicit Second Order-MacCormack, L-W
  - Low Accuracy: Split Flux(Steiger, van Leer), Physical Lamping
- Linear Models: Small perturbation, high order
  - CFD Based: Split Flux, Physical Lamping
- Approx Hyperbolic System Solution: Cole-Wills, Pade delays
- Exact Hyperbolic System Solution: Saranopoulos-Cole-Wills

Reduced Order Models:
- Of Nonlinear Systems: Methods not available
- Of Linear Systems: Balancing family, Hankel norms

This research supported by The Advanced Control Technology Branch, NASA Lewis Research Center via grant NAG 3-904.
Statistical gage capability (repeatability and reproducibility) studies were employed on a process experiencing high rejections for size. These studies identified weaknesses in the process gaging and allowed the justification of a higher resolution optical laser gage.

Manual tracing is prone to inconsistency and is too labor intensive to perform consistently to less than 6% of tolerance.

Three dimensional binary and gray scale mathematical morphology algorithms were developed to extract the porosity data from the original data. The CT data is transferred via the Ohio Academic Resource network to the Cray Y/MP at the Ohio Supercomputer Center where these algorithms are applied. Once the binary porosity data is extracted, connectivity analysis is performed to determine pathways of the porosity.

Three dimensional reconstructions of the casting with the porosity regions highlighted are computed using the animation production Environment (APE) developed by the Ohio Supercomputer Graphics Project. These renderings provide an easily comprehendible visualization to an expert observer using a workstation. However, this work was partially funded by the Cray Research Foundation.

Spatially-invariant image sequences occur in a variety of engineering and medical imaging applications, including multispectral earth satellite images, nuclear, x-ray, and MR medical images. Such sequences are obtained by the variation of some (spectral, temporal or parametric) property of the object or imaging system, such that the intensity (gray-scale value) of the features (but not the location) changes from image to image. For SI images, the spatial and sequential variation of each image formation component (feature or process) of the object or scene can be factored into the product of its spatial distribution (gray-scale map) and its variation (signature) over the sequence.

Spatially-invariant image sequences represent a method of compression of the original sequence of K images into a set of P images (where P is the number of image formation components). Then, the original sequence, or any filtered version or subset of the sequence can be reconstructed from the compressed sequence. Finally, the issues represented by image noise are considered, in terms of the effect on the identification of image component maps and on the reconstructed sequence.

The application of this filtering technique for industrial inspection applications.

Results of a recent study concerning the application of digital subtraction, a technique widely used in digital radiography, to magnetic resonance (MR) imaging are presented in this paper. By subtracting two echo images, the same anatomy under different imaging conditions, the final image will be a contrast-enhanced image of the anatomic structures, which may allow better tissue characterization and differentiation.

The application of interest in this study is the human brain. The goal is an MR image enhancement procedure, combining digital subtraction with existing image processing techniques, to improve the capability to reveal normal and abnormal anatomic structures and different pathologic states. The basic idea is that the noise in MR images may be worsened by digital subtraction unless other appropriate image pre- and post-processing is incorporated.

The results of this preliminary study show that the location of the suspicious tumor area can be enhanced and the contour of the tumor area more clearly outlined in the enhanced digital subtraction images of three different patients. Pseudo-color is also investigated for improved human viewing of the enhanced images.
This paper investigates the computational structure of several linear iterative algorithms for CT image reconstruction from projections by formulating matrix models of the algorithms. These models clarify the similarities and differences in the algorithms and in the respective reconstructed images. They also show explicitly the effect on the reconstructed image of the initial estimate and the projection data.

Another important result of these models is an explicit form for the final image obtained via each iterative algorithm. This form permits the comparison of these methods with each other and with the pseudoinverse solution. It also provides a computational alternative to the iterative algorithm, in which a (pre-computed) system matrix times the projection data vector gives in a single-pass calculation the reconstructed image equivalent to any number k of iterations (including the final image). Practical computational issues are also addressed. Current work involves the conversion of the single-pass alternative for actual CT image data from the industrial tomography unit of the Edison Industrial Systems Center.

