THE OHIO JOURNAL OF SCIENCE

Volume 87 | April Program Abstracts | No. 2

CONTENTS

96th Annual Meeting
The Ohio Academy of Science

Hosted by
Malone College
Canton, Ohio

April 24-25-26, 1987

Theme: Science, Technology and Society

Schedule of Technical Section Meetings
and
Poster Sessions

GENERAL SCHEDULE

Except as otherwise indicated, all sessions and events are on the campus of Malone College, Canton.

FRIDAY, APRIL 24, 1987

8:30 A.M. — Registration for Section Q. Economics in Osborne Hall lobby

9:30 A.M. — Section Q. Economics in Cattell Library 49

10:00 A.M. — OAS Executive Committee in Randall Campus Center Round Room 014

12:00 Noon — Lunch in Main - Hoover Room

1:00 P.M. — Section Q. Economics in Cattell Library 49

2:00 P.M. - 4:00 P.M. — OAS Council meeting in Randall Campus Center Round Room 45

2:30 P.M. - 4:00 P.M. — Ohio Biological Survey Executive Committee meeting in Cattell Library Conference Rooms B & C

5:30 P.M. — Joint OAS Council and OBS Advisory Board Dinner in Main - Hoover Room. Reservations required and limited to members and guests of the OAS Council and the OBS Board.

Special Presentation on the 75th Anniversary of The Ohio Biological Survey.

7:30 P.M. - 9:00 P.M. — OBS Advisory Board Meeting in Timken Room 160

8:00 P.M. - 10:00 P.M. — All Academy Welcoming Reception in Main - Friendship Room

Members and visitors welcome.

SATURDAY, APRIL 25, 1987

8:00 A.M. - 3:00 P.M. — Registration in Osborne Hall Lobby

9:00 A.M. — Poster Session in Osborne Hall Gymnasium Auditorium

Section Meetings. See Contents for specific section programs.

11:00 A.M. — All Academy Lecture in the Auditorium, Jewish Community Center (adjacent to Malone College)

"Tropical Rain Forest Destruction and the Response of Economic Botany"

By Dr. Ghillean T. Prance
Senior Vice President for Science,
Director, Institute of Economic Botany
The New York Botanical Garden

Dr. Ghillean T. Prance received his D. Phil. in forest botany from Oxford University, England in 1963. Since that time he has worked for the New York Botanical Garden and has directed and conducted an exploration program in Amazonian Brazil making twelve major expeditions to the region, and collecting over 25,000 different plant specimens usually in sets of ten duplicates.

Dr. Prance, a native of Britain, is author of several scientific and popular books about the Amazon. He is a member of the Brazilian Academy of Sciences, a Fellow of the Linnean Society of London and of the Explorers Club. He is author of more than 120 scientific publications.

He is Executive Director of the Organization for Flora Neotropica, a UNESCO non-governmental organization producing botanical publications about tropical America. In 1979-80 he was President of the Association for Tropical Biology.

12:00 Noon — Lunch (reservations required) In Main - Friendship Room

1:30 P.M. — Section Business Meetings See Contents for specific section.

2:00 P.M. — Afternoon Poster Sessions and Section Meetings

5:00 P.M. - 6:30 P.M. — Hospitality Hour in the Randall Campus Center Stewart Room 125

6:30 P.M. — Annual Banquet and Awards Ceremony (reservations required) In the Randall Campus Center Bennett Lounge

Presidential Address by
Dr. Milton A. Lessler
The Ohio State University

"Environmental Lead Through the Ages"

9:00 P.M. — Annual Business Meeting for members only in the Randall Campus Center Round Room 035

REGISTRATION & PARKING

REGISTRATION is required for all meeting participants.
See registration form on last page.

+++ Access to meeting rooms by name tag only +++

Pick up name tag at registration desk
BEFORE attending sessions

Please observe the no smoking rule on campus.

Meal reservations and payments must be postmarked by Monday, April 20, 1987.

Make checks payable to Malone College and mail to:

Malone College
OAS Registration
515 25th Street N.W.
Canton, OH 44709

Phone (216) 489-0800

FRIDAY, APRIL 24, 1987

Parking in campus lots.

Registration will be in Osborne Hall Lobby

SATURDAY, APRIL 25, 1987

Parking in campus lots.

Registration materials, poster sessions, and coffee will be available in the Osborne Hall Lobby.

MEALS

Advance reservations required. See registration form

Friday, April 24 Luncheon	$7.00
Saturday, April 25 Luncheon	$7.00
Banquet	$11.00

A list of restaurants within driving distance of the campus will be available at the Registration desk.

HOUSING

Registrants wishing to stay in Canton are expected to make their own reservation.

Belden Village Area

Canton Super 8 Motel
3970 Convenience Circle,NW
Canton, Ohio 44718
(216) 493-8883

Knights Inn
3950 Convenience Circle
Canton, Ohio 44718
(216) 492-5030

Hampton Inn
5335 Broadmoor Circle
Canton, Ohio 44709
(216) 492-0151

Parke Hotel
4343 Everhard Road NW
Canton, Ohio 44718
(216) 499-9410

Holiday Inn-Belden
4520 Everhard Road NW
Canton, Ohio 44718
(216) 494-2770

Red Roof Inn
5353 Inn Circle NW
North Canton, Ohio 44720
(216) 499-1970

L & K Motel
4475 Everhard Road NW
Canton, Ohio 44718
(216) 494-6360

Sheraton Belden Inn
4375 Metro Circle NW
North Canton, Ohio 44720
(216) 494-6494

North Canton Area

Downtown Canton

Harleigh Inn
500 North Main Street
North Canton, Ohio 44720
(216) 499-9900

Newmarket Hilton
320 N. Market Ave. S.
Canton, Ohio 44702
(216) 454-5000

Massillon

Days Inn
2050 Lincoln Way, East
Massillon, Ohio 44646
(216) 837-4611

Massillon Inn
412 Lincoln Way, East
Massillon, Ohio 44646
(216) 832-1538

Mills Motel
4531 Lincoln Way, East
Massillon, Ohio 44646
(216) 477-3471

Alliance

Best Western
Tanglewood Inn
2330 West State Street
Alliance, OH 44601
(216) 821-1933

SPECIAL EVENTS & FIELD TRIPS

FRIDAY, APRIL 24, 1987

1:00 P.M.- 2:00 P.M. — Movie: "A Bold Commitment" - Lee Shelley, Manager of Steel Processing, The Timken Company

P.M.- after dark — Star Watch. The Wilderness Center Astronomy Club hosts weekly star watches at the center, located one mile west of Wilmot, which is about a half hour trip down State Route 62, southwest of Canton. Often other astronomy clubs and the general public join them. Several highpower telescopes will be available; viewing is excellent in the relative dark of the countryside. April features Saturn and the Spring constellations; no watch if rainy or completely cloudy. Contact David or Robin Gill at the Center for further details, (216) 359-5239.

SATURDAY, APRIL 25, 1987

Spouses Program. There will be local maps for the use of spouses who may want to see other local attractions such as the Canton Garden Center, Pro Football Hall of Fame, Belden Village or Mellett Mall shopping malls.

SUNDAY, APRIL 26, 1987

8:00 A.M. — Geology Section Field Trip. The subject of the Geology field trip for 1987 will be Environmental - Suburban geology. The trip will emphasize the interaction of suburbanization - construction - drainage - ground water - lake quality - site modification - surface water - waste disposal - soils and geology. The trip will contain both complete and proposed project applications along with examples of installed commercially available materials including geotextiles and slope stabilization products.

Highlights of the trip will be: the classic kame-kettle topography of Brimfield Township, a landfill site with complex glacial geology and three discrete water tables, an exposure and laboratory data for an unoxidized, basal Navarre till.

The field trip will leave from Malone College parking lot at 8:00 A. M.sharp. Field trip participants must furnish their own transportation. Ride sharing is strongly encouraged. Lunch will be on your own at a concentration of fast food outlets.

Further information may be obtained from James Bauder, (216) 492-0715, 3095 Bernewood Dr. NW, Canton, Ohio 44709.

9:00 A.M. — Beach City Wildlife Area and The Wilderness Center. The trip will leave by van and private cars from Malone College parking lot; please register on Friday or Saturday on sign-up sheet. The Beach City site has two Hemlock flanked gorges and waterfalls on South Fork of Sugar Creek, and mountain laurel and extensive woodland trails through virgin beech-maple woodland, prairie and other habitats. Both areas should give extensive bird observing opportunities, with some migrant species. We should return by 3:00 - 4:00 P.M.

9:00 A.M. — Jackson Bog. The trip will leave by private car from the Malone College parking lot, for a 9:30 tour of this alkaline fen, with abundant pitcher plants, sundew, Equisetum and many other bog and marsh species. The area is partly on Jackson Local Schools property, about ten miles northwest on State Route 687; a Department of Natural Resources naturalist will be there at 9:30 A.M. for a tour; return to Malone College before noon.

1:00 P.M. — The McKinley Museum of History, Science and Industry will present a program on their development of a Children's Science museum with the current facility, with emphasis on "hands-on" exhibits. This will be the first of its kind in this area of the state and of special interest to educators.

2:00 P.M. — A Planetarium Program on the Voyager Mission. This program will be on the voyager mission and its pictures of the moons of Uranus. It will be presented in the Hoover-Price planetarium within the McKinley museum, at the base of the McKinley National Memorial. Please sign up for the programs at the registration table at Malone. There will be complementary admissions for both programs for Academy members and their families who have registered for them.

SUMMARY OF SYMPOSIA

FRIDAY, APRIL 24, 1987

9:30 A.M. — "Current Themes for Ohio's Economic Development" Section Q. Economics

SATURDAY, APRIL 25, 1987

9:00 A.M. — "Space Age Contributions to Resource Management" Section J. Natural Resources

2:00 P.M. — "The Science Teacher as a Professional" Section H. Science Education

LOCAL ARRANGEMENTS

LOCAL ARRANGEMENTS CHAIRPERSON

Arnold W. Fritz
Malone College

Local Section Hosts

A. Zoology:	Dr. George Klee Kent State Univ.
B: Plant Sciences:	Conrad Guttermuth Walsh College
C: Geology:	Jim Bauder Private Consultant
D: Medical Science:	Dr. Raymond Gesinski Kent State Univ.
E: Physics and Astronomy:	Dr. Richard Werstler McKinley Museum
F: Geography:	Dr. James Stuckey Malone College
G: Chemistry:	Dr. Arthur Murdock Mount Union College
H: Science Education:	Dr. Jane Hazen Stark County Schools
I: Anthropology and Sociology:	Dr. Eugene Collins Malone College
J: Natural Resources:	Sarah Jean Peters Ohio Div. of Wildlife
K: Genetics and Cell Biology:	Dr. Dale Thomson Malone College
L: Math & Computer Science:	Donald Bartoo Diebold, Inc.
M: Psychology:	Dr. Charles Cureton Malone College
N: Junior Academy:	Dr. Karl Schwenk Tuscarawas Valley H. S.
O: Engineering:	Tom Grove The Timken Company
Q: Economics:	Leo E. Doyle United Bank
R: Ecology:	Robert Rohrbaugh Jackson Middle School
S: Information & Library Sciences	R. Stanford Terhune, Jr. Malone College

COMMITTEES

Registration & Ticket Sales:	Dr. Millard Niver & Sigma Zeta
Welcoming Committee & Banquet:	Dr. Dale S. Thomson
Room Arrangements & Hosts:	Glenn Lipely
Audio Visual:	Glenn Lipely
Poster Session Arrangements:	Dr. Jeffrey Nichols
Meals & Receptions:	Dr. Stephen Diakoff
Publicity:	Steven M. Plottner
Directional & Parking Signs:	Dr. Jeffrey Nichols

OUR HOST

Malone College, founded in 1892 as Cleveland Bible College, grew from the dreams and labors of an energetic Friends couple, Walter and Emma Malone. Before the turn of the century, thier concern for the education of Christian young people led them to rent a house and begin the Cleveland Bible College, and in 1957, it moved to Canton and was renamed Malone College to honor its founders.

With this move came a change in curriculum, Malone became a Christian liberal arts college. The trustees, administration, and faculty developed an institution emphasizing communicative and interpretive skills in developing the whole person physically, mentally, spiritually, and emotionally. This Christian liberal arts approach, vital to the success of Malone, is widely recognized today as producing exceptional graduates, not only for the marketplace, but for all life.

The college offers degrees in twenty-two fields of study, including pre-medicine and allied health. In addition, the Malone College Management Program was initiated in 1985 to serve adults desiring to finish their college education. The program has graduated seventy-three students to date.

The Malone teaching faculty, commited to integrating a Judeo-Christain world view into their curriculum, provide students with a well rounded educational base upon which to make well informed decisions and build future careers.

Malone students are encouraged through this type of learning to know and understand themselves and the world around them. That's why many of the 5,500 alumni have excelled in a wide variety of occupations.

Because of this firm commitment to Christian liberal arts education, Malone has recently enjoyed increasing enrollments, four successful accreditation reviews, and renewed financial health.

The college also continues to enjoy a unique relationship with the Canton Community. Its athletic teams have brought national recognition to the city through cross-country titles, basketball championships, soccer and baseball titles, and fine volleyball and tennis teams.

Canton, known for its connection with sports, is the home of the Professional Football Hall of Fame and is the host of the Ohio State High School Swimming Championships.

Although sports are a vibrant part of the community, industry plays a key role: Canton is home to 362 manufacturing companies. The Canton area is noted throughout the industrial world for its leading production of metal, ceramic, rubber, paper, plastic, and other products. Canton is also noted as a food processing center.

Canton provides four junior and two senior high schools in its city secondary education system and four colleges with a combined enrollment of 8,062.

The Cultural Center for the Arts provides facilities for the Canton Art Institute, the Canton Civic Opera Association, the Players Guild, and the Canton Civic Ballet. Adjacent to the Cultural Center complex is the Canton Memorial Civic Center, home of Canton's professional indoor soccer champion team, the Invaders.

Two all-enclosed shopping malls and over sixty area restaurants, part of the city's growth and development, are located near the college.

SECTION A. ZOOLOGY
MORNING SESSION - TIMKEN SCIENCE HALL 221
SATURDAY, APRIL 25, 1987
PAUL HOLESKI, PRESIDING

9:00 FUNCTION AND ORIGIN OF FISH CAECA. Amjad Hossain and Hiran M. Dutta. Department of Biological Sciences, Kent State University, Kent, OH 44242

Caeca, unique structures located at the gastrointestinal junction, were identified as early as 300 BC. The exact source and cause of origin and functional identity of these structures were unknown. The earlier researchers considered caeca to be pancreas. Some of them regarded these structures to be accessory food reservoirs and shelter and breeding places for intestinal flora. Others indicated that caeca supplemented the digestive function of the stomach. The most common belief was that they complement the function of the intestine by increasing the surface area. None of these views were confirmed by experiments. The different views about the probable function of caeca played a major role in naming these tiny structures differently, such as pyloric or intestinal caeca. The histological similarity between the intestine and the caeca were observed by certain researchers and on that basis they also suggested the function of caeca was to increase the digestive surface area. Our study on the postembryonic development confirmed the source and causes of the caecal origin and designated them as intestinal caeca.

9:15 PHARYNGEAL FEEDING APPARATUS IN THE CYPRINID GENUS HYBOGNATHUS. Catherine M. Polak, Miles M. Coburn and Ted M. Cavender. Biology Department, John Carroll University, University Hts., OH 44118 and Museum of Zoology, Ohio State University, Columbus,OH 43210

Unusual soft tissue pharyngeal structures were studied in six species of the nearctic cyprinid genus Hybognathus (H.argyritis, H.hankinsoni, H.hayi, H.nuchalis, H.placitus and H.regius). These structures were not present in other North American cyprinids surveyed. The pharyngeal roof has a centrally positioned dorsal patch consisting of a rosette of small papillae. The pharyngeal floor has a large comb-like row of papillae between the first pair of gill arches, and a smaller row between the second pair of gill arches. A transient row can also develop between the third pair of gill arches. Additionally, the median gill rakers of the second arch have papillae and form interdigitated rows. Intraspecific variation is considerable. The apparatus is most complex in H.nuchalis and H.hankinsoni. The structures appear to function in trapping or filtering small food items.

9:30 EVOLUTIONARY RELATIONSHIPS AMONG EASTERN NORTH AMERICAN CYPRINIDS PART III. Ted M. Cavender and Miles M. Coburn, Ohio State University, Columbus, OH 43210 and John Carroll University, Cleveland, OH 44118

Continued work on the osteology of American minnows has included an effort to find characters that might support a phyletic relationship among a primitive group of genera which have previously been associated either by plesiomorphic features and similarities in external morphology or by a specialized condition of breast tuberculation in spawning males. Together these genera [Phoxinus (= Chrosomus), Semotilus, Couesius, Hemitremia and Clinostomus] have a strong northern component to their distribution and are definitely linked to the Eurasian cyprinid fauna through the genus Phoxinus. The most promising character we found was a unique type of anal fin suspension where the anterior pterygiophores are positioned forward of the first hemal spine and suspended via ligamentous attachment both directly to the vertebral column and indirectly through support from at least one pair of overlapping pleural ribs. This character state unites all North American species of Phoxinus together with the Eurasian Phoxinus phoxinus and Phoxinus (= Moroco) Steindachneri, Semotilus margarita, Semotilus atromaculatus, Hemitremia flammea and Couesius plumbeus. It was not fully developed in Clinostomus or in all Semotilus corporalis. Several synapomorphies indicate Clinostomus is the sister group of Richardsonius but how this line is related to the "Phoxinus group" is not clear.

9:45 EVOLUTIONARY RELATIONSHIPS AMONG EASTERN NORTH AMERICAN CYPRINIDS. PART IV. COBURN, Miles M. and Ted M. Cavender. Biology Dept., John Carroll University, University Hts., OH, 44118, and Museum of Zoology, Ohio State University, Columbus, OH, 43210.

A group of species presently placed in the subgenera Alburnops and Notropis of the genus Notropis form an interrelated group based primarily on derived character states correlated with the enlargement of the nasal capsule. The included species are Notropis shumardi, N. candidus, N. simus, N. jemezanus, N. bairdi, N. buccula, and N. girardi. Notropis orca was not examined, but may also be a member. They share an enlarged nasal capsule; loss of mesethmoid cartilage; anterior closure of the cranial vault; projection of the frontals over the mesethmoid; elongated vomer and palatine; concave shaft of the palatine; elongated ascending palatal process; and, enlarged olfactory foramen. Two Rio Grande species, N. simus and N. jemezanus, have the most extreme development of these character states and may be sister species. Additionally, N. bairdi, N. buccula and N. girardi show a detachment of the preopercular canal from the underlying bone. All species share character states of the hyoid bar, branchial arches and dentary with Alburnops (N. blennius, N. potteri), and may be more closely related to these species than to Notropis (s.s.) including N. atherinoides and N. oxyrhynchus.

10:00 NEW DISTRIBUTIONAL RECORDS OF ICHTHYOMYZON FOSSOR, I. UNICUSPIS, AND LAMPETRA APPENDIX (PETROMYZONTIDAE) FROM NORTHEASTERN OHIO TRIBUTARIES OF LAKE ERIE. Thomas Rosegger and Andrew White, Biology Department, John Carroll University, Cleveland Ohio, 44118.

The distribution of three Ohio endangered fishes, the Northern Brook Lamprey, Ichthyomyzon fossor, the Silver Lamprey, I. unicuspis, and the American Brook Lamprey, Lampetra appendix was investigated in NE Ohio. Ammocoetes, transformers, and/or adults of these species were collected from various Lake Erie tributary streams in Lake, Ashtabula, Trumbull and Geauga counties. New county and/or drainage records were established for I. fossor, including Arcola Creek in Lake County, and the Grand River and several of its tributaries in Trumbull County. New drainage records were established for I. unicuspis, in Conneaut Creek and the Ashtabula River in Ashtabula County. New county and/or drainage records were established for Lampetra appendix, in the Grand River and several of its tributaries in Trumbull County, and in Conneaut Creek in Ashtabula County.

10:15 HABITAT AND BAIT SPECIFICITY AMONG DROSOPHILIDS IN NORTHEASTERN OHIO. Eugene A. Rundo and Diane M. Gelbaugh. Kent State University, Department of Biological Sciences, Kent, Ohio, 44242.

By utilizing four baits within four different habitats, habitat specificity, bait preferences, and sexual disparity toward baits were examined among drosophilids from mid-August to mid-October. Significant differences in abundance existed only between the domestic and old field habitats. No such difference existed between domestic, marsh, and woodland sites. Of the 11 species collected, the most (91%) and the least (36%) were represented in the domestic and old field habitats, respectively. D. falleni Wh., D. putrida Sturt., and D. tripunctata Lw. dominated the woodland habitat, while D. affinis Sturt. and D. algonquin Sturt. & Dobzh. were the principal species in the old field. D. melanogaster Mg., D. robusta Sturt., and D. affinis prevailed in the domestic site; species prevalence in the marsh was similar, except D. robusta was replaced by D. deflecta Malloch. Over time species dominance changed in the marsh and woodland habitats. No such change was observed in the domestic and old field habitats.

No significant differences in abundance were found between apple, banana, peach, and tomato baits. Sexual disparity toward baits was demonstrated but only for banana and tomato.

10:30 BIOLOGY OF RIVELLIA SPECIES (DIPTERA: PLATYSTOMATIDAE) FEEDING ON NITROGEN-FIXING NODULES OF ROBINIA PSEUDO-ACACIA (LEGUMINOSAE). B.A. Foote and Bonnie McMichael. Kent State University, Department of Biological Sciences, Kent, OH 44242.

Flies of the genus Rivellia associated with black locust were studied to determine whether larvae and/or adults are specific for this host plant. Tests were run to determine whether larvae preferred host over non-host nodules as food sources. A Y-tube apparatus was used to investigate whether larvae could locate nodules. Adults were observed in nature as well as in breeding jars to determine possible affinity for Robinia in courtship, mating, and oviposition behavior. Adult females were tested with the Y-tube to determine whether they could locate and seek out host foliage. It was found that larvae can be raised to maturity on non-host legumes and that larvae are unable to locate nodules in a Y-tube. Preliminary testing indicated that larvae are indiscriminate in feeding habits when given a choice between host and non-host nodules. Adults demonstrated affinity for Robinia in their courtship and oviposition behavior and in the adult female's ability to recognize and seek out host plant foliage in the Y-tube.

10:45 LIFE HISTORIES AND HOST SPECIFICITY OF RIVELLIA SPP. ON THREE NATIVE OHIO LEGUMES. B. D. Bowker and B. A. Foote, Department of Biological Sciences, Kent State University, Kent, Ohio 44242

Life history information on three species of Rivellia is presented. Rivellia pallida Loew is associated with hog-peanut (Amphicarpaea bracteata (L.) Fern.); Rivellia steyskali Namba, with panicled tick-trefoil (Desmodium paniculatum (L.) D. C.); and Rivellia variabilis Loew, with ground nut (Apios americana Medic.). Larvae attack and destroy the root-fixing nodules of these native species of legumes in Ohio. Up to 26% of the nodules found on individual plants were destroyed. Larvae were non-selective consumers of different legume nodules, and fed on any type of nodule (including those of non-native legumes) presented. However, preliminary investigations indicate that adult females are able to distinguish between the host plant and other legumes. Nodular tissue was found to be significantly higher in protein content than root tissue.

SECTION A. ZOOLOGY
AFTERNOON SESSION - TIMKEN SCIENCE HALL 221
SATURDAY, APRIL 25, 1987
GEORGE KLEE, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 PHEROMONE TRAPPING THE GRAPE ROOT BORER, VITACEA POLISTIFORMIS (HARRIS) (LEPIDOPTERA: SESIIDAE) IN OHIO. Roger N. Williams and Daniel M. Pavuk. Department of Entomology, Ohio Agricultural Research and Development Center, The Ohio State University, Wooster, Ohio 44691

The grape root borer, Vitacea polistiformis, is a serious pest of grapes in many areas of the Southeastern United States. This insect has been found in one southern Ohio location in previous years; however, a sex pheromone was not available to monitor moth activity. Prior to the 1986 season, a sex pheromone was developed, which was tested by cooperators throughout the southeastern states and in Ohio. This pheromone proved to be very effective in attracting males of the species. Examination of areas around the bases of vines in three southern Ohio vineyards having high trap counts revealed substantial numbers of pupal skins. Excavation of the root systems of vines in 2 vineyards revealed the presence of grape root borer larvae and considerable damage to the roots. The extent of the distribution of the grape root borer in Ohio remains to be determined; however, damage due to this insect may be more extensive than was previously suspected.

2:15 REVIEW: TOXICITY OF THE EASTERN MASSASAUGA (SISTRURUS CATENATUS CATENATUS), AN ENDANGERED RATTLESNAKE. Donald M. McKinstry, Department of Biology, The Pennsylvania State University, The Behrend College, Station Road, Erie, PA, 16563.

The massasauga (S. catenatus) has rather short fangs in proportion to head length. Venom yield for adults is 15-45 mg (dry wt.) per milking. The LD_{50} is given as 2.91 mg/kg, determined in mice injected intravenously. The lethal dose for an adult man is estimated as 20-25 mg. Envenomation in humans can produce pain, swelling, ecchymosis, blistering of the skin, weakness, sweating, and vomiting. Hemolysis and defects in coagulation can also occur. The mortality rate is less than 0.5 percent. In one survey, most cases of massasauga snakebite occurred in Michigan (56) with fewer cases in Ohio (6) and Pennsylvania (2). In a survey of 1,130 rattlesnake bites in the eastern United States, the massasauga accounted for eight percent of the cases. Knowledge of current first aid guidelines and location of the nearest medical facility is essential for those working with this species. Polyvalent antivenin is supplied to physicians by Wyeth Laboratories. The massasauga is not extremely aggressive toward man but its behavior is unpredictable. Its fang length and venom yield are not as impressive as those of larger rattlesnakes. However, its venom is very toxic for experimental animals and there have been authenticated cases of fatal bites in man.

2:30 THE ROLE OF CYCLIC NUCLEOTIDES IN THE REGULATION OF STEROIDOGENESIS IN THE Y-ORGANS OF THE CRAYFISH, ORCONECTES IMMUNIS.
Constance R. Casey & Dr. Thomas C. Jegla
Dept. of Biology, Kenyon College Gambier, OH 43022

Molt-inhibiting hormone (MIH) is a peptide synthesized in the X-organ sinus gland complex of the eyestalks and is known to inhibit ecdysone synthesis in Y-organs (paired organs attached to the epidermis of the cephalothorax). My study addresses the role played by cyclic nucleotides (in particular cAMP and cGMP) in the mode of action of MIH in the crayfish, Orconectes immunis. Premolt was initiated in the animals by eyestalk ablation and experiments were performed in vitro on cultured Y-organs. Dibutryl cAMP and cGMP compounds were added to the culture fluid of one Y-organ and the other was used as a control. Through pairwise comparison of Y-organs it was possible to evaluate differential ecdysone production. A radioimmunoassay was used to determine ecdysone levels. The results of my study indicate that cAMP in the range 10^{-7}M to 10^{-3}M weakly inhibits ecdysone synthesis in the Y-organs of animals in early premolt, but clearly causes a different effect in late premolt animals. Cyclic GMP in the range 10^{-7}M to 10^{-3}M was found to strongly inhibit ecdysone synthesis in the Y-organs of early premolt animals.

SECTION A. ZOOLOGY
POSTER SESSION - OSBORNE HALL GYMNASIUM AUDITORIUM
SATURDAY, APRIL 25, 1987

Board A @ 9:00 AM CHROMOSOMES OF THE MADTOM CATFISHES NOTURUS STIGMOSUS AND NOTURUS ELEUTHERUS. Ted M. Cavender, Museum of Zoology, The Ohio State University, Columbus, OH 43210

As part of an ongoing investigation into the biology of the northern madtom (Noturus stigmosus) and mountain madtom (N. eleutherus) from Ohio waters, chromosome spreads were prepared using the aceto-orcein, thumb-squash technique. Karyotypes showed N. stigmosus (2n=42) and N. eleutherus (2n=40) were significantly different in both chromosome number and morphology.

The Karyotype of N. stigmosus had one group of 8 long biarmed chromosomes (4 metacentrics and 4 submetacentrics) with a second group of medium to very small chromosomes gradational in size. This group contained two medium-sized metacentric chromosomes in females (an identical pair was absent in males) and at least 6 small metacentric or submetacentric chromosomes.

The Karyotype of N. eleutherus had two distinctive, very long metacentrics followed by a graded series of 38 chromosomes of which at least 14 were biarmed (10 metacentrics and 4 submetacentrics). The latter included two distinctive, small metacentrics. The Karyotype of N. eleutherus from the lower Duck River Tennessee had the same diploid number (2n=40) as that of N. eleutherus from Ohio. This

number is the lowest reported for the family Ictaluridae (2n=40 shared also by N. taylori). The published literature listed N. eleutherus with 42 chromosomes.

Board B @ 9:00 AM — RELATIVE ABUNDANCE OF CONOTELUS OBSCURUS (COLEOPTERA: NITIDULIDAE) IN FLOWERS OF CONVOLVULACEAE IN OHIO. Roger N. Williams, Daniel S. Fickle, and Daniel M. Pavuk. Department of Entomology, Ohio Agricultural Research and Development Center, The Ohio State University, Wooster, Ohio 44691

The cone-shaped nitidulids, genus Conotelus, are indigenous to the Neotropics and have remained, for the most part, in the American tropics with some range extension into temperate North and South America. We studied the most northerly species, Conotelus obscurus Erichson. This nitidulid beetle exists through the north central tier of United States and up into Canada. It is the only species of Conotelus known to occur in Ohio. There is a paucity of literature on this group. The bionomics of the genus are little known. During the 1986 growing season, we conducted surveys to determine the relative abundance of C. obscurus in the flowers of hedge bindweed, Convolvulus sepium L., wild sweet potato, Ipomoea pandurata (L.), and other flowers. Flowers of various plants were also examined in order to determine the range of plant species infested by C. obscurus. In addition, adults were brought into the laboratory, and we had limited success in rearing C. obscurus for two generations on artificial diet.

Board C @ 9:00 AM — REGULATION OF THE SUPERCOOLING POINT IN THE MEALWORM BEETLE, TENEBRIO MOLITOR. Sean L. Johnston and Richard E. Lee, Jr., Department of Zoology, Miami University, Hamilton, Ohio 45011.

Tenebrio molitor is a freeze susceptible species which does not survive tissue freezing in any stage of development. Therefore, the supercooling point (SCP) represents the absolute lower lethal temperature for this species. Although most species have a narrow range of SCP values, Tenebrio larvae reared at 25C on dry wheat bran exhibited a wide range of values extending between -2 to -24C. Larvae acclimated at 5C exhibited a slight decrease in SCP's, however, the range of individual values remained highly variable. SCP's were correlated (r=0.59) with body weight: small larvae demonstrated a greater capacity for supercooling than larger individuals. In an attempt to identify the specific site of nucleation the SCP's of hemolymph, fat body and gut contents were determined and compared to whole body SPC's. Hemolymph and fat body samples generally supercooled to -15C or lower for larvae whose whole body SCP's were -5C or higher. Only on some occasions could whole body SCP's be explained based upon the efficacy of ice nucleators within the gut. This work was supported in part by a NSF grant DCB-8517875.

Board D @ 9:00 AM — DEVELOPMENTAL PATTERNS OF COLD-HARDENING IN SARCOPHAGA CRASSIPALPIS. Richard E. Lee, Jr., *Cheng-ping Chen, Mark H. Meacham and *David L. Denlinger, Department of Zoology, Miami University, Hamilton, Ohio 45011 and *Department of Entomology, Ohio State University, Columbus, Ohio 43210.

Ontogenetic patterns of low temperature tolerance and glycerol production were determined for larval, pupal and adult stages of the flesh fly, Sarcophaga crassipalpis. Both diapause and nondiapause destined flies were reared at relatively high temperatures, 20 C or 25 C, prior to testing. Cold tolerance was greatest for diapause pupae aged 12-35 days post-pupariation. Among nondiapause destined flies, pupae exhibited a greater level of low temperature tolerance than larvae or adults. Diapause pupae were more cold tolerant than nondiapause pupae, however, maximal tolerance was not observed until ten days post-pupariation. Glycerol was the only cryoprotective compound identified in relatively high concentrations (>1 mM). Nondiapause destined feeding and wandering larvae had higher glycerol levels than larvae destined for diapause. In diapause pupae glycerol levels increased steadily during the first six weeks after pupariation. Termination of pupal diapause was associated with a rapid loss of glycerol and cold-hardiness. This work was supported in part by grants from USDA-CRGO, No. 8600186 to D.L.D. and NSF, DCB-8517875 to R.E.L.

Board E @ 9:00 AM — EFFECT OF WARM ACCLIMATION ON COLD TOLERANCE IN THE LADY BEETLE, HIPPODAMIA CONVERGENS. Lloyd E. Bennett, Mark W. Mabry and Richard E. Lee, Jr., Department of Zoology, Miami University, Hamilton, Ohio 45011.

The convergent lady beetle, Hippodamia convergens, is a freeze susceptible species which migrates in the autumn from the valleys of California to form large overwintering aggregations in the mountains. In spring they return to the valleys to feed and reproduce. In order to study physiological changes associated with the winter to spring transition, beetles acclimated at 5 C were transferred to 20 C and examined for a 16 day period. Supercooling points remained constant at -15 C throughout the study. Warm acclimated beetles were less cold hardy than those acclimated to 5 C, only 10% survived exposure to -13 C for two hours as compared to 67% of cold acclimated insects. Within one day after transfer to 20 C respiration rates decreased by 20%, a response classified as inverse or paradoxical acclimation. Inositol was the primary cryoprotective compound identified from tissue extracts of cold acclimated beetles. Exposure to 20 C resulted in the loss of inositol concomitantly with an increase in glucose levels. This work was supported by NSF grant DCB-8517875.

Board F @ 9:00 AM — POLYCHAETE AMYLASE: PROPERTIES OF THE DIGESTIVE FLUID COMPONENT IN NEREIS VIRENS. N. Schoch King and E.J. DeVillez Zoology Dept., Miami University, Oxford, Ohio 45056.

Amylase from the gastric fluid of the Polychaete, Nereis virens, was purified by filtration through Sephadex G-100 followed by filtration through Bio-Gel P-100. The Sephadex acted as an affinity column causing the enzyme to elute in a volume corresponding to that of a 10,000 molecular weight protein. This step yielded a 6-fold increase in specific activity compared to the crude extract. Gel filtration through the Bio-Gel P-100 column resulted in a 40-fold increase in specific activity compared to the crude extract. The identity of this enzyme was confirmed as α-amylase by HPLC analysis of the degradation products of its reaction with starch. This analysis showed maltose as the only reaction product thus eliminating complicity of other enzymes such as α-glucosidases. The pH optimum of the purified enzyme was in the range of 7.0 to 7.2. The enzyme was activated by Cl^- ions with maximum activation achieved by addition of 5 to 10 mM NaCl. These characterizations indicate that this enzyme has physical properties similar to α-amylases studied in other invertebrates and vertebrates. Attempts to determine the molecular weight of the enzyme were inconclusive. The molecular weight estimated by filtration through Bio-Gel P-100 was 32,000 while PAGE estimations of the molecular weight provided values near 56,000. The endogenous source of the enzyme is presently under investigation.

Board G @ 9:00 AM — THE BODY-SURFACE ULTRAMORPHOLOGY STUDIES OF LEIDYNEMA PORTENTOSAE BY SCANNING ELECTRON MICROSCOPY (NEMATODA: OXYUROIDEA). Xiong Yu, Department of Zoology, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210-1293.

Both male and female adults of Leidynema portentosae were examined with scanning electron microscope. Males have two amphids, no lips and no external cephalic papillae. Females have two lateral amphids, four cephalic papillae, and eight "V"-shaped lips surrounding the mouth. The excretory pore of the female is located at the end of a digitiform projection. The excretory pore of the male is surrounded by a low cuticular ring. The cuticle of the male has numerous cuticular bosses posterior to the esophagus. Males have caudal papillae but no external phasmids, females have phasmids but no caudal papillae.

Board H @ 9:00 AM — THE COMPARISON OF EGG SURFACE ULTRAMORPHOLOGY OF HAMMERSCHMIDTIELLA DIESINGI, LEIDYNEMA APPENDICULATUM, AND LEIDYNEMA PORTENTOSAE (NEMATODA: OXYUROIDEA). Xiong Yu. Department of Zoology, The Ohio State University, Columbus, OH 43210.

The eggs of L. portentosae and L. appendiculatum have the same shapes and locations for opercular grooves. The opercular grooves are oblique, incomplete, and terminal. The opercular groove of L. portentosae is partially formed at the beginning of embryonic development. The opercular groove deepens and two sharp edges form as development proceeds. The opercular groove of the egg of L. appendiculatum has a suture in the midline. Two narrow but slightly salient zones surround the suture. The suture becomes deeper with embryonic development. The morphology of the opercular groove of H. diesingi is very similar to that of L. appendiculatum except its opercular groove is completely circular and less tilted to the axis of the egg. There are numerous pores and concave pits distributed on the whole egg shell of these three species. Their shapes and sizes are very similar in L. appendiculatum and H. diesingi except the pores are more numerous in H. diesingi than L. appendiculatum. In L. portentosae, the concave pits are smaller and less

numerous. Compared to L. appendiculatum and H. diesingi, the egg surface of L. portentosae is rougher and sand-like in appearance.

SECTION B. PLANT SCIENCES

FIRST MORNING SESSION - TIMKEN SCIENCE HALL 251
SATURDAY, APRIL 25, 1987
JERRY SNIDER, PRESIDING

9:00 FLORISTIC SURVEY OF THE CUYAHOGA VALLEY NATIONAL RECREATION AREA, CUYAHOGA AND SUMMIT COUNTIES, OHIO. Barbara K. Andreas. Cuyahoga Community College, Cleveland, Ohio 44122.

The U.S. Fish and Wildlife Service and the National Park Service provided funds for a floristic survey of the portion of the Cuyahoga Valley National Recreation Area (CVNRA) owned by the U.S. government. Occurring in northern Summit and southern Cuyahoga Counties, the study area encompassed 5600 hectares which are located primarily along steep-side, narrow tributary ravines and the floodplain of the Cuyahoga River. Eight hundred and twenty-eight species of vascular plants, of which 18% are non-indigenous, have been recorded from the CVNRA.

The area was last glaciated by the Wisconsinan advance which resulted in the formation of several glacial lakes that left thick lacustrine deposits in the ice-dammed Cuyahoga River valley. These lacustrine deposits, constantly subject to stream erosion at their bases, support a characteristic plant community termed an eroding slope community. The flora of these eroding slopes is dominated by plant species typically associated with disturbance. Approximately half of the 51 rare vascular plants located within the CVNRA occur on these slopes. Sharon Conglomerate outcrops, especially at Virginia Kendall Ledges, also support rare plants.

9:15 VEGETATIONAL SURVEY OF SINKING CREEK FEN, CLARK COUNTY, OHIO. Jeffrey D. Knoop, The Nature Conservancy, 1504 W. First Ave., Columbus, Ohio 43212, and Barbara K. Andreas, Cuyahoga Community College, Cleveland, Ohio 44122.

Sinking Creek Fen (Springfield Fen), located in the Mad River Valley, Springfield Twp., Clark County, Ohio, consists of a series of artesian seeps (pH 7.4 - 7.7, conductivity 630 - 740 µmhos/cm) that extend along the base of a dissected glacial outwash plain. The vegetation of the largest fen seeps was sampled using contiguous m^2 quadrats along eight permanent belt transects. Importance values, based on a compilation of percentage cover and percentage frequency, were determined for vascular plants in the tree, shrub and herbaceous layers.

Organic meadows which comprise 80% of the open fen consist of two plant associations: a sedge-herb association dominated by Carex stricta and Filipendula rubra; and a successional shrub association dominated by Potentilla fruticosa and Physocarpus opulifolia. Open marl seeps with little or no organic layer are sparsely vegetated with Rhynchospora capillacea and Deschampsia caespitosa. This fen community is floristically rich with approximately 150 species of vascular plants. A single m^2 quadrat may contain as many as 30 species.

9:30 **THE BRYOPHYTE FLORA OF CEDAR BOG: PAST AND PRESENT** Jerry A. Snider, Department of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006

The bryophyte flora of Cedar Bog has been so incompletely studied over the past 150 years that any attempt at a comparative analysis of the past and the present flora can be misleading. A more useful way of interpreting the bryoflora of Cedar Bog is to compare it with the current bryoflora occupying similar habitats in more northern regions. The results of a comparison with white cedar swamps and fens in northern Michigan are presented. A current study of the bryophyte flora of Cedar Bog shows an increase of ca. 50% in total number of taxa previously recorded. In contrast with a 1975 study of the bryoflora of the bog which concluded that 60% of the pre-1900 bog moss flora had changed due to the influence of a dryer environment, the present study indicates that most of this decrease can be attributed to incomplete collecting of the area. Approximately 75% of the taxa reported to now be extinct from the bog have since been rediscovered, many in some abundance. Rare taxa such as Buxbaumia minakatae and Plagiothecium latebricola are reported for the first time from Cedar Bog. Phytogeographical implications of these finds are presented.

9:45 TYPHA ANGUSTIFOLIA IN NORTH AMERICA: A FOREIGNER MASQUERADING AS A NATIVE. Ronald L. Stuckey and Douglas P. Salamon. Department of Botany, The Ohio State University, Columbus, OH 43210.

The distributional history of T. angustifolia, narrow-leaved cattail, in North America strongly suggests that this species, usually treated as native, may have arrived on the continent with early European settlement and migrated in the glacial wetlands to the Great Lakes region and farther westward. The first floras written of the areas for Boston, New York, Philadelphia, and localities elsewhere, in the early 19th century do not report T. angustifolia; but their later floras, by 1820, state it as being present or rare. By 1860, the species was known from at least ten localities in four northeastern states. It then spread westward mostly via canals through the states of New York and Ohio, by 1900, and reached as far west as southern Lake Michigan. By 1940, T. angustifolia had penetrated farther west, to the eastern edge of the Great Plains. During this period, its movement was influenced largely by railroads. With the expansion of the nation's highway system since then, T. angustifolia is known today from southern Canada and the United States in all states east of the 105th meridian. In contrast, the native, T. latifolia, common cattail or broad-leaved cattail, by 1900 was common in most localities in nearly every state. The distributional history and geographical range of their hybrid, T. x glauca, parallels that of T. angustifolia.

10:00 POLLINATION ECOLOGY AND ALPINE ENDEMISM OF PEDICULARIS PULCHELLA. Lazarus Walter Macior, Dept. of Biology, The University of Akron, Akron, Ohio 44325.