O. Engineering
Third Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 151
Y. T. Hung, Presiding

2:10 DOMESTIC SEWAGE TREATMENT USING STABILIZATION FOND FOLLOWED BY NATURATION FOND
Alk-Hong Lee, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

A field study was conducted to evaluate the treatment performance of domestic sewage treatment plant using two stabilization ponds followed by a maturation pond. For the period of 1-year study, the overall removal efficiency of BOD (biological oxygen demand) was 61.9% and 76.8% for stabilization and maturation loading increased. The overall SS (suspended solids) removal efficiency was 39.60 and 50.46%, respectively. The ammonia nitrogen removal efficiency was 39.60 and 79.78%, respectively. The ammonia nitrogen removal efficiency was 39.60 and 79.78%, respectively. The TOC removal efficiency varied from 35 to 50% for continuous flow. The TOC removal loading equations at 24 hour were designed to treat high, medium, and low TOC (total organic carbon). Beer yeast was used as yeast culture in the reactors for conversion of organic to yeasts. The TOC removal efficiency varied from 35 to 50 % for control reactors. The total suspended solids removal was from 30 to 40 %.

2:15 INDUSTRIAL WASTE TREATMENT IN MALAYSIA
Alk-Hong Lee, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

In Malaysia, most industrial plants have a great deal of problems treating their wastes. These plants include palm oil mills, pulp and paper mills, textile plants, food processing plants, and many others. In various industries, two thirds of the plants produce waste during their operational processes. The types of wastes produced were classified into solids, liquids, and gases. With the types of industrial waste, aerobic and anaerobic wastes are most commonly treated (%0) comparing to the solids (%50) and liquids (%40) wastes. Most of the plants know how to treat their wastes to meet the Malaysian Environmental Quality requirement. The need of upgrading current knowledge of techniques used in industrial pollution control is emphasized.

2:30 WASTEWATER TREATMENT WITH SAWDUST. Venkateshwar Rao Durgan, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115; Ruth Yu-Li Yeh, Chemical Engineering Department, Ming Hsin Engineering College, Hsin Chu, Taiwan.

The objective of the laboratory research is to determine the effectiveness of sawdust in removing TOC (total organic carbon) and turbidity from potato wastewater and in increasing light transmittance for dye wastewater. Types of sawdust used included red oak and white oak. For potato wastewater treatment, sawdust addition decreased turbidity, especially for high strength potato wastewater. However, the reduction in TOC was insignificant. For dye wastewater treatment, sawdust of red oak is effective in increasing light transmittance for direct-blue CI-78 dye, but is insignificant for other types of dyes such as acid red, basic red, disperses red, direct yellow and basic yellow. It also decreased pH from 8 to 3.

2:45 WASTEWATER TREATMENT BY SAND COLUMNS WITH BIOAUGMENTATION. Ganesh Patoli, Yung-Tse Hung, Howard H. Lo, Civil Engineering Department, Department of Geological Sciences, Cleveland State University, Cleveland, Ohio 44115

A laboratory study was conducted to determine the feasibility of using sand columns with bioaugmentation for treatment of potato and sugar wastewaters. Four continuous flow sand columns were designed to treat potato wastewater. Two sand columns were without bioaugmentation and used as control columns. The experimental parameters were bioaugmentation conditions and hydraulic detention time in the columns. Results indicate that up to 90% removal was achieved in sand columns with bioaugmentation. Biostabilized sand columns had higher suspended solids reduction over the control columns and achieved 70 to 95% reduction. Bacterial population depended on the organic content.

3:00 POTATO WASTEWATER TREATMENT BY YEAST PROCESS. Srinivas Seela, Yung-Tse Hung, Howard H. Lo, Civil Engineering Department, Department of Geological Sciences, Cleveland State University, Cleveland, Ohio 44115

The laboratory study was conducted to determine the effectiveness of yeast process for treatment of potato wastewater. Eight reactors of different diameters were employed to determine the effect of yeast process with different operational factors including hydraulic detention time, type of filter media, and strength of potato wastewater. Two reactors were operated as control reactors. Two types of filter media used included plastic ring and stones. The wastewater strength was high included 1000, 600, and 200 mg TOC (total organic carbon). Yeast was used as yeast culture in the reactors for conversion of organic to yeasts. The TOC removal efficiency varied from 35 to 50 % for control reactors. The total suspended solids removal was from 30 to 40 %.

3:15 OPTIMAL OPERATION CONDITION OF POTATO WASTEWATER TREATMENT IN THREE STEP BATCH TEST. Nian-Fa Tang*, Yung-Tse Hung**, Howard H. Lo**, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115; Ohio Environmental Protection Agency, Twinsburg, Ohio 44087

Batch reactor study was conducted to determine the optimal operation condition of potato wastewater treatment by yeast process. In the first step batch test, 9 reactors were operated under design condition. Linear equation was calculated for every sampling time and measured item. The analyzed results of 24th hour was used to compute the step length, and to design the second step. Two reactors were used in the second test. Temperature, pH, TOC (total organic carbon), and TSS (total suspended solids) were selected as variable factors in the tests of first and second step. Two levels of every factor were designed and were designed based on the results obtained from the first and second step test. The third step test was conducted under two variable factors condition, pH and temperature. Results indicated that TOC removal loading in the first test was 37 C temperature, 3.7 pH. The TOC removal loading equations at 24 hour in the first step test and the third step test were determined.