Pedicularis pulchella (Scrophulariaceae), endemic to the alpine zone of southern Montana, has flowers with ultraviolet reflective calyx and red-purple corolla with deep (12.4mm) nectariferous tubes. Its nectar contains fructose and sucrose and about 58% total dissolved solids expressed as sucrose equivalents. Absence of fruiting under insect exclosures contrasted with 79% fruiting on exposed plants found to be pollinated by 3 bumblebee (Bombus Latr.) species, none of which nest on the alpine tundra. Direct observations, corroborated by cinematographic records of pollinator behavior, indicated that Bombus queens pollinate nototribically while foraging for nectar or sternotribically while scraping pollen from concealed anthers. Workers pollinate sternotribically only. Analysis of corbicular pollen loads indicated a pollen-constancy of about 15%. Flourishing populations of P. pulchella were confined to loose scree on alpine slopes and ridges scattered among isolated mats of Dryas. In diverse alpine communities on mature, stable tundra turf, P. pulchella was scarce or absent, while P. cystopteridifolia was abundant and pollinated by 7 Bombus species. The endemism of P. pulchella appears to be related to its ability to colonize a poor alpine substrate, where competition from other alpine plants is absent, and not to its pollination syndrome.

10:15 HARDWOOD REGENERATION UNDER OHIO PINE PLANTATIONS. Francisco J. Artigas and R.E.J. Boerner, Environmental Biology Program and Botany Dept. Ohio State University, Columbus, Ohio 43210

Though hardwood forests dominated by oaks once covered most of the ridgetops of southeastern Ohio, today these sites are occupied by artificial pine stands. These plantations of red pine (Pinus resinosa), white pine (P. strobus), pitch pine (P. rigida) and Virgina or shortleaf pine (P. virginiana) were established in the 1920's and 1930's to reclaim abandoned farms. Today these plantations are overmature and beginning to senesce. Natural regeneration of pines does not occur because of the lack of a bare mineral soil horizon suitable for seed germination; this is due to the lack of fire in these stands. To determine what type of hardwood forests might succeed these senescent plantations, the current status of hardwood regeneration under the pine canopy was estimated in 21 pine stands occupying a range of topographic positions. To develop a predictive model, multiple regression and factor analysis were used to relate independent site variables (species of pine, density, dbh, litter depth/composition, soil chemistry and physiographic

parameters) to dependent variables of the subcanopy hardwood community (hardwood species present, relative densities, stage classes). We discuss the relative importance of pine species, silvicultural practices, and environmental factors in determining hardwood regeneration patterns.

10:30 DISTURBANCE AND REGENERATION OF SOME SHADE TOLERANT AND INTOLERANT TREE SPECIES IN GOLL WOODS, OHIO. Do-Soon Cho and R.E.J. Boerner, Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Relationships among disturbance, species composition and succession were studied in Goll Woods State Nature Preserve, a remnant of the Black Swamp Forest in northwestern Ohio. Weather records indicate that large scale disturbances such as tornadoes, fires, hurricanes and ice storms are rare and their return intervals are longer than the lifespan of long-lived oaks. A series of aerial photos show a small forested area which was cleared before 1939. Comparison of the species composition in this area with that of nearby preserve area shows that a large scale disturbance would favor the existence of shade-intolerant species. We compared annual ring growth pattern of five abundant, tolerant tree species (sugar maple, beech, basswood, white ash and silver maple) with three intolerant species (bur oak, white oak and chinquapin oak). These results are being used as an evidence for the presence of periodic large scale disturbances in Goll Woods, and for the different requirements for canopy gaps between shade tolerant and intolerant species. A Markov Chain successional model suggests that in the absence of external disturbance shade tolerant species will increase, and this is an indication that shade intolerant species may need external disturbances to persist in a mature forest like Goll Woods.

10:45 EVIDENCES OF THE SOLAR CYCLE IN ENGLISH GRASSLAND COMMUNITIES, 1936-1980. John F. Wing, Department of Psychology, Wittenberg University, P.O. Box 720, Springfield, Ohio 45501

Grassland production in England has had a 10-year cycle with peaks about 1936-38, 1946-48, 1956-58, 1967-69 and 1978-80. At Watt's Grassland F site total cover (occurrences of all spp.) peaked in 1936, 1946 and 1955, showing a significant ($p<.05$) 9-yr cycle when the contingency periodogram is applied to the 21-yr time series; but there must have been a slightly longer cycle for England as a whole because data from seven other sites show a rise in cover at least until 1957. Watt's Grassland A site reveals the same peaks for its successive dominants (Festuca ovina in 1936; Hieracium pilosella in 1946) as Grassland F did for total cover, except no peak dominant occurred in 1956-58 because of interspecific competition; but Thymus drucei attained dominance in 1970-71 just after the 1967-69 probable English peak. The 1978-80 peak appears in a number of studies. Peaks occur after 3-5 years of increasing June temperature and May-June rainfall. This is invariably on the rising portion of the sunspot cycle with peaks occurring two years before sunspot maxima, coincident with influxes of phytophagus insects and immigrant lepidoptera. At this lag Grassland F cover correlates $r=.673$ ($n=21$, $p<.005$) with sunspots and Watt's Galium hercynicum series correlates $r=.505$ ($n=33$, $p<.005$).

SECTION B. PLANT SCIENCES
SECOND MORNING SESSION - TIMKEN SCIENCE HALL 271
SATURDAY, APRIL 25, 1987
DOROTHY JEGLA, PRESIDING

9:00 THE EPIDERMAL CHARACTERS AND SYSTEMATICS OF ARALIA (ARALIACEAE). Jun Wen, Department of Botany, Ohio State University, Columbus 43210.

The genus Aralia consists of about 35 species with a disjunct distribution between East Asia and North and Central America. In the course of a systematic study of Aralia, the morphology of epidermal characters has been shown to provide useful evolutionary information. The morphology of epidermal hairs, cuticles, and stomata was investigated by light and scanning electron microscopy. The results reveal a close relationship between A. spinosa from the southeastern United States and A. chinensis from China. The cuticles on the abaxial leaf surfaces of woody Aralia species such as A. chinensis, A. elata and A. spinosa are coronulate and are connected by radiating ridges. Most Aralia species have simple hairs. However, A. pubescens from Mexico has dendritic trichomes on the abaxial leaf surface. In Aralia the epidermal characters are useful taxonomically.

9:15 MICROMORPHOLOGICAL CHARACTERISTICS OF THE TEGUMEN LAYER AMONG THREE MICHIGAN SPECIES OF LUZULA (JUNCACEAE). James C. Zech. The Ohio State University, Botany Dept., 1735 Neil Ave., Columbus, Ohio 43210-1293.

Seed micromorphological characteristics of the tegumen layer have been previously established for taxa of Juncus, but no work has been done within Luzula. As part of an investigation of the micromorphology of seeds of Juncaceae occurring in Michigan, three species of Luzula were examined using scanning electron microscopy. Mature seeds were obtained from herbarium specimens and the outer integument removed by a 1:9 mixture of sulfuric acid and acetic anhydride, followed by sonification. The seeds were then examined using an AMR-1200 Scanning Electron Microscope to establish micromorphological characteristics. The three Luzula species studied exhibit distinct tegumen configurations. Luzula multiflora shows a reticulate-foveate tegumen configuration. Luzula parviflora displays a pattern which is the result of an imprint from the integument layer above. The tegumen layer consists of channels which surround plateaus and represents the negative of the reticulate integument configuration above. Of the six samples of L. acuminata examined, three consistently showed a reticulate-foveate tegumen configuration similar to L. multiflora and the other three a negative configuration similar to L. parviflora.

9:30 ULTRASTRUCTURE OF THE FLAGELLAR APPARATUS OF THE UNICELLULAR GREEN ALGA, *GLOEOMONAS* (Volvocales, Chlorophyceae). Brian A. Berry and Gary L. Floyd. Dept. of Botany. Ohio State University 1735 Neil Ave. Columbus, Ohio 43210.

Many of the ultrastructural features of the flagellar apparatus of the green alga, *Gloeomonas*, are not typical of the Volvocales. The flagella become widely separated early in development unlike that of *Chlamydomonas* whose flagella remain together at a 90° angle until cell division. Also, in *Gloeomonas*, an accessory basal body is connected by a fibrous component to each primary basal body. Unlike the motile colonial green algae, a multicomponent distal fiber connects the primary basal bodies. In addition, the distal fiber appears to grow in length rather than stretch as in the previously studied colonial Volvocales. A multilayered membrane system of unknown function develops anteriorly to the distal fiber in the mature stages. More typically, two-membered and three-membered microtubular rootlets have been observed near each primary basal body. A striated microtubular associated component is associated with the three-membered rootlet. Furthermore, sexual reproduction involves fusion of gametes at lateral positions, rather than anteriorly, as reported for other algae of this order. Determination of the phylogenetic affiliations of *Gloeomonas* require additional developmental studies.

9:45 BREAK

10:00 ULTRASTRUCTURE OF MITOSIS AND CYTOKINESIS IN THE GREEN ALGA *CHAETOPELTIS* (CHLOROPHYCEAE). Paul L. Booth and Gary L. Floyd, Dept. of Botany, The Ohio State University, 1735 Neil Ave. Columbus, OH 43210

Chaetopeltis orbicularis Berth. has been proposed as the extant form of the ancestral genus through which the Chlorophycae diverged from the Ulvophyceae. It has scaly, quadriflagellate zoospores with a strictly cruciate absolute orientation of its basal bodies, combined features which are considered primitive by some investigators. Mitosis occurs within a closed nuclear envelope. At telophase the spindle collapses leaving narrowly separated daughter nuclei. Both pairs of centrioles and a phycoplast are positioned between the nuclei; and cytokinesis is accomplished by a unilateral cleavage furrow. *Chaetopeltis, therefore,* is placed at the base of the Chlorophycean line and may have phylogenetic affinities to the Chlorococcales, the Sphaeropleales, and the Pleurastrophyceae.

10:15 CLONAL ANALYSIS OF MERISTEM DEVELOPMENT IN THE SEEDLING SUNFLOWER SHOOT

Beth A. Welty & Dorothy E. Jegla, Department of Biology Kenyon College, Gambier OH 43022

The development of the shoot of sunflower, Helianthus annuus, was studied to determine whether vegetative and reproductive parts of the plant are derived from separate subsets of cells in the shoot apical meristem of five-day old seedlings. The fates of the meristemic cells were traced unequivocally using clonal analysis. The seedlings were irradiated with approximately 1000 kilorads of x-rays to induce pigment deficient mutations in meristem cells. Mutant cells produced pigment deficient sectors which appeared as white, yellow or yellow-green, or pale green areas affecting one or more leaves of the maturing plant. Sectors were observed which encompassed both vegetative and reproductive portions of the plant. Thus in the five-day seedling stage the cell lineages that will give rise exclusively to reproductive parts of the plant have not diverged from those that give rise to vegetative portions of the plant.

10:30 THE USE OF VIRAL ASSOCIATED dsRNA ANALYSIS FOR VIRUS IDENTIFICATION IN CUCURBITS. J.P.Rinhart and S.T. Nameth; River Valley High School, Marion, OH 43302, and Dept. of Plant Pathology, The Ohio State University, Columbus, OH 43210 respectively.

The possibilities of using viral-associated double-stranded RNA (dsRNA) as a method of detection and identification of cucurbit viruses in diseased cucurbit plants were explored. One week old seedlings of Cucurbita pepo var. Small Sugar Pumpkin were mechanically inoculated with five of the most common plant viruses known to infect cucurbits. The viruses were squash mosaic virus (SqMV),cucumber mosaic virus(CMV), watermelon mosaic virus-2 (WMV-2), zucchini yellow mosaic virus (ZMV), and papaya ring-spot virus (PRV). Inoculated plants were placed in an insect proof greenhouse under artificial illumination. Two weeks post-inoculation symptomatic plants were harvested and analyzed for the presence of viral-associated dsRNA using polyacryanide gel electrophoresis. Non-inoculated plants were also analyzed. Preliminary results indicate the presence of dsRNA profiles diagnostic for some viruses. DsRNA profiles of other viruses may not be as diagnostic. Other cucurbit varieties contain indigenous dsRNA's which may complicate disease diagnosis. Further work will be conducted in this area in an effort to modify this technique to a more selective and sensitive method of virus detection and identification.

SECTION B. PLANT SCIENCES
FIRST AFTERNOON SESSION - TIMKEN SCIENCE HALL 251
SATURDAY, APRIL 25, 1987
RALPH BOERNER, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 SPECIES AND MICROSITE SPECIFIC EFFECTS OF ICE STORM DAMAGE TO A FORESTED ECOSYSTEM. Kooser, James G., D.S. Cho, S. Runge and R.E.J. Boerner Program in Environmental Biology and Dept. of Botany, The Ohio State Univ. 1735 Neil Col., Oh. 43210.

On 19-20 January 1986, a rain and snow storm struck southern Ohio. In Neotoma Valley, Hocking co., unique microclimate patterns resulted in this storm being dominated by sleet and ice. The number of ice damaged trees and the proportion of basal area damaged was higher on the SW-facing slope than the NE-facing slope, and higher on lower slopes than on upper. Damaged trees were separated into those directly damaged by ice accumulation, and those secondarily damaged by the falling of portions of directly damaged trees. Significant correlations were found between the degree of direct damage and canopy diameter, basal area and tree height. Tree dimensions were not found to be reliable predictors of secondary tree damage, indicating secondary damage occured at random. Pines on the SW-facing slope were more heavily and frequently damaged than were broad-leaved trees. Different susceptibilities to ice damage were found among broad-leaved trees. Species experiencing damage to 20% of cumulative basal area included Quercus borealis, Acer rubra, Fagus grandifolia, and Oxydendron arboreum. By removing trees and opening space in the community, ice storms may alter the rate and pattern of succession in forests.

2:15 DISTRIBUTION OF FOREST GROUND-LAYER VEGETATION AND MYCORRHIZAL INFECTION INTENSITY ALONG AN ELEVATION AND MOISTURE GRADIENT ON THE LAKE ERIE ISLANDS. Ralph E.J. Boerner and Hugh F. Crowell, Botany Dept., Ohio State University, Columbus, OH 43210

Though the distribution of herbaceous plants and their mycorrhizal fungi along complex gradients of elevation, moisture, and soil chemistry have been described in many regions, the complex nature of such gradients has made resolution of the relative importance of each factor difficult. On the Lake Erie Islands, soil moisture varies inversely with elevation above lake level without any significant co-occurring nutrient gradient. Analysis of axis scores from DCA ordination of 74 herb/vine species in 21 forest stands demonstrated strong correlations between species composition and both elevation and moisture but no correlation with soil nutrient status. The proportion of rootlength with VAM fungi varied directly with moisture in Impatiens pallida, a species of wetter sites, and inversely in Geranium robertianum and Geum canadense, more wide-ranging species. Thus soil moisture regimes may influence mycorrhizal infection intensity independent of soil nutrient status, though the form of the relationship may differ among species.

2:30 MICROSITE VARIATION IN NITROGEN MINERALIZATION AND NITRIFICATION IN A BEECH-MAPLE FOREST. Shari D. Runge, Rick L. Yang, and R.E.J. Boerner, Botany Dept., Ohio State University, Columbus, Ohio 43210.

Though whole forest stand and ecosystem estimates of soil nitrogen dynamics are common, few studies have considered within-stand variations in N-mineralization and nitrification among microsites. We evaluated net mineralization & nitrification potentials during Autumn 1986 in A & B horizon soils taken from near the bases of beech (Fagus grandifolia), sugar maple (Acer saccharum), white ash (Fraxinus americana) and from sites away from trees, using buried bag incubations. Beech sites had significantly lower pH in both horizons than did soils from other sites, but moisture differed little among sites. Initial NO_3^- and NH_4^+ pools were higher in A than B horizon samples, differed among site types, and were greater later in the season than earlier. Net mineralization decreased in the order: ash > sugar maple > beech > no tree (A horizon); and ash > sugar maple > beech > no tree (B). Relative nitrification, in contrast, was highest in no tree sites. These results indicate that significant within-stand variations in both initial soil chemistry and the patterns and rates of N-transformations exist within this forest stand. We discuss the relative importance of soil organic content, soil N and P pools, time, moisture, and root dynamics in controlling these patterns.

2:45 CARBOHYDRATE CONCENTRATION IN CULTURE MEDIA IN RELATION TO THE SENSITIVITY OF MYCELIAL GROWTH AND SPORULATION OF BIPOLARIS MAYDIS RACE T TO GUAIACOL. Y-S. Shin and M. O. Garraway. Dept. of Plant Pathology, Ohio Agr. Res. Dev. Centr. and The Ohio State University, Columbus, OH 43210.

Mycelial growth and sporulation of Bipolaris maydis race T (BMT) after 7 days of incubation on a synthetic agar medium (pH 6.0) containing either low (1 g/liter each of D (+) - glucose and D (+) - xylose) or high (5 g/liter each of D (+) - glucose and D (+) - xylose) carbohydrate, were compared with that on similar media amended with either 200 or 400 mg /liter of o-methoxyphenol (guaiacol), a substrate for fungal polyphenoloxidase. Mycelial growth on low carbohydrate media with either 200 or 400 mg/liter guaiacol was, respectively, 81% and 61% of the control, which weighed 100 mg/ thallus. In contrast, with high carbohydrate mycelial growth was 89% and 38% of the control which weighed 340 mg/ thallus. Sporulation (conidia/mg/dry wt) at these guaiacol concentrations was 7% and 6% of the control with low carbohydrate and 11% and 1% of the control with high carbohydrate. After 7 days of incubation media pH and fungal polyphenoloxidase (ΔOD/hr/mg dry wt) were 8.0 $\pm$ 0.1 and 86 $\pm$ 30 with low carbohydrate and 7.7 $\pm$ 0.1 and 3 $\pm$ 1 with high carbohydrate. An increase in the sensitivity of mycelial growth and sporulation of BMT to inhibition by guaiacol occurs when the carbohydrate concentration in the medium is increased. This is associated with a significant decrease in fungal polyphenoloxidase.

3:00 VAMF SPORE GERMINATION AFFECTED BY pH AND (Cd^{++}). David A. Wright and Lawrence A. Kapustka. Botany Department, Miami University, Oxford, OH 45056.

VAMF colonization of plants in sludge amended plots declined dramatically from the 5th year to 8th year of amendment. This decline was due in part to acidification of the soils. Also the sludge Milorganite contains high concentrations of several toxic metals. To assess the impact of pH and Cd^{++} on germination and early hyphal growth, spores of Gigaspora margarita were placed on media varying in pH and (Cd^{++}). Ten replicates of 15 spores each were subjected to Cd cone varying from 0-80 umolar at pH 4.5, 6.0, or 7.5. Percentage germination and topological measures of hyphal growth were determined throughout a 28-day period. Germination, hyphal extension and branching pattern were markedly suppressed even at moderate levels of Cd^{++}. Optimum conditions were pH 6.0 and 0 Cd^{++}.

3:15 PROPAGATION OF GRASSLAND SPECIES BY TISSUE CULTURE TECHNIQUES. Lawrence A. Kapustka, Hunter Smith, Paul Burkhouse, and K. G. Wilson, Botany Dept., Miami University, Oxford, OH 45056.

Vegetative and reproductive tissues of several wild grassland species were placed on MS medium with various hormonal combinations. The plants were manipulated to determine regeneration potentials including bud initiation from callous, shoot proliferation, and rooting. Cultures which developed shoots and roots were transferred to soil to achieve more mature stages. Mammalaria vivipara, Lithospermum incisum, Oenothera macrocarpa, Rudbeckia hirta, and Baptisia australis were readily propagated.

SECTION B. PLANT SCIENCES
SECOND AFTERNOON SESSION - TIMKEN SCIENCE HALL 271
SATURDAY, APRIL 25, 1987
DAVID SPOONER, PRESIDING

2:00 THE GENUS PEPEROMIA ON THE JUAN FERNANDEZ ISLANDS AND ON THE SOUTH AMERICAN CONTINENT;A PHENETIC STUDY. Hugo A. Valdebenito and Tod F Stuessy.The Ohio State University, Department of Botany, 1735 Neil Avenue, Columbus, Ohio 43210.

Phenetic analyses were used to understand relationships of four species of the genus Peperomia (Piperaceae) present on the Juan Fernandez Islands (Chile). The results suggest a close relationship among the insular species belonging to subgenus Tildeniidium (Peperomia berteroana, P. margaritifera, and P. skottsbergii).The endemic species present on the Chilean continent (P. nummularioides, P . doellii, and P, coquimbensis) seem to be related with Andean species preseht in Peru and Bolivia. Moreover, phenetic analyses showed some resemblances betwen species present on the islands and those present on the South American continent, especially from Bolivia (i.e. P. yanacachiana, P. unduavina, P. yungasana, P. olens and P. vestita).

It is suggested that there were two introductions of the genus to the archipelago. Possibly the first introduction was the ancestor of P. berteroana . This species could have given rise to P. margaritifera and P. skottsbergii, with the former evolving primary on Masatierra and the latter on Masafuera. At the same time, P. fernandeziana on both islands might have had a separate introduction from conspecific mainland populations. It is significant that the species present on the Juan Fernandez Islands belong to different subgenera.

2:15 FLAVONOID EVOLUTION IN GUNNERA (GUNNERACEAE) OF THE JUAN FERNANDEZ ISLANDS. Patricia Pacheco, Daniel J. Crawford, and Tod F. Stuessy. Department of Botany, The Ohio State University, Columbus, Ohio 43210.

The flora of the Juan Fernandez Archipelago (520 km west of the Chilean mainland) is characterized by a high degree of endemism. The genus Gunnera, which is the most conspicuous herbaceous genus in the archipelago, has three endemic species : Gunnera bracteata, G. masafuerae, and G. peltata. A closely related species, G tinctoria, grows abundantly in mainland Chile. A total of twelve flavonoid compounds were isolated from these four species. All compounds are flavonol (quercetin) and flavone glycosides. The distribution of flavonoid compounds in these four species indicates that: (1) little flavonoid divergence has accumulated between the island species and their presumed progenitor in the mainland; and (2) minimal changes in flavonoid chemistry have occurred among the endemic species on the archipelago.