3:30 AEROBIC YEAST BENCH TEST UNDER SPECIAL CONDITION. Nian-Fa Tang*, Yung-Tse Hung**, Howard H. Lo**, Ohio Environmental Protection Agency, Twinsburg, Ohio 44087; Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

An aerobic yeast bench test was conducted using the best condition found in the three step batch tests. Temperature was 37 C, and pH to 5. Three different volumes of reactors were arranged in a thermal water bath. Three reactor runs were designed to treat high, medium, and low TOC (total organic carbon) concentration potato wastewater. Test results indicated that aerobic yeast process can be applied to pretreat high concentration potato wastewater. TOC removal efficiencies were from 85.4 to 87.7 for an influent TOC of 1742 mg/l and hydraulic detention time of 6.3 to 24.6 hours. There was no significant difference of TOC removal efficiency at different hydraulic detention time. High influent organic removal rate in the system building. The effluent total suspended solids (TSS) in shorter hydraulic detention time reactors was less than that for longer hydraulic detention time reactors. Linear relationships and equations were found between TOC removal loading and effluent TOC, influent TOC and hydraulic detention time respectively.
TWO-STAGE ANAEROIC-AEROBIC PROCESS FOR MILK WASTEWATER TREATMENT. Jerry R. Tariessa, Yu-ming Hung, Wong-TseHung, Ming Hsin Engineering College, Hsin Chu, Taiwan. **Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

This bench-scale laboratory study was conducted to examine the effectiveness of two-stage anaerobic-aerobic lagoon process for milk wastewater treatment with bioaugmentation. The two-stage reactors consisted of three pairs of reactors with HRT of 5, 10, and 15 days. Bioaugmentation was applied to one reactor of each pair in both stages. The two-stage systems were fed with synthetic milk wastewater of TOC (total organic carbon) of 40 mg/l. Results indicated that two-stage systems achieved over 96% TOC removal. The systems with media addition achieved over 99% TOC removal. Media addition improved TOC removal of anaerobic reactors of about 16.4%. Bioaugmentation improved the stage 2 TOC removal efficiency by 9.2% in low organic loadings.

4:00 BATCH REACTOR STUDY ON BIOAUGMENTATION EFFECTIVENESS. Tong Yu, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115.

A batch reactor experiment was conducted to determine the effects of bioaugmentation on the conversion of insoluble, macromolecular organic materials in wastewater into soluble small molecular organic materials. The starch, soy bean, and cheese, representing three main components, carbohydrates, protein, and lipid in general organic wastewater, were used as organic food sources for microorganisms. The bioaugmentation products (LLMO) used in the study were C-1 and C-2. The experiment lasted for 48 hours. LLMO S-I had better performance than LLMO G-I. But neither S-I nor G-I showed any distinct advantage for removal of TOC (total organic carbon) or COD (chemical oxygen demand) from starch soy bean or cheese wastewater if comparing them with bacteria existing in wastewater treatment system naturally.

4:15 PHENOL WASTEWATER BY BATCH ACTIVATED SLUDGE PROCESS WITH BIOAUGMENTATION. Tong Yu, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115.

Batch activated sludge experiment was conducted to determine the effect of bioaugmentation on the biodegradation of phenol wastewater. Three types of LLMO (bacterial culture product), a liquid mixed culture bacteria system, were used in the study. Phenol concentration in the wastewater varied from 3.6 to 189.9 mg/l TOC (total organic carbon). Activated sludge was added in one of the control reactors. Both experimental and control reactors were aerated for 7 days. Activated sludge played important role in removing phenol from wastewater. There was no significant difference in phenol removal between the experiment and the control reactor without activated sludge addition. There seemed no advantage in bioaugmentation with LLMO when comparing it with the bacteria existing in the activated sludge reactor with respect to phenol removal.

4:30 METHANE GENERATION AND RECOVERY FROM LANDFILLS. Majid Zarrinifar, Yong-Tse Hung, Ruth Yu Li, Ming Hsin Engineering College, Hsin Chu, Taiwan.

In recent years there has been a growing interest in the generation of landfill gas. Trend towards regionalization of disposal sites has resulted in development of landfills in metropolitan areas where substantial quantities of refuse can be deposited to great depths. In methane formation process, stabilization of organic wastes is carried by microorganisms under anaerobic conditions. Anaerobic decomposition is a two-stage process. In the first stage, complex materials such as cellulose, fats, proteins and carbohydrates are hydrolyzed, fermented and biologically converted to simple organic materials by a group of facultative and anaerobic bacteria, the acid formers. During the second stage, anaerobic materials consumed by anaerobic bacteria and converted into methane and carbon dioxide. The methane production is a function of quantity of refuse deposited as well as other factors such as moisture, moisture content, pH. Large regional landfills represent prime candidate for gas recovery.
Little is known about the premigrational movements of locally fledged juvenile waterfowl. To determine juvenile waterfowl dispersal patterns, I fitted local juvenile wood ducks (Aix sponsa) with radio transmitters and radio tracked them from 21 July to 29 September 1989 (18 females, 8 males) from 7 July to 30 October 1990 (13 females, 19 males) on the Killbuck Marsh State Wildlife Area in northeastern Ohio. Distances from the natal marsh increased significantly with age; 3 weeks after fledging, they averaged 3.87 km. Mean distance moved on daily feeding flights from the nocturnal roost was 1.2 km (N=26, SD=0.56). Mean time at a night roost was 21.3 days for females and 13.5 days for males. Early stages of dispersal from the natal marsh consisted of small, incremental steps. Most juvenile wood duck activity prior to mid-September was limited to the wetland complex contiguous to the natal area.

**Reese Ecology**

First Afternoon & Business Mtg at 1:30 pm

SATURDAY, APRIL 27, 1991

Townshend Hall 255

Angela Martin, Presiding
Sources of variation within and among plants in pollen production, a component of male reproductive success, were estimated for two different populations of Andropogon and Sorgastrum. The results of this 1990 study are then compared to a composition analysis carried out 22 years ago. A total of 22 tree species with an average dbh of 3.98 mm, respectively. Andropogon produced 6.2 inflorescences per culm and 2.8 racemes per inflorescence. Both parameters varied significantly among Andropogon individuals. There was no difference in dbh alone by inflorescence position in this species. In the much simpler inflorescence of Sorgastrum, individuals differed in the number of spikelets per inflorescence. Individuals of both species differed significantly in the number of culms per individual and mean culm height. Annual variation in these parameters of pollen production, and comparisons with Minnesota populations of these species will also be discussed.

2:30 INFLUENCE OF VEGETATIONAL DIVERSITY IN SEA ISLANDS ON POPULATIONS OF THE PHIPPIDAE ARTHROPOD ORTHUS INSIDOSUS (SAY) (HEMIPHTERA: ANTHOCORIDAE). Daniel R. Pavuk & Benjamin R. Stinner, Department of Botany, Miami University, Oxford, OH 45056, and Department of Entomology, O.A.R.D.C., The Ohio State University, Wooster, Ohio 44691.

A two-year study at Wooster, Ohio, examined the influence of vegetational diversity in corn plantings on populations of the generalist predaceous arthropod, Orthus insidiosus (Hemiptera: Anthocoridae). Indigenous weed species were artificially manipulated to provide four different plant communities. The four treatments were corn without weeds, corn with broadleaf weeds, corn with both broadleaf and grassy weeds, and corn with both seed types. The experiment was a 2 x 2 factorial design, with plots set up in a randomized complete block. Significantly more O. insidiosus were caught with a sweep net on corn in broadleaf treatments than on corn in non-broadleaf treatments in 1988 (P < 0.05), but not in 1989. Abundance of O. insidiosus on corn was not significantly different between grassy and non-grassy treatments in either year (P > 0.05). Future research should test the differences of different weed types, densities and placements in corn plantings on O. insidiosus populations.

2:45 THE EFFECT OF FOREST FRAGMENTATION ON THE GENETIC DIVERSITY AND STRUCTURE OF ACER SACCHARUM MARSH POPULATIONS. S. A. Fore, Department of Botany, Miami University, Oxford, OH 45056.

In many parts of the world, large expanses of forests have been fragmented to small stands resulting in isolation of local populations. Acer saccharum Marsh was used as a model to test the hypothesis that this isolation affects the genotypes and amount of genetic variation in tree populations. Genetic data were collected by starch gel electrophoresis from mature (pre-fragmentation) and juvenile (post-fragmentation) individuals in 20 woodlots from four different isolation categories. Allele frequency data were compared using Nei's statistics, Wright's F statistic, and Slatkin's estimate of gene flow. The relationship between genetic diversity and stand isolation and differences in alleles frequencies and genotypes between juvenile and mature individuals were determined statistically. Preliminary data indicate that the degree of isolation does not affect the percent of polymorphic loci in a stand and there are significant differences in allelic frequencies among woodlots for the juvenile but not for the mature individuals.