2:30 CHROMOSOME NUMBERS OF HAWAIIAN LOBELIOIDEAE (CAMPANULACEAE), AND THE SYSTEMATIC UTILITY OF CYTOLOGICAL DATA IN THE SUBFAMILY. Thomas G. Lammers, Department of Botany, The Ohio State University, 1735 Neil Ave., Columbus, OH 43210-1293.

The flora of the Hawaiian Islands includes over 100 endemic species of Lobelioideae (Campanulaceae), representing six endemic genera (Brighamia, Clermontia, Cyanea, Delissea, Rollandia, and Trematolobelia) plus cosmopolitan Lobelia. These plants are poorly known cytologically. Chromosome numbers have been determined for only 11 species. All previously published counts are n=14. New counts reported here confirm this. Although there is no variation in chromosome number among the Hawaiian species, systematically useful variation does exist within the subfamily as a whole. The base number of the subfamily is x=7. Euploid and aneuploid series occur in several genera (e.g., Lobelia, Pratia, Downingia). In such taxa, cytological data offer useful supplementary data in understanding taxonomic relationships and determining evolutionary directionalities. For example, D.J. Mabberley has recently proposed that woodiness is a primitive character state among lobelioids. However, this concept is not supported by cytological data. Woody lobelioids (e.g., Lobelia subg. Tupa, Cyanea, Trematolobelia) are tetraploid and hexaploid (n=14,21), while herbaceous taxa (e.g., Lobelia subg. Lobelia, Hypsela, Isotoma) are diploid, with n=7.

2:45 THE ORIGIN OF SIMSIA CHASEAE. David M. Spooner. Deptartment of Botany, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio, 43210-1293.

Simsia (Compositae, Heliantheae), is a genus of 20 species distributed throughout tropical America. Hybridization is believed to be operative on many levels in the genus, from sporadic local hybridization to diploid hybrid speciation. Simsia chaseae is a self-compatible species distributed in open areas of tropical lowland deciduous forests in southern Veracruz and the Yucatan peninsula. It is hypothesized to be of diploid hybrid origin between self-compatible S. eurylepis of the lowlands of the Gulf coast of Mexico and self-incompatible S. foetida, widespread throughout Mexico and Central America. This hypothesis was tested by artificial interspecific hybridization of the putative parents. Thirty-four hybrids were produced, all intermediate morphologically between the parents and similar to S. chaseae. The artificial hybrids have reduced pollen stainabilities (mean = 36.5%, range = 4-50%; vs. over 90% for the parents) and are self-incompatible. They are strikingly similar to S. chaseae and are believed to represent progenitors which gave rise to this species through the development of inbreeding and the fixation of their distinctive features. It is believed to be reproductively isolated by chromosomal rearrangements.

3:00 THE SYSTEMATICS OF ASTER SUBGENUS OXYTRIPOLIUM AND HISTORICALLY ALLIED SPECIES. Scott Sundberg. Dept. of Botany, The Ohio State Univ., 1735 Neil Ave., Columbus, OH 43210.

The systematics of Aster subgenus Oxytripolium (Compositae) is discussed, including a realignment of the subgenus and assignment of several historically misplaced species to other genera. Subgenus Oxytripolium includes three species: A. potosinus, A. tenuifolius (with two varieties), and A. subulatus (with six, widely distributed varieties). Hybridization experiments demonstrate that none of these species is interfertile. Artificial hybrids have been produced amongst most paired combinations of varieties within A. subulatus, as well as between the two varieties of A. tenuifolius. Other species historically placed in the subgenus, including A. spinosus, A. intricatus, A. pauciflorus, A. leonis, A. lepidopodus, and A. riparius are aligned with other genera or are placed in other subgenera of Aster.

3:15 VARIATION IN POLYGONUM PENSYLVANICUM L. WITH AN EMPHASIS ON VAR. EGLANDULOSUM (MYERS) John Taylor-Lehman, Dept. of Botany The Ohio State University 1735 Neil Ave. Columbus, Ohio 43210-1293

Polygonum pensylvanicum occurs throughout the United States and Canada with six varieties currently recognized for the species. The var. eglandulosum has the most restricted distribution; occurring almost exclusively on the western Lake Erie Islands along the shoreline in recently disturbed calcareous soils. Examination of populations in central and northwestern Ohio indicates that the features used to seperate all varieties are variable in natural populations. Results from a phenetic analysis are presented to illustrate this point. The var. durum is reported for the first time from Ohio; this is far outside its normal range in the southern United States. Chromosome counts of 2n=44 are presented and differ from those reported by Love & Love 2n=22. Electrophoretic data support the tetraploid chromosome level and are used to describe genetic variation within and among populations of P. pensylvanicum.

3:30 **A REVISION OF THE MOSS GENUS HOMALIA (NECKERACEAE) IN ASIA. Si He, Dept. of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006**

A taxonomic revision of Homalia in Asia has led to a reduction of the taxa from 12 to 4, including two new taxa. The taxa Homalia pygmaea and Homalia pygmaea var. elongata, together with Glossadelphus abortivapicus (Sematophyllaceae) are placed in synonomy under Symphyodon complanatus (Symphyodontaceae). Homalia goughiana and Homalia pusilla are transferred to the genus Neckera (Neckeraceae) and Homalia sakontata is transferred to the genus Homaliodendron (Neckeraceae). The intergeneric relationships have been investigated between Homalia and the genera Neckera, Isodrepanium and Homaliodendron (Neckeraceae), Isopterygium and Taxiphyllum (Hypnaceae), Symphyodon (Symphyodontaceae) and Glossadelphus (Sematophyllaceae). The Asian species of Homalia are mainly distributed in the east Indian islands, southern and southeastern Asia. Homalia represents a complex genus in the Neckeraceae that possesses characters exhibiting broad morphological variation.

SECTION B. PLANT SCIENCES
POSTER SESSION - OSBORNE HALL GYMNASIUM AUDITORIUM
SATURDAY, APRIL 25, 1987

Board I @ 9:00 AM ASSESSMENT OF VAMF COLONIZATION IN SOIL AFTER EIGHT YEARS OF SLUDGE AMENDMENT. C. E. Wilms, P.T. Arnold and L. A. Kapustka. Botany Department, Miami University, Oxford, OH 45056.

After five years of sludge-amendment (1983), the percentage colonization of VAMF symbionts on selected field species and on bioassay plants was similar to that in unamended fields at the Ecological Research Center (ERC) at Miami University. Similarly, field collections in 1985 were analyzed for VAMF colonization. Bioassay Lolium plants were grown in soil collected from the sludge-amended, urea-phosphate-amended, and unamended plots at the ERC. Field and bioassay root samples showed little or no colonization in either the sludge- or urea-phosphate-amended soils, and high levels of colonization in the unamended soil. Examination of the pH showed that the sludge- and urea-phosphate-amended soils were very acidic with pHs as low as 4, while control soils maintained a pH range of 5-6. A glasshouse experiment where soil pH was adjusted to 4, 5, 6, and 6.5-7 was performed with sorghum as the bioassay plant. The results showed that upon raising the pH, sludge-amended soils and unamended soils once again had similar colonization levels, while at low pHs colonization was suppressed. The dramatic loss of VAMF colonization in sludge-amended fields between the fifth and eighth year of amendment appears to be related to a pH effect. However, VAMF germination is also suppressed by toxic metals. Implications of pH and toxic cation mobility will be discussed.

Board J @ 9:00 AM EFFECTS OF ACID DEPOSITION-RELATED SOIL FERTILITY CHANGES ON GROWTH OF PANICUM VIRGATUM. Johnna D. Sholtis and Ralph E. J. Boerner. Dept. of Botany. The Ohio State University. Columbus, Ohio 43210

The physiological plasticity of plants may allow the maintenance of relative growth rates despite acid deposition-induced low soil nutrient availability by increasing nutrient use efficiency, at least over some range of nutrient availability. To determine the threshold for this growth/fertility relationship for perennial switchgrass, Panicum virgatum, and to clarify which of several effects on soil acid deposition may have, plants were grown under greenhouse conditions with combinations of treatment factors: pH (3.5 or 5.0), N+P supply rate (low vs normal), and Ca:Al ratio (1:1,10:1, 25:1). Growth responses and nutrient use efficiency were assessed by calculating growth rate, growth efficiency, N, P, Ca, and Al uptake and resorption, and uptake efficiency. Additionally, the effect of acid deposition on mycorrhizal infection was studied by measuring % VAM infection of roots. By analyzing each treatment and their interactions, the factor or combination of factors most inhibitory to plant growth will be identified.

SECTION C. GEOLOGY
MORNING SESSION - TIMKEN SCIENCE HALL 240
SATURDAY, APRIL 25, 1987
MARK J. CAMP, PRESIDING

9:00 NEW THOUGHTS ON THE EXTINCTION OF MAMMUT IN NORTH AMERICA. Barry E. Muller and Mark J. Camp, Toledo Museum of Science, 2700 Broadway, Toledo, Ohio 43609 and Department of Geology, University of Toledo, Toledo, Ohio 43606

In recent years many studies have focused on the late Pleistocene extinctions of the proboscideans. There are two major schools of thought; one invoking the climatic model and the other, the "overkill" model. Each model has its merits and flaws, causing some researchers to seek the middle ground, combining the strengths of both. We propose additional considerations to the climatic/"overkill" model. These are based on the natural history of modern elephants as well as on insights on what is presently known about earlier elephants. Certain aspects of the lifestyle of Mammut allowed it to be one of the most successful of all proboscideans while at the same time was the reason for its demise. Studies on modern proboscideans show that they form matriarchal family groups which are very stable. Evidence points to similarities between the habits of Mammuthus and modern elephants. Mammut occurrences, however, suggest it inhabited a wide variety of habitats, was geographically widespread, and was able to spread rapidly into new areas open to it. Mammut apparently formed smaller, more flexible, and mobile family units which could more rapidly take advantage of new biomes. These small family units were probably more susceptible to predation by organized hunters like man.

9:15 QUATERNARY DELTAIC SEQUENCES, CENTRAL SANDUSKY COUNTY, OHIO Michael P. Angle, ODNR, Division of Geological Survey, Fountain Square, Bldg. B, Columbus, Ohio 43224

A series of previously unreported deltaic sequences have been delineated while mapping the glacial geology of Sandusky County. The sequences include a sandy (with minor gravelly bars) proximal deltaic facies and a laminated silt (with fine sand partings) distal deltaic facies. The former represents moderately rapid deposition into shallow water, whereas the latter is more indicative of slower, deeper water deposition. Locally, it appears that the sandy facies has prograded over the silty facies. The source of these sequences appears to be the sediment load of the ancestral Sandusky River, which was being deposited into former, higher water level stands of Lake Erie.

The highest, and areally most extensive, of these sequences begins near Fort Seneca and rapidly broadens northward to Fremont, where the distal, silty facies becomes predominant. The elevation of the delta's proximal surface slopes northward from 700 to 640 feet. The delta was a potential source for Warren (685 ft to 675 ft), Wayne (660 ft) and Grassmere (640 ft) beaches. From 630 to 610 feet, a second sandy facies overlies the earlier silty facies and corresponds with Lundy or Elkton (625 ft to 615 ft) beaches. To the north, thin sandy and thicker silty

interdistributaries branch towards Sandusky Bay.

The deltas have been identified on the basis of their paleogeography, geomorphology, and composition. Unfortunately, poor exposures, combined with intense bioturbation and agriculture result in a lack of observable sedimentary structures such as cross-bedding, ripples, and foresets. Wave activity from the fluctuating lake levels also may have contributed to the lack of preserved bedding features.

9:30 DEPOSITIONAL ENVIRONMENT OF THE NORTHERN ELEMENT OF THE WYANDOT ESKER, NORTH-CENTRAL OHIO. Rene L. Fernandez, Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square Dr., Columbus, Ohio 43224

The northern section of the Wyandot esker formed in a sub-ice tunnel which follows a pre-existing valley cut into Millbrook Till. The esker formed during the ablating stage of what appears to be the next-to-last ice advance in the area. A subglacial melt-out till caps the entire 3 mile length of this northern element. The character of till varies widely but commonly resembles Hayesville Till. In places blocks of the till have been incorporated into the underlying glaciofluvial sediment. Till and sediment along the flanks of the esker exibit ice-contact deformation.

Three glaciofluvial facies are recognized within the esker on the basis of grain size and sedimentary structures. From proximal to distal end these are: a scour-and-fill cobble gravel and gravelly sand facies, a parallel topset and foreset gravel and sand facies, and a bedded and crossbedded sand facies. These facies represent respectively the entry, the closed conduit, and the distributary sections of the esker.

9:45 THE WISCONSINAN GLACIAL MARGIN IN HAMILTON COUNTY, OHIO C. Scott Brockman, Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square, Bldg. B, Columbus, Ohio 43224

Wisconsinan-age Shelbyville till covers the northern quarter of Hamilton county. The ice terminus is generally marked by thin till which abuts north-facing bedrock hills or extends partially down south-flowing valleys. The discontinuous Hartwell Moraine is the actual till boundary over a relatively small area, particularly in the Sharonville and Fernald areas. In the latter area, a crescentic alpine-like morainic ridge formed across the former valley of Paddy's Run.

Shelbyville ice and till partially filled or blocked certain pre-Wisconsinan streams and formed several sedimentologic/geomorphic associations. Lacustrine silt and clay accumulated in meltwater basins that were eventually breached to form outlets and outlet fans. Near Ross, a high-level ice-marginal channel ends in a large fan.

Ice-contact features are present in the eastern part of the county but absent in the western part. Kames and eskers have formed in a broad pre-Wisconsinan (Deep-Stage) trough. The same trough to the west is mantled by hummocky ablational deposits; in front of this margin a small stand of Wisconsinan-age spruce stumps, rooted in sandy Shelbyville outwash, has been uncovered by a recent stream-channel diversion.

10:00 GEOMORPHOLOGY AND SURFICIAL GEOLOGY OF RANDOLPH TOWNSHIP, PORTAGE COUNTY, OHIO. David H. Mangold, Department of Geology, The University of Akron, Akron, Ohio 44325

The township is in the glaciated region of Ohio. The surface is the result of glaciation during the Pleistocene Epoch. The preglacial surface of Pennsylvanian Age was eroded during glaciation. Ground moraine, kames and kettles are common. The topography is a result of the preglacial topography and glacial modification. The surface is currently being eroded and drained by a poorly connected deranged drainage system. Many of the creeks have been dredged to permit better drainage. This has increased flow capacity and prevents flooding. Reworking and deposition of the glacial sediments occurs in and along the streams. A regional divide or watershed passes through the township. The divide separates the drainage basin of the Ohio River and Lake Erie. The divide has been mapped. Using a Top-of Rock map and topographic maps, profiles have been drawn to show the thickness of the glacial drift. The profiles can be used to visualize the control of the bedrock surface on the currenty postglacial surface. The glacial deposits of sand and gravel are of economic importance. Limestone, coal, and sandstone in the bedrock could also be of economic importance if not buried by a large amount of till.

10:15 MINERALOGY AND LITHOFACIES OF THE ASHTABULA TILL IN LAKE AND ASHTABULA COUNTIES, OHIO Pierre W. Bruno and John P. Szabo, Dept. of Geology, The University of Akron, Akron, OH 44325

Woodfordian Ashtabula Till has two distinguishable facies which appear in the bluffs of Lake Erie in Ashtabula and Lake Counties in northeastern Ohio. The upper facies, represented by a bed which usually comprises the upper three quarters of the bluffs, is moderately oxidized and leached except where subsequent deposition of sand and silt has preserved erosional surfaces. Below the weathered zone the till is gray, generally massive, but has beds, laminations, and lenses of silt. The lower facies contains more shale, has lighter gray color, and is intermittently exposed. Locally, a finer-grained red bed, often quite convoluted, occurs in the exposures. Field identification of matrix supported, massive to stratified, and sheared lithofacies was used with laboratory analyses of texture and mineralogy to differentiate the beds. Cathodoluminescence techniques identified a quartz-rich, alkali-feldspar dominant, fine sand fraction. Gray shales dominate the 1-2mm fraction. Calcareous red siltstone and crystalline grains are abundant. X-ray diffraction showed that illite, kaolinite, and chlorite are the major clay minerals. Carbonate analysis of the less that 0.074mm fraction yielded calcite/dolomite ratios ranging from 1.0 to 0.5 throughout the study area. Texture and mineralogical differences within the Ashtabula Till probably indicate a lodgement till facies overlain by basal meltout facies.

10:30 THE INFLUENCE OF LOCAL BEDROCK ON PRE-WOODFORDIAN TILLS IN COLUMBIAN COUNTY, OHIO, Richard W. Volpi and John P. Szabo, Dept. of Geology, The University of Akron, Akron, Ohio 44325

The Grand River sublobe of the Erie lobe flowed southward into Columbiana County and deposited several distinctly different tills. These tills overlie Pennsylvanian bedrock consisting of shales, sandstones, minor amounts of limestones, and continuous and discontinuous coal beds. Twelve sections of till and underlying bedrock were measured in active strip mines. A total of 160 till samples and 40 bedrock samples were taken for analysis. Sand content of tills ranged from 26.7% to 53.6%, silt from 32.3% to 41.2%, and clay content ranged from 11.7% to 28.2%. Carbonate content of tills ranged from 0.0% to 5.6%. Five sections of the till form a north-south traverse from lower Mahoning County to the glacial boundary in Columbiana County. Comparision of diffraction intensity ratios (D.I.) of clay minerals in unweathered tills and underlying bedrock indicated that there are three trends in the data. First, a positive correlation of 0.96 was found between the D.I. of bedrock versus north-south distance. Second, a positive correlation of 0.99 was found between the D.I. of bedrock versus north-south distance. Third, a positive correlation of 0.98 was found between the D.I. of tills versus north-south distance. Results show that although ice was slowing as it overrode the plateau, compressional flow permitted increased erosion of local bedrock.

10:45 TRANSPORT MECHANISMS OF CLASTS BY AN ALPINE GLACIAL SYSTEM: A CASE STUDY OF THE CATHEDRAL MASSIF GLACIER, BRITISH COLOMBIA. Michael L. Strobel. Institute of Polar Studies. 125 S. Oval Mall. Columbus, Ohio 43210.

Clasts transported and deposited by alpine glaciers occur in three major types of deposits: basal till, englacial till, and supraglacial till. Attrition and deposition along the base of a glacier account for an exponential decrease in the abundance (A) of clasts with distance from their source. Clasts that are moved into the body of the glacier or are deposited on the glacier surface are not subjected to the attrition and deposition of basal till and therefore display a linear decrease in certain clasts as a function of distance.

Clasts of the Cathedral Massif Glacier of British Columbia decrease linearly with distance from their source. A straight line, fitted to the data by least squares regression, has a slope = -0.013 and a correlation coefficient $r^2 = 0.9466$. This suggests that among the samples tested, englacial and supraglacial processes play a dominant role in clast transport.

SECTION C. GEOLOGY
FIRST AFTERNOON SESSION - TIMKEN SCIENCE HALL 240
SATURDAY, APRIL 25, 1987
WAYNE MARTIN, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 A SHALLOW SEISMIC REFLECTION STUDY OF UNCONSOLIDATED SEDIMENTS. Paul J. Wolfe, Peter K. Middlebrooks, and Karel Toman, Dept. of Geological Sciences, Wright State University, Dayton, OH 45435.

High resolution seismic reflection techniques allow mapping of shallow geologic features such as water table, clay layers, sand lenses and bedrock surface. Seismic data for this study were collected using a 12-channel seismic recording system, high-frequency geophones and a ten-pound weight drop energy source. The data were processed using the MEGASEIS computer package.

The survey site was in the Mad River Valley just below Huffman Dam (a Miami Conservancy District Flood Control Dam). The one-half mile wide valley was filled with sediment during the most recent glacial episode. Strong reflections from the bedrock surface provided a detailed profile which was in good agreement with well data. Within the valley fill a prominent sand-clay interface was mapped from its seismic reflection.

2:15 CORRELATION OF GRAVITY RESIDUALS WITH KNOX UNCONFORMITY RELATED STRUCTURES IN MORROW, COUNTY, OHIO. Paul J. Wolfe, William M. Armstrong, B.H. Richard, and Christopher Sweazy, Dept. of Geological Sciences, Wright State University, Dayton, OH 45435.

A three square mile area of Cardington Township, Morrow County, Ohio has been studied with detailed gravity surveys and well log analysis. This area has been extensively drilled for oil which is produced from erosional remnant highs on the Knox unconformity surface. Existing well logs were interpreted and structure contour and isopach maps were constructed for several relevant formations.

A gravity survey on a 220-foot grid with 0.2-foot elevation control was conducted over the area. The gravity data were reduced using standard corrections and the regional gravity field was removed.

A good correlation was found between high areas on the Knox surface and positive residual gravity anomalies. Second derivative gravity maps also showed good agreement with the same high areas.

The structure contour maps were used to generate theoretical gravity profiles. A comparison of these theoretical profiles with observed gravity anomalies show good correlation but the observed gravity anomalies are larger than the models predict.

2:30 MIDDLE SILURIAN TIDAL FLAT SEDIMENTATION IN LEWIS COUNTY, KENTUCKY. Kent Y. Whitaker and Wayne D. Martin, Miami University, Department of Geology, Oxford, Ohio 45056.

The Bisher Dolomite Formation (Middle Silurian) of Lewis County, Kentucky contains sedimentary structures, allochems and facies relationships indicative of tidal flat sedimentation.

Bioturbated dolomitized wackestones, resulting from the induration of subtidal, protected open marine deposits, are void of physical sedimentary structures and contain an open marine fossil fauna of brachiopods, crinoids, bryozoans, rugose corals and stromatoporoids.