Dysart Woods is a 50 acre remnant of the pre-European forests which covered most of Ohio. It is located in un-glastoned Belvoir, a predominantly and one in an area never completely cleared. The former is dominated by Acer, Robinia, and Fraxinus, the latter by Acer and Quercus. The former has more stems >2 cm dbh, the latter more stems both < 1 cm dbh and > 24 cm dbh.

4:00 THE EFFECTS OF DRYING TECHNIQUES IN ARTIFICIAL LEAF PACK CONSTRUCTION ON LEAF PROCESSING AND MACROINVERTEBRATE COLONIZATION. Patricia Turner and Kelly Harpster, 630 North Fountain Avenue, Springfield, Ohio 45504.
Artificial leaf packs are used to provide results indicative of processing in naturally accumulated leaf packs in exposed aerobic locations. In leaf pack construction, scientists vary such factors as leaf pack size, leaf species, drying techniques, and leaf pack enclosure. In this experiment, the effects of oven-drying and air-drying on leaf processing and macroinvertebrate colonization were investigated. Fourteen five-gram packs of Acer saccharum—six oven-dried at 60°C for 48h, six air-dried for 48h, and two controls—were immersed in Buck Creek, Clark County, Ohio for three weeks. Results indicated that drying techniques can affect the dry weights remaining for leaves after processing. No significant differences for macroinvertebrate colonization between manipulations were found.

4:15 Autumn Leaf-fall as a Source of Trihalomethane Precursors. Andrea Martin, and A. J. Carlson, Department of Biological Sciences, Kent State Univ., Kent, Ohio 44242

Trihalomethanes (THMs) form when chlorine reacts with certain naturally occurring organic molecules (THM precursors) during the disinfection of drinking water. THMs are believed to have significant mutagenic properties. The elucidation of THM precursor sources is important because source management may lower costs and increase effectiveness of chlorination treatments. This study investigated the importance of organic compounds released from leaves as THM precursors.

The loading of leaf material into Lake Rockwell, a drinking water reservoir in northeastern Ohio, was investigated for the autumn leaf-fall of 1989. Leaf influx from the primary tributary flowing into the lake was measured 1 day per week by collecting particulate material in a 1-mm mesh sieve net over a 10-minute period. The THM precursor release rates from two different leaf types, a rapidly decomposing species and a more recalcitrant species were determined in the laboratory. The total loading of THM precursors from leaf material entering the reservoir was estimated by multiplying laboratory-derived release rates per gram dry weight with estimated leaf influx.

4:30 DIETARY UPTAKE OF HEAVY METALS BY THE LEAST SHREW, CRYPTOTIS PARVA. Christopher C. Brueske and Gary W. Barratt, Department of Zoology, Miami University, Oxford, OH 45056

Heavy metals from municipal sewage sludge have been shown to accumulate in detritivores, producers, and primary consumers. Heavy metal bioaccumulation in secondary consumers, however, remains poorly investigated. In order to assess rates of heavy metal transfer in an old-field community food chain, six adult least shrews (Cryptotis parva) were fed a diet containing earthworms collected from unperturbed municipal sludge for eleven years. Six adult C. parva were fed a diet containing earthworms collected from unperturbed municipal sludge to serve as the control group. Cadmium, copper, lead, and zinc concentrations in the liver, kidney, and digestive tract of each experimental animal were determined by atomic absorption spectrophotometry. Significantly higher concentrations of all four heavy metals were detected in liver tissue of shrews fed the contaminated diet. A significantly greater amount of Cd was also detected in digestive tract tissues from shrews fed the contaminated diet than from the control group. The body mass of the animals fed the contaminated diet was reduced significantly during the experimental period; this loss was attributed to Pb toxicity. It appears that heavy metal transfer occurs through higher trophic levels and may represent a hazard to secondary consumers.

4:45 BIOREMEDIATION - AFFORDABLE POLLUTION CONTROL. Jo Davison, Research Director Lambda Bioremediation Systems, Inc. 2840 Fisher Road Columbus, Ohio 43204

The treatment of polluted soil and water resulting from acid mine drainage, industrial waste, landfill leachate, underground storage tanks and agricultural run-off has proven very challenging. Many treatment methods have been employed with variable results, some of which have been negative. The use of natural biological methods, or bioremediation, has proven successful at sites as listed above.

The Lambda method is based upon the acceleration of natural biological and physical processes which have been present on Earth for a billion+ years. Using these principles, Lambda has developed a process whereby biologically active microbes enhance chelation and the deposition of heavy metals and other minerals in the sub-soil.

These concepts have been successful at the bench and in field applications. Heavy metals in acid coal mine drainage sites in W and PA have been significantly reduced. Ponds at a ME country club were reduced from toxic levels to drinking water standards. Both soil and water pollution at the sites have shown rapid and sustained recovery with little or no sludge production and no deleterious environment effects.

R. Ecology

Second Afternoon at 2:00 pm SATURDAY, APRIL 27, 1991 Townshend Hall 256 David Francko, Presiding

2:00 PHYTOPLANKTON PRODUCTIVITY VERSUS CAMP: AN EMPIRICAL MODEL. D. A. Francko and S. H. Al-Hamdani, Department of Botany, Miami University, Oxford, OH 45056.

A linear regression model relating log-transformed dissolved CAMP concentration to epilimnophic phytoplanktonic photosynthetic carbon assimilation (PGA) rates was developed in cyanophyte-dominated Sangre Isle Lake, Oklahoma. This model suggests that in situ PGA rates are a predictable function of lake water dissolved CAMP content. During the 1980 season CAMP removal/addition experiments were conducted on Sangre Isle Lake and four lakes in southeastern Ohio to test this hypothesis. Removal of CAMP from lake water resulted in an increase in planktonic PGA rates. Readdition of CAMP to levels below, above or equivalent to original levels induced a linear decrease in PGA. The productivity of unperturbed control samples fell within the 95% confidence interval of the regression. In Ohio lakes (three dominated by green algae and one by chrysophytes), CAMP removal/addition also resulted in PGA rate alterations and a close approximation of nominal PGA rates based on extant CAMP. The magnitude of response was smaller than in the blue-green-dominated Oklahoma system, suggesting that CAMP-mediated PGA rates may be dependent on the type of phytoplankton association present in a given system.

2:15 FRACTIONATION OF PHYTOPLANKTON FROM BACTERIOPLANKTON IN LAKE WATER USING FILTERS AND ISOPYCNIC SEDIMENTATION. R. T. Heath, R. Garono, Department of Biological Sciences, Kent State Univ., Kent, OH 44362.

Separation of bacterioplankton from phytoplankton is essential for investigating the role of nutrient cycling in freshwater lakes. Generally, this is accomplished by size-selective filtration. We examined the notion that this provides a reasonable separation of these organisms by using track-etched polycarbonate filters to filter mixtures of calibrated fluorescent beads and natural planktonic communities. We find that filtration successively retains particles greater than the nominal pore size, but filters also retain significant numbers of particles smaller than the nominal pore size. We found that rapid swirling of the mixture did not improve the separation efficiency. We recommend that when filters are calibrated with fluorescent beads the results of size-selective filtration be interpreted with caution. Using Percoll we found that isopycnic sedimentation can separate bacteria from many algae, but that separations based on these results also should be interpreted with caution.

This study was supported by Ohio Sea Grant.

2:30 DISTRIBUTION AND ABUNDANCE OF THE MICROBIAL BIOTA OF AN ACID BOG LAKE. R. Meyers, S. J. Rugg, and T. R. Heath, Department of Biological Sciences, Kent State University, Kent, OH 44242.

Distribution and abundance of the microbial biota of Triangle Bog Lake, an acid bog lake in Portage County, were observed during the summer of 1990. Samples were collected at one meter intervals throughout the water column and at several surface sites in the mat. Enumeration was
Bacterioplankton abundance and activity in Sandusky Bay. S.-J. Hwang and R.T. Heath. Dept. of Biological Sciences, Kent State University, Kent, OH 44242.

The role of bacterioplankton in planktonic community structure and function is not well understood. Growing information has shown that bacterioplankton are not only important in detrital decomposition but also may be important in nutrient dynamics at the base of the food web. The development of planktonic communities in Great Lakes coastal wetlands is also not well understood. The purpose of this study was to examine the abundance and functional importance of bacterioplankton in Sandusky Bay, a coastal wetland through which Sandusky River water passes before entering Lake Erie. Bacterial populations, enumerated following acriflavin staining, reached a maximum in the eastern basin of the bay then decreased as the water moved into Lake Erie. Lake Erie surface waters generally had \(3 \times 10^7\) cells/mL, while surface waters in Sandusky Bay contained greater than \(3 \times 10^8\) cells/mL in summer. Bacterial productivity and metabolic activities were greatest at stations sampled within the bay. Particularly high bacterial activity was significant in the uptake of phosphate and in the hydrolysis of dissolved organic compounds.