Facies originating in tidal channels, tidal ponds and channel levees are closely associated, but can be differentiated. Parallel laminations, intraclasts and desiccation features characterize channel levee deposits. Cross laminations with reactivation surfaces and a highly variable grain size distinguish tidal channel deposits and argillaceous, burrow mottled mudstones typify tidal pond deposits. Birdseye vugs, wrinkle marks, desiccation cracks, and alternations of very thin beds typical of storm and interstorm deposits support a supratidal algal marsh environmental interpretation for the very thin bedded mudstone lithofacies. Vertical relationships between these lithofacies define two shallowing upward sequences that resulted from tidal flat progradation in northern Kentucky during the Niagaran Epoch.

2:45 DEPOSITIONAL ENVIRONMENTS OF THE BEREA SANDSTONE AT ROCKY FORK, GAHANNA, OHIO. Coats, Kenneth and Krissek, Lawrence, Department of Geology and Mineralogy, Ohio State University, Columbus, OH 43210

The Rocky Fork section at Gahanna is the best, and the only complete, exposure of Berea Sandstone between northern Ohio and Circleville, Ohio. This section has been described previously in the literature for its excellent exposure of flow rolls and soft sediment deformation. The present study uses primary sedimentary structures to define the depositional environments of the Berea Sandstone at Gahanna.

The section coarsens upward, beginning with the upper 4.5m of Bedford Shale. The base of the Berea is defined by the loss of mudstone. The Berea is 12.1m thick, with the top defined by a sharp contact with the Sunbury Shale. Sedimentary structures present include horizontal laminations, low angle and low amplitude cross-stratification, and oscillation ripple marks.

The vertical association of swaley cross-stratified and oscillation ripple-marked beds, and the vertical repetition of that association, suggests that the Berea at Gahanna represents a gradually shallowing(?) marine shelf sequence deposited near fair-weather wave base. Further interpretations of ripple orientations and wavelengths may indicate approximate water depth and wave conditions at the time of deposition.

3:00 PALEOECOLOGY OF A CINCINNATIAN (UPPER ORDOVICIAN) BRYOZOAN-TRILOBITE ASSOCIATION. SHRAKE, Douglas L., Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square, Building B, Columbus, Ohio 43224.

In situ epibenthonic faunal associations are rarely preserved in the fossil record. Buried bryozoan thickets collected from the basal Kope Formation near Carntown, Kentucky, are interpreted to be in situ with a well-preserved epibenthonic fauna. The epibenthonic fauna consisted of the inarticulate brachiopods, Petrocrania scabiosa and Orbiculoidea tenuistriata, the articulate brachiopods, Zygospira modesta and Sowerbyella rugosa, and the trilobites, Primaspis crosotus and P. trentonensis. This fauna was associated with ramose bryozoan thickets identified as predominantly Batostoma jamesi.

Analysis of the Carntown collection indicates the bryozoan-trilobite association existed for some time prior to the rapid burial of the thicket. Evidence supporting the existance of this association include overgrowths of trilobite fragments by bryozoan material, accumulation of trilobite fragments on or near bryozoan thickets, and borings that penetrate through fossil fragments into the underlying bryozoan. This association is unique in that trilobites, Primaspis spp., are preserved in an epibenthonic setting, instead of a benthonic setting. Epibenthonic Primaspis crosotus and P. trentonensis exploit the low-competition ecological niche provided by the bryozoan thicket.

3:15 **ORIGIN OF CINCINNATIAN SERIES MICROCRYSTALLINE LIMESTONES. Lasemi, Zakaria, Department of Geology, Miami University, Oxford, Ohio 45056.**

Scanning electron microscopy of Cincinnatian Series (Upper Ordovician) microcrystalline limestones from southeastern Indiana and southwestern Ohio reveals ultrastructural properties similar to those recently described for Plio-Pleistocene microcrystalline limestones with aragonitic lime mud precursors. This suggests that the lime mud precursor of the Cincinnatian Series microcrystalline limestone was aragonite-dominated. During this time the sea-water chemistry was different than today and calcite, rather than aragonite, precipitated inorganically (Sandberg, 1983). Thus the lime mud precursors of Cincinnatian Series microcrystalline limestones were probably not of inorganic, but biogenic (algal?) in origin. Apparently, during the Late Ordovician just as today, calcareous organisms important in lime mud production exerted some control on their skeletal mineralogy.

Neomorphic calcite crystals in the Cincinnatian Series microcrystalline limestones are platy in fracture surfaces. Lobo and Osborne (1973) suggested that platy calcite represents disintegerated skeletal material in these rocks. However, platy calcite crystals are formed by replacement of aragonite; thus the presence of platy calcite is inadequate to confirm comminuted calcareous skeletal material.

3:45 INVESTIGATION OF A SOUND HEARD OVER A WIDE AREA. Scott, T., Department of Physiology, Ohio State University, Columbus, Ohio 43210

On October 11, 1973, an unusual tremor was experienced over a 10 state area. It may have been the most widespread sound ever recorded with the exception of the Krakatoa explosion. A detailed investigation was made using local newspapers, earthquake information, and the Freedom of Information Act. The time of the tremor varied from between 8:41 and around 9:00 PM in an area stretching from Indiana to Maryland and Kentucky to Pennsylvania. The sound and vibrations could not be attributed to earthquake tremors, nor did the widespread pattern of the boom match that of a sonic boom. In comparison, the sonic boom of an SR-71 aircraft (October 21, 1973) was reported as such. No meteor fall was witnessed. A five-second burst of very high-frequency sound was recorded at a Pennsylvania seismograph at 8:53 PM. Although officials at Wright-Patterson Air Force Base were reported to have investigated the origin of the sound, it's origin has never been explained.

SECTION C. GEOLOGY
SECOND AFTERNOON SESSION - TIMKEN SCIENCE HALL 220
SATURDAY, APRIL 25, 1987
ROBERT MALCUIT, PRESIDING

2:00 ORIGIN OF THE MOON BY GRAVITATIONAL CAPTURE: IMPLICATIONS FOR OCEAN TIDES ON EARTH OVER GEOLOGIC TIME. Robert J. Malcuit, Dept. of Geology and Geography, Denison Univ., Granville, Ohio 43023

A gravitational capture origin for the Earth-Moon system can be divided into four orbital eras: the Pre-Capture Era in which the lunar body is in a heliocentric (planetary) orbit; the Capture Era (short-lived and about 3.9 b.y.b.p.) in which the lunar body changes from a heliocentric to a geocentric orbit; the Early Post-Capture Era in which the Moon's orbit evolves from a highly elongate, high energy orbit to a near circular one; and the Post-Capture Circular Orbit Era in which the Moon's near circular geocentric orbit slowly expands to its present dimensions due to transfer of angular momentum from a rotating Earth. The Pre-Capture and Capture Eras are characterized by tidal amplitudes of several km on an irregular periodic time-scale during close, non-capture planetary encounters. However, after the capture encounter the lunar body is inserted into a highly elliptical orbit with a period of about 100 days (day=24 hrs.). The period of the lunar orbit then decreases from about 100 days to 15 days as the perigee increases from about 20 R_e (Earth radii) to 40 R_e and as the apogee decreases from about 270 R_e to 40 R_e . During this orbital circularization, the maximum equilibrium tidal amplitude gradually changes from about 10 m when the Moon is at 20 R_e to about 1.4 m when the Moon is at 40 R_e. During the Post-Capture Circular Orbit Era, the maximum equilibrium tidal amplitude gradually decreases to the present 0.5 m.

2:15 CHEMICAL AND SR-ISOTOPE CORRELATION OF STRATIGRAPHIC SECTIONS OF THE KIRKPATRICK BASALT IN THE MESA RANGE AREA, NORTHERN VICTORIA LAND, ANTARCTICA. Teresa M. Mensing and Gunter Faure, Institute of Polar Studies, Ohio State University, Columbus, Ohio 43210.

A thick sequence of lava flows of the Jurrasic Kirkpatrick Basalt Group is exposed in the Mesa Range area. Four complete stratigraphic sections were measured and sampled: three sections on Pain Mesa and one at Solo Nunatak (located 20 km northeast of Pain Mesa). The distinctive and strikingly similar appearance of the uppermost flow on Solo Nunatak compared to a laterally continuous flow near the base of Pain Mesa suggests that the units are correlative and have been separated by erosion. Chemical and Sr-isotopic data and the regional westerly dip of the lava pile is consistent with this hypothesis. Therefore, the Solo Nunatak section together with that on Pain Mesa may represent a thick and continuous sequence consisting of more than 40 lava flows. A second correlation can be made between the three sections measured on Pain Mesa based on a distinct chemical break toward more chemically evolved compositions near the top of the sequence.

2:30 RADON OCCURRENCES IN NORTHEAST OHIO - AN ENVIRONMENTAL HAZARD? Darioush T. Ghahremani, Terradon Exploration Technologies, Inc., P.O. Box 22288, Cleveland, Ohio 44122

Radon gas is a naturally occurring radioactive gas. When it undergoes radioactive decay, the successive radioactive products attach themselves to very small dust particles present in the air. When these particles are inhaled, they may become lodged in the lungs and before they are cleared from the lungs, the subsequent decay of these products can damage surrounding tissue and cause an increased risk of lung cancer. This has been noted among uranium miners where exposures to radon and daughter products have produced lung cancer.
Results of several radiometric surveys using multiple radon detection techniques in northeast Ohio revealed many sites where anomalous values of radon and associated gases were found in near surface environments. Laboratory analysis of soil samples and comparisons between radon activities and scintillometer readings at the same sites indicated that radon is of bed rock (shale) origin. Natural fracturing of rocks and higher permeability of local soil enhanced radon flux to the surface. Therefore, it is possible that higher than average levels of radon gas may be trapped inside living environments (with longer residence time to decay). This significantly increases the risk of lung cancer due to higher radioactivity caused by localized bed rock (shale) related micro-seeps.

2:45 EARTH MATERIALS AS COAGULANTS FOR MUNICIPAL WASTEWATER TREATMENT. Howard H. Lo and Paul J. Novak, Jr., Department of Geological Sciences and Yung-Tse Hung, Department of Civil Engineering, Cleveland State University, Cleveland, Ohio 44115.

Our investigation involved adding various types of earth materials to wastewaters of different treatment plants to determine the effects to the turbidity and transmittance of the water. Earth materials selected for study were granite, basalt, shale, and limestone. The wastewaters were collected from two locations, Southerly Sewer Treatment Plant, Cleveland, Ohio and Central Wastewater Treatment Plant, Solon, Ohio. Water from the Southerly plant consisted only of samples taken after primary clarification. Water from the Solon plant consisted of samples taken after four different treatment stages, primary clarification, secondary clarification, tertiary filters, chlorination, and combined raw sewage. The turbidity of the wastewaters from the Southerly plant increased while the transmittance decreased when the powdered rock samples of granite, basalt, and shale were added with increasing dosage. Similar results were also observed in the samples of Solon plant regardless of different stages of treatment. Results of study indicated that regardless of mesh size, turbidity increased with increasing dosage of earth materials. Granite, basalt, and shale exhibited similar behavior in all the wastewaters. Limestone, however, behaved differently, having a lower turbidity and a higher transmittance with an increase of its dosage.

3:00 USE OF WATER WELL LOGS TO CHARACTERIZE THE GEOLOGIC CONDITIONS AROUND A SUPER FUND SITE, STARK COUNTY, OHIO
James R. Bauder, 3095 Bernewood Drive N.W. Canton, Ohio 44709 (216) 492-0715

The Industrial Excess Landfill, located just south of Uniontown, Ohio, is located within interlobate deposits. Geologic cross sections developed from 200 water well logs indicated: the probable lateral extent of the various glacial materials, the glacial deposits over lie Potsville strata, the bedrock had been eroded to valley and ridge landforms, the landfill site is flanked by two buried valleys, and that there are at least three distinct aquifer zones that have strongly contrasting flow directions and less contrasting static water levels.

Most of the Super Fund testing was limited to the landfill site. Off site tests were limited to water, sediment and methane gas sampling. The results of the site studies could be used to

refine the fairly detailed information available on the cross sections. The combined use of the more recent test data and the geologic cross sections would also enable correlation between the various test results and interpolation of the data into the surrounding area.

3:15 EARLY SYNFUEL DEVELOPMENT IN OHIO. James E. Bradley, Department of Geology and Mineralogy, The Ohio State University at Newark, University Drive, Newark, Ohio 43055.

Ohio has a long history of interest in synfuel development, including both gasification and liquefaction of coal. Gasification started in 1842 with the opening of the Cincinnati gas works. By 1884, 75 gas works were operating in Ohio. Liquefaction was introduced into the United States in 1846, but the main period of interest in Ohio was between 1855 and 1860. In 1860, 54 coal oil companies were operating in the United States and 11 of those were located in Ohio. The gas works were in the cities where the gas was used. The chief oil works centers were Canfield, Cincinnati, Coshocton, Newark, and Zanesville. This early period of synfuel development ended when coal oil was replaced by petroleum, and coal gas was replaced by other energy sources.

3:30 THE SIGNIFICANCE OF ORGANIC CHARACTERIZATION OF OHIO COALS. McMahon, David A., Univ. of Toledo, Dept. of Geology, 2801 W. Bancroft St., Toledo, OH 43606

In 1985, 110 grant proposals were submitted to the Ohio Coal Development office for consideration. Twenty-four were chosen to share in the first year's funding. Eight of these grants went to cooperatively fund industrial pilot and demonstration plants, with the remaining sixteen going to state universities and private laboratories for development of future coal technology. Perhaps, the most significant work to be addressed is that of characterizing those properties of Ohio coals that could make them uniquely more marketable, than other neighboring coals. This paper intends to briefly summarize what proposals merited funding during 1986, and what the author perceives as important aspects of coal characterization, significant to Ohio coals; specifically, the analysis of raw coal stocks for their Benzole, Phenol and Naphthalene constituents by pyrolysis-gas chromatography. In depth characterization of these complex organic compounds could then be used to help market selective Ohio coals as raw materials for petrochemical or pharmaceutical industries.

3:45 MINE STABILIZATION IN SHARON, PENNSYLVANIA. Ann G. Harris, Department of Geology, Youngstown State University, Youngstown, Ohio 44555

Coal was first found in the Shenango Valley outcropping on a hillside in 1835 by General Joel B. Curtis. In 1840 the Strawbridge Brothers discovered coal on their land. The coal was known as the block or splint coal and it was the first time that it had been found in the United States.

The coal at this time was used extensively by the iron industry. By the 1860's the main mines in operation were the McCleary, Dunham or Pacific Shaft, the Atlantic Mine, the Bombeck, Boyce & Strawbridge Mines. By the mid-1880's most of the coal beneath the City of Sharon had been removed.

At the present time all but one mine map has been lost and the map is incomplete, therefore a test drilling program was initiated in 1981 to locate the approximate area that has been undermined and the approximate depth of the mines. With this information, a drilling and flushing with sand and water program began in 1986. A bore hole television camera was brought in twice to aid in determining the layout of the mine, its condition, dimensions and amount of wooden supporting posts since the cover was as little as 25'. The camera was also used to determine how effectively the sand was being flushed into the voids and its degree of filling. Apparently this method was fairly successful and hopefully the potential for mine subsidence has been considerably reduced.

4:00 RELEASE OF PRODUCTION CONTROLLED RADIONUCLIDES FROM A HIGH-LEVEL NUCLEAR WASTE SITE. Nick Koumoutzis and Douglas Oliver, Mechanical Engineering Department. University of Toledo. Toledo, OH. 43606.

This work implements an analytical solution to predict the concentration and the release rate of production controlled radionuclides from the edge of the waste form into the surrounding host rock in a geologic nuclear waste repository. Three simulations were generated, one for each type of coordinate system; cartesian, cylindrical and spherical coordinate systems. The results of these simulations are plotted versus distance from the edge of the waste form. The predictions for the release rates will depend on the specific parameters used as input. The parameters used in this work are typical values for radionuclides such as Ac_{227} and Pb_{210}.

SECTION D. MEDICAL SCIENCES
FIRST MORNING SESSION - MAIN 20
SATURDAY, APRIL 25, 1987
KATHLEEN FRANCO, PRESIDING

9:00 LIFE STYLE FACTORS AS PREDICTORS FOR PROSTACYCLIN PRODUCTION BY HUMAN AORTIC TISSUE. Joan Lukich, University of Akron. 1025 W. Market St., Akron, Ohio 44313.

Twenty-one factors frequently studied as possible risk factors for or indicators of future coronary heart disease were analyzed as independent statistical variables. The 4 mm. segment of aortic tissue removed at coronary artery bypass graft surgery to permit egress of blood into the new graft was the tissue sampled. Prostacyclin production by the aortic tissue of the 99 subjects was the dependent variable. Statistically significant differences were found between male and female tissue responses,, with regression models of over 90% predictability for females and about 10% for males.

9:15 BEFORE/AFTER ATTITUDES TOWARD AGING Diane M. Eddy, MSN, RN. Kent State University, School of Nursing, Kent, Ohio 44242

Statement of the Purpose: Meyer's research in 1980 indicates that previous research has overlooked how nursing educators can design programs to meet the need for gerontologic nurses. The purpose of this study was to evaluate the integration of a well-elderly visitation program into an undergraduate medical-surgical course.

Methodology: Design was a one-group pretest/posttest. Sample--56 junior nursing students. Instrument--Tuckman-Lorge "Attitudes Toward Old People." Instrument contains 137 items measuring dimensions of stereotyping in the elderly. Of the subscales with proven validity, twelve were used in this study. Analysis--three hypotheses were tested. A t-test was done to determine the difference between attitude score means before/after the visitations. An analysis of variance was done on two variables--age of student and clinical visitation site--to look for attitude change.

Major Findings: Forty-two percent (42%) of the students showed no change in attitudes over the semester. Thirty-five percent (35%) did show an improvement in attitude.

9:30 PHYSICIAN & FAMILY RELATIONSHIPS POST-HYSTERECTOMY. FRANCO, Kathleen, FONDRON, Regina, STRIPLING, J. O., BRONNER, Nancy, JURS, Stephen, MCO Dept. of Psychiatry, C.S. #10008, Toledo, OH 43699

The authors surveyed a group of women posthysterectomy to determine their feelings about their gynecologists, spouses, and children. The protypic respondant was a middle-aged homemaker actively seeking to increase her education or accept gainful employment. Half or more reported irritability, insomnia, and lacking in energy and sexual interest. Fifty percent reported anniversary responses to their hysterectomy; 28% had sought psychotherapy; and 19% had considered suicide after surgery. A lack of support from spouses and a tendency to discipline children too severely in the post-hysterectomy period were also reported by many. Women who had never been married scored significantly higher on the Beck Depression Inventory. On the positive side, women with higher levels of education were less likely to report depression. College-educated husbands were also less likely to depressed wives.

The respondants indicated prehysterectomy concerns they had not discussed with their physician, which may inpart, explain their high physician-switch rate. Although they wished to discuss marital, sexual and emotional issues with their gynecologists, many remained uneasy to do so. Recommendations will be made regarding psychology-gynecology liaison in the care of these women and their families.

9:45 BREAST RECONSTRUCTION AFTER MASTECTOMY
Richard V. Dowden, M.D., FACS,
Head of the Section of Breast Surgery
Plastic Surgery Department, Cleveland Clinic,
9500 Euclid Avenue, Cleveland, Ohio 44106

Women who have had mastectomy can now look forward to the many benefits of having the breast reconstructed using modern plastic surgery techniques. The methods include silicone breast implants, stretching of the skin in the mastectomy region, shifting of skin and fat from nearby regions, and the transfer of skin, fat, and muscle from distant areas such as the back or abdomen. The nipple areola can be reconstructed using skin grafts and medical tattooing.

Regardless of the type of mastectomy which was performed, virtually any woman can be considered a candidate for breast reconstruction. Breast reconstruction does not in any way interfere with the likelihood of cure from the cancer. A reconstructed breast can be examined using the same techniques that are used for the natural breast.

One of the most significant advances in breast reconstruction has been the ability to reconstruct the breast on the same day as the mastectomy. This immediate breast reconstruction greatly reduces the emotional trauma for the patient, and decreases the psychological difficulties that formerly accompanied adjustment to the mastectomy deformity. It has been observed that patients are able to approach a mastectomy with less fear, and greater peace of mind.

10:00 **ABORTION IN ADOLESCENCE**
Nancy Bronner,M.D. and Kathleen Franco, M.D.,
Medical College of Ohio, Department of Psychiatry, C.S. # 10008, Toledo, OH 43699.

Sexual attitudes and behavior of adolescent females have been the topic of much interest over the past decade. Feelings about contraception, conception and abortion have been described with relation to the adolescent's beliefs about the possibility of becoming pregnant, who will or will not 'protect' them, and the influence of significant others on their decision making. This study explores differences thirty-five in women who had abortions during their teenage years with thirty-six women whose abortions occurred after the age of twenty. A demographic questionnaire, the Millon Clinical Multiaxial Inventory, and the Beck Depression Inventory were completed by women who were members of a patient-led support group. Premorbid psychiatric histories, the decision making process itself, and distressing symptoms post-abortion are reported. Specific differences in perceptions of coercion, pre-abortion suicidal ideation, and nightmares post-abortion were found in the adolescent group. Antisocial and paranoid personality disorders as well as drug abuse and psychotic delusions were found to be significantly higher in the group who aborted as teenagers. Hypotheses regarding the influences of adolescent development on mother/child relationships, power struggles and the use of fantasy as a coping device are explored.

10:15 A PROFILE OF COMPUTER ASSISTED INSTRUCTION USE AMONG BACCALAUREATE NURSING PROGRAMS
Toni Hebda, R.N., Ph.D. RD #1, P.O. Box 286, Hickory, PA 15340

Computer assisted instruction (CAI) has been suggested repeatedly as an alternative which can maximize resources available to nurse educators. However, little research relative to CAI use has been conducted. For this reason an attempt was made to establish a profile of computer assisted instruction use among baccalaureate nursing programs. Research questions focused upon: Number of schools using CAI; course and program level of use; specific commercial programs in use; local development of CAI; content areas represented; instructional methods employed; plans for future use; and, reasons for nonuse. All 441 National League for Nursing (NLN) accredited baccalaureate programs were contacted. There were 339 participants (77%).

CAI was used by 48.4%, predominantly in nursing courses. One-third used CAI in prerequisite courses (primarily nutrition, anatomy and physiology, and pharmacology).

Most CAI was commercial (91.7%). Use occurred most often at higher program levels. The program NURSESTAR was most frequently used. Eighteen percent of the sample identified local development of CAI. Content areas varied, but pharmacology and dosage calculation were heavily represented in commercial and local CAI.

Problem solving and didactics were the most frequently identified instructional methods.

Plans to implement CAI or expand its use in the near future were expressed by one-third of the sample.

SECTION D. MEDICAL SCIENCES
SECOND MORNING SESSION - MAIN 24
SATURDAY, APRIL 25, 1987
SAM ROSEN, PRESIDING

9:00 CHANGES IN LIPID COMPOSITION OF ACULEACIN A RESISTANT CANDIDA ALBICANS
Jere M. Boyer, Aultman Hospital,
2600 Sixth Street, S.W., Canton, Ohio 44710

Lipids from both an Aculeacin A susceptible parent and a mutant resistant strain of Candida albicans were extracted from cultures of cells grown for four days at 35°C. Lipids were extracted with chloroform, methanol (2:1, v/v) using standard methods. Phospholipids were extracted by silicic acid chromatography and thin layer chromatography using appropriate solvent systems. Free fatty acids were extracted from total lipids by thin layer chromatography and gas chromatography. Changes in lipid composition were observed in both groups of lipids, when resistant and parent strains were compared. There was a two-fold increase in phosphatidylserine and a similar decrease in phosphatidylethanolamine and phosphatidylcholine in the resistant mutant. There was a decrease in phosphatidic acid in the resistant isolate. The fatty acids from the resistant organism were twice as saturated as those from the parent strain. The increases were seen in the 18:0 and 20:0 fatty acids with decreases in 16:2, 18:2, 18:3 and 20:2 fractions. This information may lead to a better understanding of this cell wall active antibiotic.

9:15 PLAQUE MICROFLORA CHANGES WITH SMOKELESS TOBACCO(ST). S. Rosen ,KL Schroeder,HA Soller and CJ Wenrick. The Ohio State University, College of Dentistry, Columbus, Ohio 43210

Subgingival plaque was collected in young males from a side in which ST was used(Experimental) and the contralateral side in which ST was not used(Control) for oral microflora assessment. The plaque was collected in RTF and placed in an anaerobic chamber. Dilutions were made in RTF and plated onto various selective and non-selective media. CFU's were enumerated on all plates and isolations of representative colonies were made. Microflora were identified by the Anaerobic-Tek system of Flow Laboratories,Inc.(Buesching,W.I. et al.J.Clin.Microbiol,17:824-829,1983). A total of 147 isolates from the ST side and 143 isolates from the control side from 33 subjects have been identified. The frequency with which some of the microorganisms from the ST and control sides have been isolated respectively are as follow: Actinomyces sp., 12,9;Bacteroides sp.,10,4;Fusobacterium nucleatum, 7,6; Lactobacillus sp., 9,5; Veillonella parvula 22,28; Streptococcus sanguis I,7,5;S.Sanguis II,3,7; S.constellatus,6,5;S.mitis,10,10; alpha hemolytic strep,15,25. There was no more than a 2½ fold difference in frequency of isolation for any of the microflora found in this study. Quantitative determinations, expressed as % of total anaerobic CFU's, showed that Bacteroides sp. and Lactobacillus sp. were found more than 10 fold greater on the smokeless tobacco than on the control side.

9:30 HOSPITAL-ACQUIRED FUNGEMIA IN A LARGE COMMUNITY TEACHING HOSPITAL. Roger Harvey, D.O., Joseph P. Myers, M.D., Dept. of Medicine, Western Reserve Care System, Southside Medical Center, 345 Oak Hill Avenue, Youngstown, Ohio 44501

During a 4-yr. period (1982-1985), 48 episodes of hospital-acquired fungemia (HAF) were documented in an 800-bed hospital. The incidence of HAF increased 8-fold during the study period. Candida albicans (58%), Candida tropicalis (25%), and Candida parapsilosis (15%) were the most common fungal pathogens. 21 pts. (44%), had concomitant bacteremia. Intravascular catheters (100%), antibiotic administration (98%), urinary catheters (85%), surgical procedures (75%), parenteral alimentation (60%), and corticosteroid administration (50%) were the most common predisposing factors for HAF. Pathogenic fungi were also isolated from urine (58%), sputum (44%), intravascular catheters (40%), and surgical wounds (29%), however most pts. had the pathogenic yeast (blood isolate) isolated from multiple body sites and the primary source of HAF was often indeterminate. The overall mortality rate (MR) for HAF was 75%. The MR was higher for pts. who were over 60 yrs. of age, were of the male sex, were hospitalized fewer than 100 days, received total parenteral nutrition, received

corticosteroids, did not receive intravenous amphotericin B, and did not have an infectious disease consultation. However, only age greater than 60 yrs. and hospital stay less than 100 days significantly influenced MR ($p<0.05$).

9:45 INFLUENCE OF SMOKELESS TOBACCO ON MICROFLORA IN RATS. C.J. Kesler , K.L. Schroeder and S. Rosen. The Ohio State University, College of Dentistry, Columbus, Ohio 43210

Forty-two(42) male albino Sprague-Dawley rats, 5 months of age were divided into 2 groups: Controls and ST treated. Experimental groups were given, in the lower lip pouch, 2 successive 1 hour treatments of a popular brand of ST(5.6mg nicotine/gm tobacco) on the gingival margin of the mandibular incisors. Plaque samples were taken from subgingival and supragingival areas where the ST was applied for microflora analysis. These samples were plated onto various selective and non-selective media. Plates were incubated anaerobically for 24 hours at 37°C. Microflora were identified by the Anaerobic-Tek system of Flow Laboratories, Inc.(Bueshing,WI et al., J. Clin. Microbiol., 17:824-829,1983). The frequencies with which some of the microflora have been isolated in control and ST treated rats respectively are as follows: Streptococcus mutans,5,5; alpha hemolytic streptococci, 7,1; Staphylococcus epidermidis,4,4; S. aureus, 0,3;Pasteurella pneumotropica, 2,26. A possible explanation for the high frequency of P.pneumotropica is that ST contains a substance that encourages the growth of this microorganism.

10:00 TUMOR PHOTODESTRUCTION: IN VITRO STUDIES WITH SOLUBLE CHLOROALUMINUM PHTHALOCYANINES (CATSP). G. M. Garbo, R. W. Keck, S. H. Selman, E. Ben-Hur, I. Rosenthal, and M. Kreimer-Birnbaum. St. Vincent Medical Center, Toledo, OH 43608; Medical College of Ohio, Toledo, OH; Nuclear Research Center-Negev, Beer-Sheva, Israel; The Volcani Center, Bet-Dagan, Israel.

When a mixture of dicarboxylic porphyrins such as Hematoporphyrin Derivative (HpD) is systemically administered, the porphyrins accumulate preferentially in tumors. Subsequent tumor destruction occurs as a result of the activation of the sensitizer with light. CATSP, a group of modified tetraazatetrabenzoporphyrins, absorb stronger in the red than HpD. Light in this region offers the therapeutic advantage of enhanced tissue penetration. Spectroscopic characterization of CATSP was performed in various solvent systems such as 0.9% NaCl, phosphate buffered saline, ethanol and NaOH. AY-27 rat bladder tumor cells, derived from a FANFT (N-(4-(5-nitro-2-furyl)-2-thiazolyl)formamide) induced transitional cell carcinoma, were incubated for 1 hr at 37°C with HpD or CATSP. Cellular uptake was 1.11 ug/mg protein for HpD and 1.31 for CATSP, or 0.52 and 0.61 pg/cell, respectively. Phototoxicity studies (5 min of phototreatment, $\lambda > 590$ nm) showed comparable cell-killing efficiency. From previous in vivo experiments and the present studies we conclude that phthalocyanines are promising second generation photosensitizers for photodynamic therapy of tumors. (Supported by the F. M. Douglass and St. Vincent Med. Ctr. Foundations and NIH R23 CA38754.)

10:15 METASTASES IN DIFFUSE PLEURAL MESOTHELIOMA IN WOMEN. Michael Huncharek. Canadian Tumor Reference Center, National Cancer Institute of Canada, 60 Ruskin Avenue, Ottawa, Canada KiY 4M9.

Thirty-three cases of autopsy confirmed pleural mesothelioma were reviewed in order to describe the frequency and distribution of distant metastases. Cases ranged in age from 23-89 years with a mean of 61. The primary tumor in 17 cases was located in the left pleura while 12 had right sided tumors. Four cases were bilateral. No information was available regarding possible exposure to asbestos. Overall, 18 cases (55%) were found to have distant metastases at autopsy. The most common sites of metastatic involvement were; liver (9 cases), contralateral lung (6 cases), adrenal glands (5 cases, bilateral in 3), kidneys (4 cases, bilateral in 1), heart (4 cases), thyroid (3 cases) and spleen (3 cases). One case each of metastatic spread to pancreas, brain and bone marrow were observed while 2 cases had ovarian metastases. The histological type of all tumors was categorized as follows; 55% epithelial, 30% sarcomatous and 15% biphasic. Sixty-four percent of the epithelial tumors were metastatic while 50% and 40% of those cases with sarcomatous and biphasic tumors respectively had metastatic disease. In contrast to several previous reports, this analysis suggests that distant visceral metastases are a common feature of diffuse pleural mesothelioma. In addition, all three histological types of this tumor were shown to be associated with metastatic disease.

SECTION D. MEDICAL SCIENCES
FIRST AFTERNOON SESSION - MAIN 20
SATURDAY, APRIL 25, 1987
KATHLEEN L. SCHROEDER, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 PREVENTING HARDENING OF THE ARTERIES: The Bowling Green Study

W.E. Feeman Jr., MD
640 S. Wintergarden Road
Bowling Green, Ohio 43402

Those people at risk for atherosclerotic disease (ASD) can be predicted in advance of clinical disease, and with successful treatment, ASD can likewise be treated with the aim of disease reversal. Such "modern miracles" are possible thanks in part to a 12-year 7,000 plus-patient study of a family physician's private practice in northwest Ohio.

The Bowling Green Study (BGS) utilizes the low density cholesterol-high density cholesterol ratio as the best currently available measure of cholesterol accumulation within the artery wall. It uses the systolic blood pressure as the force driving cholesterol into the artery wall. Cigarette smoking weakens the artery wall, facilitating the ASD process. The BGS has generated graphs inter-relating these three risk factors for ASD, and these graphs have great predictive value under age 80 years, as well as providing the best available means of guiding therapy to reverse the ASD process.

2:15 INFLUENCES OF NICOTINE AND SMOKELESS TOBACCO ON RAT BLOOD PRESSURE. A. Milo and K.L. Schroeder The Ohio State University, College of Dentistry Columbus, Ohio.

Physiologic effects of nicotine and snokeless tobacco(ST) were recorded on 50 unanesthetized male Sprague-Dawley rats (age 5 mos., 350-400gm) using a photoelectric indirect blood pressure system. Treatment groups consisted of Controls(no tobacco or nicotine n=6) and Experimental groups receiving ST, 1.6 and 5/6 mg/gm nicotine in orabase. Rats were monitered at 0,5,10,15,30 and 60 min. intervals, with baseline readings taken of all rats, at the same time each day, prior to the start of treatment. In another group of similarly treated rats, serum blood nicotine/cotinine levels were obtained upon sacrifice at 0,5,10,15, 30 and 60 minutes. Mean nicotine levels were reached within 5 min. of application in acutely treated rats. Results indicate that mean BP increased 49mmHg in rats with first time treatment with nicotine for an acute response to both 5.6 and 1.6 mg/gm, peaking 10 minutes after administration. Similarly, rats treated with ST for acute response exhibited a mean increase of 55 mmHg, peaking at 10 min. In all groups, return to "normal" BP occurred within 60 min. Rats treated chronically with ST for 7,28 and 90 days exhibited mean increases of 45, 60 and 68 mmHg, with peaks at 10,15, and 15 min. respectively. This study indicates similar high mean increases in BP in both acute and chronically treated rats to ST and nicotine

2:30 MYOCARDIAL CONTRACTILITY DURING CHRONIC SODIUM DEPLETION (SD) IN CONSCIOUS DOGS. Fetnat M. Fouad, Carlos M. Ferrario, Emmanuel L. Bravo, Takanobu Nii, Barbara Czerska, Research Institute of the Cleveland Clinic Foundation, Cleveland, Ohio.

Chronic SD decreased ejection fraction (EF) in anethetized dogs. We tested the hypothesis that this reduction in cardiac performance was due to hemodynamic and/or humoral factors. 7 mongrel dogs were fed a low sodium diet (4 mEq/day) for 5 weeks. Echocardiographic and radionuclide techniques were used to monitor cardiac function. There was a gradual but significant decrease in EF from 61±3 (SE) at baseline to 47±3% after 5 weeks of SD, in association with a fall in LV end diastolic volume; EF did not change in time control dogs (TCD, n=5) fed 65 mEq Na/day. Myocardial contractility (Emax) did not change in both SD and TCD. In 3 SD dogs, plasma norepinephrine (NE) level in the coronary sinus (CS) was 4 fold higher in SD than in TCD without significant differences in arterial NE. Thus, reduced EF during SD results from hemodynamic

changes (decreased preload). These data are the first to demonstrate a failure of sympathetic activity to augment cardiac contractility in presence of chronic decrease in preload. The site of this dysfunction is not clear but the excessive CS NE content in SD dogs suggests an effect at the neuroeffector junction.

2:45 VASCULAR DIAMETER CHANGES WITH SMOKELESS TOBACCO AND NICOTINE IN RATS. J.E. Kirkpatrick and K.L. Schroeder The Ohio State University, College of Dentistry, Columbus, Ohio.

This study was conducted to determine the amount of change in blood vasculature of rat gingival and labial mucosa related to ST. A rat model was used to deliver topical applications of ST and nicotine in orabase. Twenty-one male Sprague-Dawley rats(5 mos, 350-400g) were divided into Control(no tobacco or nicotine) and two Experimental groups chronically treated either with ST(5.6mg of nicotine/g) or nicotine(1.6mg/g) in orabase for 7,14,and 28 days. Treatments were given twice daily for one hr. in the lower lip pouch of rats. At sacrifice, rats were perfused with Batson's solution(Polyscience) to produce a vascular cast of the gingiva and labial mucosa. The cast was embedded in Epofix solution(Struers), cut in three cross-sections through labial vessels, polished(Struers DP-U2 sander), mounted on stubs, sputter coated and analyzed on a Cambridge S4-10 Scanning Electron Microscope in conjunction with a TN 5500 computer particle program. As early as 14 day chronic treatment, ST rats exhibited a marked vasoconstriction. Cross-sectional analysis of 44 vessels revealed mean diameters of 11.65um for the ST group compared to values of 88.55um for controls. This proved to be highly significant ($p \leq .01$). Similar results were found with the nicotine treated rats. This study indicates that ST and nicotine similarly cause marked decrease in vessel diameters of rat mucosa and changes in the blood vasculature.

3:00 DISSOCIATION BETWEEN EFFECTS OF ANTIHYPERTENSIVE THERAPY ON CARDIAC AND PERIPHERAL VASCULAR HYPERTROPHY

Hideo Kobayashi, Fetnat M. Fouad, Toshio Sano, Robert C. Tarazi. Research Institute of the Cleveland Clinic Foundation, Cleveland, Ohio

To determine the effects of antihypertensive drugs on heart and resistance vessels, matched groups of 17-week old SHR were treated for 12 weeks with 65 mg/kg/day of captopril (C,n=15) or 73 mg/kg/day of hydrochlorothiazide (H,n=15) and compared with untreated SHR (n=11) and WKY (n=12). Minimal perfusion pressure (PP) under constant flow and maximal vasodilation, was used as an index of hypertrophic changes (wall thickness to inner radius ratio) in resistance vessels in the hindlimbs of pithed rats. Left ventricular to body weight ratio (LVW/BW) was used as an index of LV hypertrophy. C lowered systolic blood pressure (BP), PP and LVW/BW while H reduced PP despite no significant effect on LVW/BW.

	BP (mmHg)	LVW/BW (mg/gm)	PP (mmHg)
untreated SHR	212±4.3	2.63±0.05	37.4±0.5
treated SHR (H)	189±3.0*	2.54±0.04	35.3±0.4*
treated SHR (C)	160±3.2*	2.28±0.03*	35.2±0.3*
untreated WKY	123±2.3	1.81±0.04	26.5±0.4

(M±SE * $p < 0.01$ vs untreated SHR)

Thus, for equal regression of vascular hypertrophy, C and H had different effects on regression of LV hypertrophy in the same animal.

3:15 THE HISTOGENESIS OF GIANT CELLS IN GIANT CELL MYOCARDITIS - LIGHT MICROSCOPIC, IMMUNOHISTOCHEMICAL AND ULTRASTRUCTURAL STUDIES. N.H. BRAMWELL, M.D., B.F. BURNS, M.D., and V.M. WALLEY, M.D., Department of Pathology, University of Ottawa Heart Institute and Ottawa Civic Hospital, OTTAWA, Canada K1Y 4E9.

Giant cell myocarditis (GCM) is a rare, distinctive disease of cardiac muscle with an aggressive clinical course often characterized by conduction disturbances and cardiac failure and with a usually fatal outcome. The etiology of the condition is unknown, although an association with autoimmune diseases has been described, and a post-viral hypersensitivity phenomenon has been postulated by some authors.

The histopathologic picture of GCM is one of extensive areas of myocyte necrosis associated with a florid histiocytic and eosinophilic infiltrate. Large numbers of giant cells are seen. The origin of the latter has been the source of much controversy, with derivation from either degenerating myocytes or from inflammatory cells of monocyte-macrophage lineage emerging as the two alternative theories.

We present two cases of GCM in which light microscopic, histochemical, immunohistochemical (including cell surface markers), and ultrastructural findings suggest that giant cells may derive from both cardiac myocyte and monocyte-macrophage precursors. This study may contribute towards better understanding of this enigmatic condition, in the context of the spectrum of response to injury exhibited by cardiac muscle.

3:30 MORPHOLOGICAL STUDY OF THE EFFECTS OF AFB_1 ON ORGAN SITES IN THE ELASMOBRANCH EMBRYO.

J.R. Porter[1], W.C. Hamlett[2], and G.D. Stoner[2], Depts. of Anatomy[1] and Pathology[2], Medical College of Ohio, Toledo, Ohio 43699

Elasmobranch fishes exhibit an apparent natural resistance to neoplasia in wild populations as compared to teleosts. To determine if this resistance actually exists, we exposed skate embryos, Raja erinacea, to varying doses of the known chemical carcinogen Aflatoxin B_1 (AFB_1) for one hour. At predetermined time intervals following treatment or death, organ samples (viz. liver, kidney, intestine) were removed and prepared for light microscopy. Our results to date indicate that AFB_1 produces dose dependent cellular changes in hepatocytes. This is thought to be an important step in the initiation of the process of carcinogenesis. It has previously been demonstrated in our laboratory that AFB_1 binds to hepatocyte DNA in explant culture and forms activated metabolites. These experiments are patterned after the successful chemical carcinogenesis studies utilizing the highly susceptible trout embryo. Our results will be compared with published data on the trout studies. If we can experimentally induce tumors on other pre-neoplastic changes in these animals, this would invalidate the assumption that these animals are resistant. If, however, carcinogenic changes cannot be demonstrated, this would indicate that elasmobranchs have unique features which protect them from neoplasms. This would lead to further studies to elucidate the mechanisms of such protection.

3:45 ORAL LESIONS IN MALES(AGES 18-25) RELATIVE TO PATTERNS OF SMOKELESS TOBACCO USE. K. L. Schroeder, H.A.Soller, and M.H.Gronbach The Ohio State University, College of Dentistry, Columbus, Ohio 43210

This study was undertaken to determine the relation of clinically observed mucosal changes to histopathologic changes in 34 Caucasian male regular ST users. Clinically, lesions were classified as Degree 1,2or3(Greer&Poulson,1983) by 2 independent examiners(r .89). Cross tabulations were made with user type, alcohol and other tobacco habits,brands used and age of initiation. User type was classified as Light(L) Moderate(M),Heavy(H) as determined by weekly ST exposure. Use of ST in this population ranged from 1-14 years. No significant difference was found between the 3 clinical categories of lesions and years of use. However, a very good correlation(r=.71)did exist between user type(L,M,H) and degree of lesion, particularly light users to degree 1 and heavy users to degree 3. Percentage comparisons between user type and degree lesion were: L:66%-1,33%-2,0%-3;M: 35%-1,50%-2, 15%-3;H: 0%-1,29%-2,71%-3. Recession was found in L,M,H users 33%,67%, and 83% of the time respectively. Tissue samples were taken and histologic analysis routinely revealed parakeratosis(70% of hyperparakeratosis occured in Degrees 2&3), acanthosis, exocytosis,koilocytotic activity, hyperchromatism and mild to moderate subepithelial inflammation. Chevron keratinization was noted in 38% of the samples of which 75% were in Degrees 2&3. There was no strong clinical association to observed histologic changes.