3:00 The functional role of the Sandusky Bay coastal wetland in phosphorus bioavailability. Ralph J. Garono and Robbem T. Heath, Department of Biological Sciences, Kent State University, Kent, OH 44242.

The purpose of this study was to investigate the hypothesis that bacterioplankton outcompete phytoplankton for available phosphate, especially under severely P-limiting conditions; as algae are deprived of phosphate by bacteria, they depend on dissolved organic P (DOP) for growth. We conducted this study along a continuum of P-availability in Sandusky Bay and near-shore zones of Lake Erie. Eleven stations were sampled at monthly intervals during the summer of 1980 along a 40-mile transect of the Sandusky River into Lake Erie. Using radiometric procedures, phosphate and DOP concentrations and their rates of uptake by bacteria and algae were measured at each station along the transect. As phosphate availability decreased along the transect, bacterial uptake of phosphate increased, algal uptake of DOP increased, but algae continued to depend on phosphate for growth.

This study was supported by Ohio Sea Grant.


Heterocope septentrionalis (Calanoida; Copepoda) from lakes and ponds in northern Alaska were found to support infestations of a suctorian (Trophosphate). Percentage of copepods infested varied from 9% to 95%, and this difference was significant at the 0.02 level. Percentage of copepods infested increased with increasing water temperatures. The number of trophophores per copepod was highly variable and did not appear to be related to the number of copepods infested. The number of trophophores per copepod was significantly greater in the control than in the experimental treatment. This suggests that the density of trophophores per copepod may be a useful indicator of the degree of infestation. The number of trophophores per copepod was significantly greater in the control than in the experimental treatment. This suggests that the density of trophophores per copepod may be a useful indicator of the degree of infestation.

4:00 A sampling of benthic macroinvertebrates of the Kokosing River in 1980 and other selected ecological aspects. Gary J. Burkholder, Associate Professor of Biology, Mount Vernon Nazarene College, Mount Vernon, OH 43050.

In the summer 1980 (24 and 25 July) and again in early autumn (16, 17 and 20 September) composite Surber samples were taken from eight stations located along the Kokosing River, Knox County, Ohio. These were identified to the lowest taxonomic level possible. The number of different benthic macroinvertebrates taxa present in the river were 61 and 55 for the July and September sampling periods. The total number of organisms per square meter were 4248 and 4568, respectively. The number of taxa and numbers of organisms per square meter were 37.6% and 37.6% and Ephemeroptera 18.9% and 18.8%. The number of taxa and numbers of organisms per square meter show a trend of being higher in the upstream portions of the river than downstream.


Baskets of defaunated substrate were placed in a riffle area of Buck Creek, Clark County, Ohio. The sequence of macroinvertebrate colonization and trends in species diversity, species richness, and total number of colonizers were investigated during the summer of 1979. Hydrocorophium and Chironomus were the initial colonizers and remained dominant throughout the study. Species diversity fluctuated, while species richness and the number of colonizers increased throughout the study. Macroinvertebrate communities in the baskets did not reach a state comparable to samples of surrounding substrate, suggesting that six weeks was insufficient time for the defaunated substrates to reach an equilibrium community.

4:30 Status of the Channel Darter (Eperca cupida) in the Upper and Middle Ohio River. Rob J. Raison, American Electric Power, Environmental Engineering Group, 1 Riverside Plaza, Columbus, OH 43215.
The channel darter (Percina copelandi) is designated an endangered species by the Ohio Division of Wildlife. Though populations in inland waters are small and are generally confined to Lake Erie tributaries and the mainstem Muskingum River, recent collections have indicated successful establishment of this species in the upper and middle Ohio River. Fishery collections conducted as part of the Ohio River Ecological Research Program have documented the presence of larval and/or adult channel darters near three coal-fired power plants (RM 55, 76 and 260). Most darters are collected by near-shore seining or deep-water trawling, suggesting multi-habitat use of these fish in the Ohio River. Increased frequency of channel darter collections indicates the presence of suitable habitat in the Ohio River; improvements in water quality can be inferred based on reinvasion by this species and the composition of the entire fish assemblage. The Ohio River Ecological Research Program is sponsored by American Electric Power, Edison Electric Company, Ohio Valley Electric Corporation, Cincinnati Gas & Electric Company and Tennessee Valley Authority.