4:00

ACCELERATED FIXATION OF WEIGHT BEARING IMPLANTS BY SYNTHETIC HYDROXYLAPATITE

M.T. Manley, J.F. Kay, L.S. Stern, B.N. Stulberg

Dept. of Musculoskeletal Research, Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, OHIO 44106

Loosening at the interface between implant and bone continues to be a problem in clinical orthopaedics. Other investigators have indicated an enhancement of osseous tissue response to implants in the presence of synthetic hydroxylapatite (HA). The purpose of this study was to assess the effects of an HA coating on the strength of the interface between implant and bone in a weight bearing model.
METHODS Smooth titanium alloy and HA coated titanium alloy intramedullary rods were implanted in the femora of twelve adult mongrel dogs. An osteotomy was performed at the midshaft of each femur to ensure that the implant was subjected to functional shear loads. Animals were sacrificed at ten weeks, the femora were excised, sectioned into 10mm lengths and mounted in a materials testing machine. Push-out tests and histology were performed for structural strength and information on osseous response to the materials.
RESULTS A thin fibrous capsule was shown to surround the titanium alloy implants. Direct contact between bone and implant was observed in the HA specimens. Mean values calculated from mechanical push-out tests showed a tenfold increase in strength at 10 weeks for the HA compared to metallic interfaces.
CONCLUSION An enhancement of osseous tissue response to HA vs metallic implant interfaces has been demonstrated. Synthetic HA may thus be a suitable material for providing long term stability between implant and bone.

SECTION D. MEDICAL SCIENCES
SECOND AFTERNOON SESSION - MAIN 24
SATURDAY, APRIL 25, 1987
GAYLORD SHAW, PRESIDING

2:00 EFFECTS OF BEE POLLEN ON BODY WEIGHTS OF OBESE AND LEAN FEMALE ZUCKER RATS. R. Liebelt, M. Prayson, J. Finkelstein and J. Walker. Dept. Anat. and Comp. Med. Unit., N.E. Ohio Univ. Coll. Med., Rootstown, OH 44272.

Several strains of mice and Zucker strain rats can be maintained in a healthy condition for more than 1 year when fed only certain brands of bee pollen (Liebelt, et.al.1986). Individual female obese(6) and lean(6) Zucker rats were placed on a diet of Mr. Bee Pollen 100% Natural Pollen (BP) at 60 days of age. Similar obese(6) and lean(6) females were continued on Purina Formulab (FL). Body Weights (BW) and food intake(calories/day) were recorded for each rat for 300 days. At the end of this time all groups were reversed: BP to FL and FL to BP. Obese rats on FL reached a mean BW 598.2 ± 24.2 gms. and lean rats on FL reached a mean BW 275.5 ± 12.6 gms. during the 300 days. Obese rats on BP reached a mean BW 292.5 ± 21.8 gms. and lean rats on BP reached a mean BW 216.8 ± 8.9 gms.during the same period. Reversal of diets obese rats(FL to BP) went from BW 581.2 ± 20.6 to 477.5 ± 23.8 gms. in 85 days and obese rats(BP to FL) went from 302.8 ± 23.4 gms. to 531.0 ± 25.6 gms. The "crossover" in BW occurred at about 70 days after reversal of diets. Obese rats(FL) consumed 90 cal/day and lean rats(FL) 54.8 cal/day. Obese rats(BP) consumed 56.3 cal/day and lean rats(BP) 52.8 cal/day. These data suggest the presence of a biologically active substance(s) in bee pollen which depresses food intake and in turn reduces bodyweight.

2:15 INFLUENCE OF THYROID STATUS AND AMBIENT TEMPERATURE ON WEANING BEHAVIOR IN WHITE MICE. Mary Ann R. Gonzalez and Lee A. Meserve, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Weaning normally begins at day 17 when the first ingested food can be found and is completed by the 4th postnatal week. A rise in thyroxine in the neonate at onset of weaning is physiologically correlated with maturational changes under its developmental control. It is of interest to determine if hypothyroid pups wean normally and if thyroid augmentation causes early weaning. Ambient temperature may also influence weaning behavior. In the present study normal mouse pups were injected with thyroxine to augment thyroid status. Hypothyroidism was induced by feeding dams thiouracil (0.25%) during gestation and through the postnatal period. Diet preference was measured at 17, 21 or 24 days by % of time pups spent with the dam and moist or solid food choices. Stomach contents were also analyzed and the % chow used to determine weaning. Thyroxine injection alone did not modify weaning behavior or stomach contents. However, hypothyroid pups spent less time with solid food and had less chow in stomachs than did thyroxine-injected littermates. To determine if temperature influenced weaning behavior, pups were given diet preference tests in a 37°C incubator or at room temperature. The warm environment affected weaning at 17 and 24 days, but not at 21 days. Thus, thyroid status may affect the maturation of a weaning-related thermoregulatory mechanism.

2:30 **PARTIAL PURIFICATION AND PROPERTIES OF RAT LIVER DOPAMINE SULFOTRANSFERASES.** M.H. Palmert, T.C. Feeser, L.S. Volkwein** and S.S.Singer, Department of Chemistry, University of Dayton, Dayton, OH 45469

Dopamine sulfation by rat liver is catalyzed by two sulfotransferases present in the cytoplasm. They are designated as enzymes I and II in order of their elution from DEAE-Sephadex columns. Several experimental manipulations, including adrenalectomy and castration of males and ovarectomy of females, were found to alter hepatic dopamine sulfotransferase activity. These changes were due mostly to variation of the hepatic content of enzymes I and II. Enzyme II was purified about 200-fold and was found to have K_m's of 47.5 ± 6.7μM and 12.7 ± .5μM for dopamine and 3'phosphoadenosine 5'phosphosulfate (PAPS), respectively. Molecular weight determinations gave a value of 49.1 ± 4.6 kdal for enzyme II. Phenol was preferred over catecholamines as substrate for enzyme II. The best catecholamine substrates were dopamine and 3,4-dihydroxybenzylamine. The pH optimum for enzyme II was 9.4 ± 0.30. Enzyme I, the less plentiful form of dopamine sulfotransferase, exhibited lower PAPS and dopamine K_m's than did enzyme II. Enzymes I and II are compared.

This research was funded by a grant from the Miami Valley Chapter of the American Heart Association.

2:45 RED CELL δ-AMINOLEVULINIC ACID DEHYDRATASE (ALAD) AND BLOOD LEAD LEVELS (BPb). M. R. Lust, A. V. Patel & M. Kreimer-Birnbaum. St. Vincent Medical Center, Toledo, OH 43608 & Medical College of Ohio.

Excessive exposure to lead is a significant problem affecting pediatric populations as well as adults in certain industrial settings. Effects of even low lead levels on the heme biosynthetic pathway include inhibition of ALAD activity. Hematologically normal children (n = 66) and adults (n = 61) were tested for ALAD in the absence and with the addition of 0.01 M dithiothreitol (unactivated ALAD = -DTT, activated = +DTT), activation ratio (+DTT/-DTT), and BPb.

Group	Sex	ALAD (nmoles PBG/ml rbc/hr) -DTT	+DTT	+DTT/-DTT	BPb ug/dl
Children	F	2118±528	2963±560	1.43±0.27	11.1±5.6
	M	1990±442	2905±511	1.50±0.22	10.9±5.1
Adults	F	2312±510	3218±454	1.42±0.24	6.7±3.3
	M	1984±349	2829±542	1.44±0.24	7.4±3.1

No significant differences were found between female and male children. Adult females had significantly higher levels of unactivated and activated ALAD than adult males ($p < 0.01$). BPb levels were significantly higher in all children as compared to adults. These studies point out that age and sex-related differences may need to be taken into consideration when control ranges for ALAD and BPb are established. (Supported by the F. M. Douglass Foundation.)

3:00 Properties and Endocrine Control of Rat Dopamine Sulfotransferase Activity, Including Response to Hypertension Drugs. M.J. Lucarelli, M.R. Palmert, M.D. Redman, D.M. Leahy, T.C. Feeser, and S.S. Singer, Chemistry Department, University of Dayton, Dayton, Ohio 45469.

Catecholamine sulfates are viewed as important to biological actions of catecholamines. The enzymatic sulfation has been studied mostly with dopamine. Yet, the nature of dopamine sulfotransferase, control of its production, and its relation to catecholamine actions (e.g., hypertension) are unclear. Our data indicate that dopamine sulfotransferase activity is cytoplasmic and has K_M's of 17.2 ± 4.1 and 22.4 ± 3.5 μM for dopamine, and for reaction coenzyme, 3'-phosphoadenosine-5'-phosphosulfate, in rats of both sexes. The enzyme is activated by Mg^{2+} and inhibited by Mn^{2+}. Also, enzyme levels in males are 3 to 4 times those in females. Substrate preference studies show that 4-methoxytyramine is the best substrate, followed by 3-methoxytyramine and dopamine. Epinephrine is only weakly active. Endocrine control is mediated by adrenals and ovaries, which have opposing effects, and diminished dopamine sulfotransferase levels in females appear to be due to estrogen action. Antihypertensive spironolactone and hydralazine also diminish the enzyme levels. Dopamine sulfotransferase has properties suggesting importance to catecholamine action.

** This research was supported by the Miami Valley Chapter of the American Heart Association.

3:15 LONG-TERM VOLUNTARY AEROBIC EXERCISE LOWERED AGGRESSIVE BEHAVIOR IN SPONTANEOUSLY HYPERTENSIVE RATS. E. Bittikofer-Griffin, D. Ely, Dept. of Biology, Univ. of Akron, Akron, Ohio 44325.

Male (n=18) and female (n=19) rats (19-21 wks) were placed in 4 population cages (120x120cm), 5 of each sex/cage for 12 weeks. Rats with access to exercise wheels voluntarily ran 1.62±0.35 km/day/rat (E). Controls had no wheels (C). E-rats were less aggressive: fewer scars (E:1.7±1.1 vs C:3.3±1.8 scars, $p<.01$); fewer fights (E:1.8±1.0 vs C:4.3±1.8 fights/animal/12 hrs at 5 wks, $p=.05$); and decreased irritable aggression (E:1.0 vs C:4.7 bites, $p<.001$). In E-rats, irritable aggression significantly decreased over time (baseline:5.4 vs end:0.22 bites, $p=.02$), however, they still maintained defense against intruders. Female runners actually showed increased aggression towards intruders (E:2.95 vs C:1.43 fights/min, $p<.001$).

Exercise level correlated with increased left ventricular heart weight ($r=.945$ $p<.001$); and increased B-endorphins ($r=.62$, $p<.01$) and decreased plasma norepinephrine (E:2077 vs C:4216 pg/ml, $p<.05$).

Brain punches have been taken from septum, ventromedial hypothalamus and median raphe nuclei to test serotonin levels vs degree of exercise.

The data suggest that longterm voluntary aerobic exercise decreased irritable aggression without decreasing defense against an intruder.

3:30 THE EFFECT OF BLOOD SUPPLY ON THE REGENERATION OF PERIPHERAL NERVES FOLLOWING CONVENTIONAL AND VASCULARIZED NERVE GRAFTING

Moon HK, Cook AF, Lynn MP and Browne EZ
9500 Euclid Avenue, Cleveland, Ohio 44106

Vascularized and conventional nerve grafts were performed on the Median nerves of 20 adult male Sprague/Dawley rats. The rats were divided into five groups of four rats each with recovery periods of one through five weeks. At the end of each period, cervical laminectomies were done at the C-VIII level exposing the dorsal root ganglia. Five microcuries of Tritium labled Leucine were injected intc each ganglion to study axonal transport. The nerves were removed, en bloc, from the ganglion to the wrist, cut in 2 mm segments, and radiation measured in each segment. At one through three weeks, increased regeneration of the nerves reconstructed with vascularized grafts was indicated by increased axonal transport down the nerve.
These findings were correlated with Allen video enhanced-differential interference contrast optics as well as nerve conduction velocities, and suggests that nerve regeneration and axonal transport is established sooner in vascularized nerves versus conventional nerve grafting.

3:45 SELECTIVE NEURONAL INVOLVEMENT IN MOTOR NEURON DISEASE (Wobbler Mouse). H. Mitsumoto, K. Kurahashi and G. Bunge, Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, Ohio 44106.

The reason(s) why certain groups of motor neurons are selectively affected while others are not in motor neuron disease is unknown. The wobbler mouse offers a unique opportunity to study this issue since the disease affects almost exclusively the forelimbs but not the hindlimbs. The histometric findings suggest that axonal regeneration may have been more active in lumbar roots. We compared the regenerative capacity after nerve crush of the forelimb nerves (cervical anterior horn cells) and sciatic nerves (lumbar anterior horn cells). Our previous study of the regenerative capacity of cervical anterior horn cells by means of radiolabeled axonal transport technique clearly showed at 7 days a diminished rate of axonal elongation ($p < 0.01$) and an absence of the distal peak representing a large cohort of growth endings in the cervical anterior neurons. The same test for lumbar anterior horn cells showed the presence of a normal distal peak at 7 days, identical to controls. Therefore, lumbar anterior horn cells of wobbler mice have a better regenerative capacity compared to cervical neurons, suggesting that the overall neuronal function is better in "unaffected" lumbar anterior horn cells. The difference in the regenerative capacity is perhaps closely associated with the mechanism(s) of selective neuronal involvement in this motor neuron disease.

4:00 SMOKELESS TOBACCO(ST) AFFECTS ON PERIODONTAL HEALTH. K.L. Schroeder, S. Rosen, H.A. Soller, and C.J. Wenrick The Ohio State University, College of Dentistry, Columbus, Ohio.

Thirty-three(33) Caucasian males(19-28) were studied for influences of ST on overall oral health and microflora change in Light(L), Moderate(M), and Heavy(H) users. Indices scored included:oral hygiene-Plaque Index(PI), Gingival Index(GI), Calculus Index(CI), stain, recession, pocket depth(PD), gingival crevicular fluid(GCF), & collagenase activity. Subgingival plaque samples were taken from the ST side, plated onto various media, incubated anaerobically, and identified by the Anaerobic-Tek System. Results indicate similar oral hygiene habits among all users, since no significant difference was found in PI. No significant differences were found in GI,CI,&PD. However, when comparing HvsL users, differences were found in stain(8.7 fold increase in H users) GCF(1.7 fold increase) and total collagenase activity(24%H vs 13%L for 1.8 fold increase). Recession was found in 83% of H users and in 33% of L users. One or more of the potential periodontal pathogens(Veillonella, Bacteroides, and Fusobacterium) were found in H,M,&L users in percentages of 66,39,&0 respectively. Following prophy, total collagenase levels decreased to similar levels in all users returning to previous values by 12wks. As microflora became reestablished, particularly in heavy users, increased collagenase activity returned, indicating that the kinds of organisms present are important, since PI remained the same.

4:15 Discussion of Posters
Larry J. Ream, Presiding

SECTION D. MEDICAL SCIENCES
Poster Session - Osborne Hall Gymnasium Auditorium
Saturday, April 25, 1987

Board A @ 10:00 AM A LOW SALT DIET LOWERS STRESS INDUCED VASCULAR RESISTANCE IN RATS. S. Brown, D. Ely, and F. Sadri. Dept. of Biology, Univ. of Akron, Akron, OH 44325.

Previous research has suggested that very high or low sodium diets alter sympathetic nervous system (SNS) responsiveness. Therefore, the objective of this study was to test the hypothesis that a low sodium (LNa) diet (0.5mM/100g) would decrease the stress induced blood flow (BF) reduction in mesenteric (M) and renal (R) arteries. Male spontaneously hypertensive rats (SHR) and normotensive rats (WKY, 12 weeks) were randomly divided into 2 diet groups each - a control diet (12mM, n=8) and a LNa diet (n=8) and were maintained on the diet for 10 wks. Pulsed Doppler flow probes were implanted and 3 wks later BF was measured in conscious rats at rest and during 30 sec of mental stress (air puff) and during 30 sec post physical stress (tail pinch). Resting M-BF was similar between strains and diet groups. However, SNS mediated stress reduction in BF was markedly reduced in both LNa groups by both forms of stressors (WKY-LNa: 38-50%, $p<.01$, SHR-LNa: 26-60%, $p<.01$ as compared to respective controls). Renal BF was also similar at rest but during stress the SHR-LNa group showed 17% less reduction than C, with no BF change in LNa-WKYs. The data suggest that a very low Na diet decreases SNS mediated vasoconstriction in mesenteric resistance vessels in both strains and in renal arteries of only SHRs. (Supported by Amer. Heart Assoc.).

Board B @ 10:00 AM THE EFFECTS OF FATIGUE ON GROUND REACTION FORCES, REARFOOT MOTION AND NEUROMUSCULAR PARAMETERS IN FITNESS WALKING
K.R. Campbell, N.L. Greer*, R.O. Andres*
Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, Ohio 44106/*University of Massachusetts, Amherst, Mass. 01003

The purpose of this study was to examine how biomechanical parameters vary with fatigue in fitness walking. Ten female subjects performed 10 trials (6.5 kph) pre and post fatigue in walking shoes. Fatigue was induced by a 1 hour fitness walking bout (6.5 kph). Force platform and integrated EMG for the gastrocnemeus and tibialis anterior muscles were collected (1 KHz) on a mini computer during the support phase of walking. High speed film techniques recorded subtalar joint motion at 50 fps. Repeated measures ANOVA were used to determine significant pre and post differences at a level of $p<.05$. A significant increase was found in stride time and a decrease in the average vertical force of support. In the anterio-posterior direction an increase in the impulse to the peak propulsive force was found. A significantly lower touch down angle was found for the subtalar joint. The peak and peak minus RMS values for the EMG data in braking and propulsion phases were found to decrease with fatigue . These results support the use of biomechanical techniques to assess fatigue and shoe design.

Board C @ 10:00 AM INHIBITION OF MACROPHAGE SYNTHESIS AND SECRETION OF A BONE RESORBING ENZYME--ACID PHOSPHATASE--BY BISPHOSPHONATES. P. A. DeLange and J. R. Stevenson. Miami University, Oxford, Ohio 45056.

Using mouse peritoneal macrophages as surrogate osteoclasts, the effects of bisphosphonates (BP) on bacterial lipopolysaccharide-induced synthesis and secretion of acid phosphatase (AP) was investigated. After 22 hr incubation in the presence of selected BP, macrophage culture supernatants and cell lysates were assayed to determine the extracellular and intracellular AP and lactic acid dehydrogenase (LDH) activities of these cells. As BP levels increased, the total (intracellular plus extracellular) AP activity decreased. This decrease was not due to inhibition of AP, because AP activity was not affected when assayed in the presence of BP. BP levels that decreased total AP activity reversed the LDH intracellular to extracellular (I/E) ratio; intracellular LDH decreased and extracellular LDH increased. At the lowest BP levels that reversed the LDH I/E ratio, there was no effect on the AP I/E ratio--even though total AP was reduced. At higher levels, AP paralleled LDH; intracellular AP decreased and extracellular AP increased. These results suggest that BP

exert cytotoxic effects that inhibit bone resorption by causing a loss of cell membrane integrity and decreased total activity of bone resorbing enzymes such as AP, rather than by selectively inhibiting enzyme synthesis or secretion by viable cells. (Supported by grants from the Procter and Gamble Company and Sigma Xi).

Board D @ 10:00 AM — Submaximal activation patterns of multipennate muscle during isotonic contraction.
M.D. Grabiner, Dept. of Musculoskeletal Research The Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, Ohio 44106

This study was conducted to assess the effects of practice/learning upon the electromechanical delays (EMD) of each head of the triceps brachii, the "true" EMD, "activation lag" periods, and the activation order associated with this multipennate muscle. Eight subjects participated in the study. Bipolar surface electrodes detected EMG signals (digitized at 1000 Hz) from each of the three heads of the triceps brachii muscle. The motion used in the experiment was elbow extension in a transverse plane. Each subject performed 100 trials (analyzed in groups of 10 trials) at approximately 70 percent the previously established maximum peak acceleration. Analysis consisted of calculating the EMD of each head of the triceps, "true" EMD (time from the first head's activation to movement), activation lag time (difference between the first and last activated heads EMD), and activation order. Correlations between EMD and peak acceleration for the three heads were found to be low, consistent with previous research, and the relationship was not improved by use of the true EMD. Activation lag times were found to decrease (nonsignificantly) over the 100 trials. Activation order was found to vary widely between subjects but as a group favored the medial head. Results of this study appear to support the contention that the "product" nature of EMD measure is of less merit than generally considered and that a more "process" related parameter would provide better information regarding peripheral processes.

Board E @ 10:00 AM — EARLY DETECTION OF IRON DEFICIENT ERYTHROPOIESIS BY LASER LIGHT SCATTERING CYTOMETRY.
R. Green, R.R. King, A.J. Fishleder, G.C. Hoffman and F.V. Lucas
The Cleveland Clinic Foundation, 9500 Euclid Avenue Cleveland, Ohio 44106

We have investigated the usefulness of a novel experimental flow cytometric instrument based on laser light scattering (Technicon H*1) which independently measures the volume (V) and hemoglobin concentration (HC) of individual red cells. V and HC histograms have been examined in normal individuals and patients with varying degrees of iron deficiency. We confirm that during the stage of frank iron deficiency anemia, the first changes to appear are microcytosis (↓MCV) and anisocytosis (↑RDW). Before development of frank anemia, in the phase of iron deficient erythropoiesis, there is a decrease in directly measured cell hemoglobin concentration mean (CHCM) which is reflected in an overall leftward shift in the HC histogram and precedes changes in red cell size. In contradistinction, the conventional calculated MCHC is unchanged during this early stage of iron deficiency. Our findings directly substantiate the original claim by Wintrobe that true mean cell hemoglobin concentration may indeed be the earliest red cell index to show abnormality in developing iron deficiency anemia.