4:45 CYCLES IN LAKE ERIE POPULATIONS OF THE BLUE WALLEYE, STIZOSTEDION VITREUM GLAUCAUM, FOR THE YEARS 1915-1959. John F. Wing and Donald J. Glazier, Wittenberg University, P.O. Box 720, Springfield, Ohio 45501.

Populations of the Blue Walleye, Stizostedion vitreum glaucaum, originally were abundant in Lake Erie and Ontario; but by 1915 they began to fluctuate greatly and they became extinct, the last specimen being taken in 1965 (Campbell, 1987). Commercial catches between 1915-1959 reported by Parsons (1967) show 2-10 fold fluctuations across decades with highest production usually in the middle of each decade: 1915, 1925, 1936, 1944 and 1955. Contingency periodogram analyses (Legendre et al., 1981) show significant 10-yr (p<.05) and 21-yr (p<.01) cycles in U.S. harvest, a significant 12-yr (p<.05) cycle in Ontario harvest, and significant 11-yr (p<.05) and 22-yr (p<.05) cycles in the combined U.S.-Canadian harvest. The latter cycles match periodicities obtained in Coho and Bobalin's (1976) spectral analysis of Lake Erie and other Great Lakes' water levels (1, 8, 11, 22, and 36 years). Peak walleye harvests seem to occur 2-3 years after peak lake water levels. Higher water levels may have caused greater or richer spawning areas for both the Walleye and its prey including higher oxygen concentration and lower pollution in those areas, thus inducing the 10-12 year and 20-22 year harvest peaks.

R. Ecology

POSTER SESSION

SATURDAY, APRIL 27, 1991

University Hall Lobby

Board M

@ 10:00

AN ECONOMOMETRIC ANALYSIS ON PLETHODONITE SALAMANDERS. Natarajan, Meena Department of Ecological and Biomedical Sciences, Irvine Hall, Ohio University, Athens, OH 45701.

Multivariate analysis of 12 morphometric variables were used to describe patterns of size and shape among 7 species belonging to the genus Plethodon. 15 external traits were recorded on preserved specimens; all morphometric variables were log transformed and adjusted for the effects of body size. The information was also obtained regarding sexual variation. The similarity in overall morphology and ecology among the different species may reflect a common evolutionary history rather than adaptation to external environments. In order to distinguish between the different species, PCA and multiple discriminant analysis were used. Based on P C 1, which explains 81% of the variation it is possible to cluster most of the species. The distance between the ankle joint to the tip of the longest toe in hind limb had the highest loading (0.42) for this component. The first canonical function of the discriminant analysis explains more than 90% of the variation between the species. Inter nasal distance and distance between the ankle joint to the tip of the longest toe in hind limb were the variables that maximized the differences between the groups. Correlations between ecological and morphometric variables were detected using canonical correlations analysis. The first canonical correlation coefficient was 0.95 indicating a high correlation between ecology and morphology.
Librarians with faculty status must usually meet similar standards for promotion and tenure as teaching faculty; however, many librarians feel that they do not have the flexibility as teaching faculty if they have 12-month contract. It would be helpful to have more research done on experiences in various university libraries which have faculty status.

Since the time factor is a big issue with a faculty status, have some libraries gone with a shorter contract? We have conducted a survey to gather data pertaining to the length of contract. Administrators as well as reference and technical services librarians of the American Research Libraries have been asked to express their opinions and beliefs of 12-month contract or shorter, the advantages and disadvantages of each to the individual, the library, and the university.

In reading the literature on the subject and making phone calls to various universities it was discovered that earlier surveys are outdated. We are hoping that the current survey results will reflect the state of the art in regard to length of library contracts.

10:15 CATALOGING ON INNOVAQ AND NOTIS: AN EVALUATION. Dale Ebersole, Jr. Carlson Library, University of Toledo, Toledo, Ohio 43606.

The comparison of cataloging between two automated systems is useful. Since serial records often need updating, their requirements are more complex than that of a simple monograph. All evaluations and examples are based upon such serial records. The ease with which records may be added to or removed from the database is noted. Identical keystrokes are to be used transfer records in, but deletions are more complicated. Editing records on Innovacq and Notis systems pose a number of choices. Significant features of each system's editor are highlighted. Differences in search strategies can create difficulties, especially, when used in conjunction with a bibliographic utility such as OCLC. Both Innovacq and Notis are relatively easy to use, and have definite advantages over the former manual system. It is much easier and more accurate to make a change in one or two places in an electronic record than to pull, change, and refile a set of cards.