Board F @ 10:00 AM — THE DELANEY CLAUSE AND THE REGULATION OF FOOD BORNE CARCINOGENS.
Michael Huncharek. Dept. of Epidemiology and Public Health, Yale University School of Medicine, New Haven, Conn. 06511.

The current debate over the Delaney Clause does not concern its interpretation but rather its basic premises and potentially dramatic consequences. Recent advances in laboratory and epidemiological methodologies as well as developments in risk assessment capabilities place the Delaney Clause in a new regulatory and technical context. The present analysis addresses the following questions regarding the regulation of food borne carcinogens by the Food, Drug and Cosmetic Act; (1) do current scientific developments warrant serious reconsideration of the rules governing food constituents (2) to what extent has new scientific knowledge put pressure on the existing regulatory process (3) what is the role of risk assessment in the evaluation of the safety of food constituents (4) how are determinations of risk translated into public policy and (5) can the current regulatory system adapt effectively to changes in technology without stifling innovation. By examining the historical development of the Delaney Clause and current methodologies for risk assessment , this analysis recommends that by more clearly defining the goals of regulation and establishing a technically suitable method of risk evaluation, a consistent and rational approach to the creation of public health policies related to food borne carcinogenic risk should be possible.

Board G @ 10:00 AM — AN INVESTIGATION OF THE RELATIONSHIP BETWEEN COMMITMENT TO RUNNING AND DYADIC ADJUSTMENT.
Maryhelen Kreidler and Nadine Montisano, College of Nursing, The University of Akron, Akron, Ohio 44325.

This investigation examined the relationship between commitment to running and dyadic adjustment. General systems theory, applied to the family, was the conceptual framework used to implement this study. The literature associated with running and family relationships is general and inconclusive. The sample was composed of runners and their non-running spouses or special friends. Runners were either members of a running club, independent of affiliations or race entrants. The tools used to collect data were a demographic questionnaire, the Carmack and Martens Commitment to Running Scale and the Spanier Dyadic Adjustment Scale. The sample size was 65 dyads located in nine states. Multiple linear regression was used to analyze the data. All of the null hypotheses were supported. There was no relationship found between commitment to running and dyadic adjustment for runners and their partners. These findings include both male and female runners. However, the variables of number of miles ran per week and length of relationship in years did appear to have some influence on dyadic adjustment. A recommendation for further research was that a qualitative study be undertaken to measure these variables.

Board H @ 10:00 AM — LACK OF EFFECT OF STRESS ON NATURAL KILLER CELL ACTIVITY IN LEWIS RATS.
Hamid Noorbakhsh and J. Ross Stevenson, Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

It has previously been shown that stress not only can depress immune responsiveness but also can enhance it (Monjan and Collector, Science, 196:307, 1977.). Also, studies by Newberry et al. (Psychosom. Med. 34:295, 1972; J. Natl. Cancer Inst. 61:725, 1978.) have shown that mammary tumors induced by 7, 12 dimethylbenz(a)anthrancene were fewer in numbers and smaller in size in rats that were stressed by restraint or footshock. To assess the role of natural killer (NK) cells in this inhibition of cancerous tumors, NK cell activities were compared in a time-course study. Different groups of male Lewis rats were given 80 V electric footshocks 1 second out of every 5 seconds for 10 minutes every day for varying times up to 40 days. The cytotoxicity of splenic NK cells vs YAC-1 murine lymphoma line was measured by a colorimetric assay described previously by Korzeniewski and Collewaert (J. Immunol. Methods, 64:313, 1983.). No differences were found in NK cell activity among the groups, suggesting that the inhibition of mammary tumors was effected by factors other than increased NK cell activity.

Board I @ 10:00 AM — GASTRIC MUCUS SECRETION IN RATS ADMINISTERED SODIUM FLUORIDE.
Larry J. Ream. Anatomy Department, Wright State University, Dayton, Ohio 45435.

The influence of fluoride on the production and secretion of mucus by the surface mucous cells of the stomach was investigated in rats. Male Sprague-Dawley rats were given 0 ppm (control) or 150 ppm fluoride as sodium fluoride in their drinking water *ad libitum* for 70 days. Stomachs were removed; tissue blocks of the glandular portion occupied by fundic glands were prepared for light or scanning electron microscopy (SEM). Paraffin-embedded sections were stained for neutral, acidic or sulfate-rich mucoid material. Staining of the mucous cells lining the gastric pits was similar to controls. However, while most of the surface mucous cells in control animals showed loss of mucus, most of the surface mucous cells from fluoride-treated rats had rounded luminal contours and apically located mucoid material. Observation by SEM also suggested a reduction in the apical expulsion of mucous granules in the surface mucous cells of fluoride-treated rats. The free surface of most cells was smooth to gently rugged with no perforations indicating no loss of secretory material. Although it appears that the ingestion of 150 ppm fluoride in the drinking water does not interfere with mucuc production, fluoride may interfere with the release of mucus into the lumen of the stomach.

Board J @ 10:00 AM

MYOCARDIAL PRESERVATION USING 5°C PERFUSED AND NONPERFUSED RAT HEARTS. F. Sadri, F. Sellke, M. Fatholahi, T. Louk, D. Ely, Dept. of Biology, Univ. of Akron, Akron, OH 44325.

The limit of transport of hearts for transplantationis approximately four hours. In this study, cold perfusion and immersion were compared with respect to functional preservation in isolated hearts. The hearts of male spontaneously hypertensive rats (10/group) were isolated and perfused retrograde (80mmHg) or immersed in Krebs-Henselleit (K-H) solution at 5°C. After 3.5 hours the hearts were warmed to 37°C, paced at 240/min. and perfused with oxygenated K-H solution. Functional parameters were recorded at left ventricular end diastolic volumes .05-.40 ml using a balloon catheter (SP=systolic pressure, DP=diastolic pressure, NE=tissue norepinephrine, *=p<.05, **=p<.01 compared to controls at end diastolic volume=.20ml)

Group	SP (mmHg)	DP (mmHg)	NE (pg/mg)
Control - Time 0	165±5**	12 ± 2	2250±203
Nonperfusion	162±5	17 ± 3	1600±190
Perfusion	142±6**	54 ± 8**	905±302*

In conclusion, nonperfusion was superior to perfusion with better functional recovery, higher NE tissue levels, less tissue edema and greater compliance. Cardiac performance and NE tissue levels were correlated in control, nonperfusion and perfusion groups (supported by Amer. Heart Assoc., State of Ohio, and Akron City Hospital grants).

Board K @ 10:00 AM

DYNAMIC LOADING OF SMOOTH AND POROUS CEMENTED FEMORAL COMPONENTS

L.S. STERN, M.T. MANLEY, G. KOTZAR, B.N. STULBERG

Department of Musculoskeletal Research, Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, Ohio 44106

Preservation of the stem and cement interface may play an important role in the reduction component joint loosening. Our current study assessed the stability of smooth and porous coated femoral components subjected to repetitive loading.
METHOD: Five pair of fresh human femora were implanted with femoral implants and allowed to age in saline for 1 month. Uniaxial strain gauges were placed on the proximal and distal medial cortex. Specimens were tested at 40Hz for 10^7 loading cycles.
RESULTS: All femora survived the fatigue loading. Femora with implanted smooth femoral components developed longitudinal cracks in the cortex. No cracks were seen in any porous implanted specimens. Mean subsidence and hoop strain values for smooth implants were about twice those for porous implants.
DISCUSSION: The presence of a porous coating at the stem-cement interface improved the overall stability of the implant and reduced the magnitude of non-physiologic hoop strains generated in the cortex.

Board L @ 10:00 AM

EFFECTS OF COMMERCIAL BRAND BEE POLLEN AS SOLE SOURCE OF NUTRITION ON SURVIVAL OF MICE AND RATS J. Walker, D. Lyle, and R. Liebelt.,Dept. of Anat.and Comp. Med. Unit, N.E. Ohio Univ. Coll. Med., Rootstown, OH 44272.

It has been estimated that tons of bee-collected pollen are processed annually and a significant portion is being sold as a supplemental food stuff for humans. This has resulted in bee pollen being actively marketed for alleviating and indeed even "curing" certain diseases. Experimental animal studies concerned with the physiological and pharmacological effects of bee pollen are almost non-existent.

Inbred mice of the CBA/Ki, C3H/f/Ki and C57BL/Ki were placed at 40-50 days of age on seven different brands of commercial bee pollen as the sole source of food intake. The mice survived in a healthy condition on four of the seven brands (A,C,E,F) studied for periods of at least one year. The mice died when maintained on the other three brands: Brand B 15-25 days;Brand D 5-6 days;Brand G 8-12 days.Female Zucker rats lived for at least one year when maintained on Brand A.

It was not possible to determine whether the success or failure of the different brands was related to differences in nutritional value of the pollen or the use of additives or binders to the pollen. These findings point out the importance of taking into consideration the source and form of bee pollen used in experimental animal studies when interpretating either positive or negative results.

Board M @ 10:00 AM

EFFECTS OF EXERCISE ON CORONARY RESERVE AND CAPILLARY DENSITY IN RENAL HYPERTENSIVE RATS. P. Wicker,[1] M.A-Samad,[1] K. Rakusan,[2] R.C. Tarazi.[1] 1) Cleveland Clinic Foundation, Ohio, 44106 2) University of Ottawa, Ontario, Canada.

Exercise (EX) has been reported to increase myocardial vascularity. We therefore studied whether it could prevent the decrement in coronary vasodilator reserve (Cor VR) and capillary density (CD) observed in hypertensive lett ventricular hypertrophy (HT LVH). Female 1C-2K Goldblatt renal HT rats and sham-operated controls (SH) were either made to swim (T) or maintained cage- confined (UT) for 9 wks. Minimal LV cor. resistance (LVCR)/g (mmHg/ml/min/g) (Cor VR) or for the whole LV (LVCR/LV, mmHg/ml/min), an index of the tunctional cor. cross sectional area (CSA) were measured in conscious rats by microspheres after carbochrome. Results (m ± SD):

GROUP	SH-UT	SH-T	HT-UT	HT-T
N	16	15	16	21
LVCR/g	6.4±1.8	5.3±1.3	8.7±1.5*	9.6±2.4*
LVCR/LV	11.5±3.3	8.7±1.8**	11.4±1.9	11.9±2.9
CD (C/mm^2)	4915±581	4677±725	3894±374*	3589±529*

* : p < .01, HT vs SH; ** : p < .05 vs SH-UT.
Thus, in normotensive rats, EX promoted myocardial vascularity as shown by an increase in the functional Cor. CSA. However, no beneficial effects were seen in HT rats, and the decrease in Cor. Vr of HT LVH was not prevented.

Board N @ 10:00 AM

PHARMACOLOGICAL CORONARY RESERVE PREDICTS THE RESPONSE OF THE CORONARY BED TO ISCHEMIA IN HYPERTENSIVE CARDIAC HYPERTROPHY. P. Wicker and M. A. Samad. Research Institute, The Cleveland Clinic Foundation, Cleveland, OH 44106

Whether the reduced pharmacological coronary reserve (cor res) in hypertensive (HT) cardiac hypertrophy (H) also reflects a diminished cor. res. in response to a physiological stimulus, i.e. ischemia is unclear. Left ventricular (LV) cor res, defined as minimal cor resistance after carbochrome (pharmacological cor res) was measured in conscious rats with HT LVH and in their sham operated controls and compared with ischemic cor res measured after transient coronary occlusion using a combination of a Doppler technique and microspheres in the same rat after anesthesia and thoracotomy.

	Controls (n=10)	HT LVH (n=12)
Results (m±SD)		
MAP (mmHg)	109±7	169±20*
LV wt/body wt (mg/g)	2.0±3	3.0±20*
LV cor. res.: pharmacological	4.9±0.7	7.9±2.2*
(mmHg/ml/min/g) ischemic	5.5±1.9	9.6±4.8*

* p<.01, HT LVH vs controls; There was a signficiant correlation between pharmacological and ischemic LV cor res (r=.57, n=22, p<.01). Pharmacological and ischemic LV cor res were similarly reduced in HT LVH.

Thus, it appears that in this model pharmacological cor. res. can be used to predict the response of the coronary bed to ischemia.

Board O @ 10:00 AM

MITOCHONDRIAL AND FUNCTIONAL HEART PRESERVATION BY A CALCIUM ANTAGONIST. K. Zeller, F. Sadri, F. Sellke, D. Ott, and Dr. Ely. Dept. of Biology Univ of Akron, 44325, and Akron City Hospital, 44303.

One of the problems associated with in vitro organ preservation has been ultrastructural damage leading to functional impairment upon organ reperfusion. Our heart studies focused upon chronic and acute administration of a calcium (Ca) antagonist - verapamil (V) in male Wistar Kyoto rats in order to reduce the potential damaging effect of Ca after a period of Ca-free perfusion. In the chronic experiments 9 rats were implanted with slow release capsules of V (2.5mg) for 3 weeks and then the hearts were isolated using the Langendorff technique with Krebs-Henselleit perfusate (37°C) and left ventricular LV pressure was measured at 4 different balloon volumes after 15 min. of Ca-free perfusion, followed by 15 min of regular K-H perfusion with Ca. In acute experiments, V (2mg/L) was added to the final K-H perfusate following the same protocol. Tissue samples of LV apex were taken for electron microscopic analysis of mitochondrial (M) integrity. The M were damaged in each control group and LV function was reduced. Chronic V treatment was not protective of M damage or LV function, however, acute V treatment protected the M from damage and maintained LV function. (Supported by Amer. Heart Assoc., State of Ohio and Akron City Hospital grants).

Board P @ 10:00 AM

PLASMA FIBRONECTIN: A POTENTIAL DIAGNOSTIC PARAMETER TO EVALUATE SUSPECTED HEMOLYTIC TRANSFUSION REACTIONS. J. Adams, T. Hathaway, J. Holmberg, W. Hann, and W. Monaghan. Department of Medical Technology, Bowling Green State University, Bowling Green, OH 43403.

Adverse transfusion reactions to incompatible blood have generally been evaluated by measuring various serological or chemical changes in body fluids. In this study mongrels transfused with incompatible dog and/or human blood were

utilized as a hemolytic transfusion reaction (HTR) model. Plasma haptoglobin, plasma Hb and plasma fibronectin (PFN) were measured to assess the HTR. When an HTR occurred, plasma haptoglobin levels immediately declined and remained low throughout the experiment. The plasma Hb level rose within minutes of the heterologous transfusion, then returned to the original level within 24 h. The PFN level dropped and returned to the original level within 24 h. Plasma fibronectin appears to be as sensitive as plasma Hb in monitoring RBC destruction and clearance. The rapid post transfusion replacement of PFN could be due to a dynamic shift from cellular fibronectin to PFN.

SECTION F. GEOGRAPHY

MORNING SESSION - JEWISH COMMUNITY CENTER
YOUTH ROOM 025
SATURDAY, APRIL 25, 1987
BOB J. WALTER, PRESIDING

9:00 **URBAN-RURAL TEMPERATURE DIFFERENCES AT TOLEDO, OHIO. Thomas W. Schmidlin. Geography Department, Kent State University, Kent, Ohio 44242.**

Thirty-one years of daily maximum and minimum temperatures were examined from two sites. The urban site was on the roof of a downtown office building and the rural site was at Toledo Express Airport. Mean annual temperature is 2°C warmer downtown. Mean daily maxima are 1.5° warmer and mean daily minima are 2.5° warmer. The greatest difference is in summer when temperatures average 2.5°C warmer downtown and the least difference is in spring when downtown temperatures are 1°C warmer than the rural site. The thermal effects of Lake Erie affect the downtown site more often than the rural site.

The average annual number of days with temperatures 32°C or warmer is 31 downtown and 12 at the rural site. The average number of days with temperatures 0°C or below is 119 downtown and 143 at the rural site. The last spring freeze occurs 18 days later at the rural site and the first autumn freeze occurs 24 days earlier at the rural site. The average length of the freeze-free period is 192 days downtown and 150 days at the rural site.

9:15 CHANGES IN URBAN AGRICULTURE IN TOLEDO, OHIO, 1979-1986. Thomas D. Anderson, Department of Geography, Bowling Green State University, Bowling Green, Ohio, 43403.

All land used for agriculture in Toledo, Ohio was investigated in 1979 and again in 1986. The study area was defined as the land within the belt of limited-access highway that girds the city. Methods included field examinations, interviews, and air photo analysis. The air photos were color slides taken by the ASCS in July 1979 and 1986. Results include maps of field patterns and crops for both years, identification of types of farm operations, and a review of problems peculiar to urban agriculture. Special attention was given to farmland loss and stability over the seven-year period.

9:30 MANUFACTURING BRANCH PLANT CLOSURES: THE CASE OF NORTHWESTERN OHIO. Bruce Smith and John Hiltner, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403.

Geographers have expended much research effort studying the various locational shifts which have been developing in the American economy. One of those geographic patterns has been the growth of manufacturing employment in the nonmetropolitan areas of the nation. An important component of this trend has been the opening of manufacturing branch plants in rural areas. Although their number has been growing, the employment stability of branch plants has been questioned.

The goal of this research was to assess the characteristics of manufacturing branch plants which closed in Northwestern Ohio between 1978 and 1984. More specifically, logistic regression analysis was utilized to identify those attributes which distinguished between the closed plants and the manufacturing establishments which remained open.

Slow growing, durable manufacturing establishments exhibited a lower likelihood of closing than did other types of plants. Furthermore, the size of the plant's labor force proved to be an important variable. Larger establishments had a lower probability of closing than did companies with fewer employees.

9:45 EXPORT PROCESSING ZONE: A MODEL OF DEVELOPMENT Stephen S. Chang, Department of Geography Bowling Green State University, Bowling Green, OH 43403.

The Kaohsuing Export Processing Zone was the first of three established in 1966 in Taiwan. These were created to increase the pace of economic development by attracting foreign investments. Other economic benefits that can be derived include providing jobs and training for the labor force, the diffusion of technology and know-how to the local industries, the development of export markets and the availability of competition to spur local industries.

The idea is successful. Taiwan, however, is currently experiencing a labor shortage. The initial labor-instensive, low-skill, and assembly-oriented industires, though still dominant, are faced with increasing protectionism and price competition from abroad. Taiwan has to embark on and face the challenges of the next stage of evolution towards technologically-oriented industries and a mature economy.

This model of development is export driven. With increased pressures of protectionism, price competition and productivity improvements, newly developing countries wishing to follow this model will have major problems to overcome.

SECTION F. GEOGRAPHY

AFTERNOON SESSION - JEWISH COMMUNITY CENTER
YOUTH ROOM 025
SATURDAY, APRIL 25, 1987
BOB J. WALTER, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 RESIDENTIAL SEGREGATION IN THE CLEVELAND AND DETROIT METROPOLITAN AREAS. Elias T. Nigem, Geoffrey Penny, Hazem Alfaham. The University of Toledo, Toledo, Ohio 43606.

Using the 1980 U.S. census of population and the census tract as the unit of analysis inter- and intragroup residential segregation for blacks and whites in the metropolitan areas of Detroit and Cleveland was examined. The degree of residential segregation between the two groups and within each one was measured by the index of segregation, index of dissimilarity and the segregation curve. Other indexes of segregation were also utilized. For the two metropolitan areas inter- and intragroup residential segregation by income and occupation exists. A difference in the degree of inter- and intragroup residential segregation between the two metropolitan areas is also apparent. Although residential segregation by race is higher in Cleveland than Detroit the pattern and the degree of intragroup residential segregation in the two metropolitan areas appears to be similar.

2:15 URBAN DEVELOPMENT OF THE VILLAGE OF HARTVILLE AND SURROUNDING LAKE TOWNSHIP 1950-1983.

Leonard G. Peacefull, Firelands College, Bowling Green State University, Huron, Ohio 44839

Lake Township was the fastest growing area in Stark County during the 1970's. This growth, particularly in the northeast part of the township, has generated a booming commercial development. This paper outlines the spatial aspect of that growth and its effect on local economies.

2:45 AN OVERVIEW OF THE SPATIAL NATURE OF PERIODIC FLEA MARKETS AND ANTIQUES MARKETS EXISTING IN 1986 IN THE STATE OF OHIO. Jeffrey J. Gordon, Department of Geography, Bowling Green State University, Bowling Green, OH 43403.

Flea markets and antiques markets represent the two most common periodic market forms for recirculated goods in the United States. An exhaustive survey of the trade journal literature for 1986 was undertaken for all extant examples of these periodic market forms in the state of Ohio.

The spatial and temporal characteristics of these periodic markets were examined, and an overview of

selected geographic findings are presented in this paper, as follows:

1. the proportion of settlements having these periodic markets,
2. the relationship between the size and number of these periodic markets and the size of the settlements in which they are located,
3. the size of these periodic markets in terms of the number of vendors and the apparent existence of a periodic market hierarchy.

3:00 **A PRELIMINARY GEOGRAPHICAL INVESTIGATION OF THE NATIONAL TRACTOR PULL IN BOWLING GREEN, OHIO.** Pat Smith and Jeff Gordon, Department of Geography, Bowling Green State University, Bowling Green, Ohio, 43403.

The competetive sport of tractor pulling evolved from the folk culture. Bowling Green, Ohio, since 1967, has been the home of the National Tractor Pulling Championships- the world's largest outdoor tractor pull. This geographical study focuses on selected spatio-temporal aspects of this recent and popular phenomenon.

The evolution of tractor pulling in Bowling Green is specifically examined here with respect to the number of competetors, where they come from and the classes in which they compete. The results of this study, based on four years (1970, 1975, 1980, and 1985), are presented as mapped patterns illustrating the dynamic nature and evolution of the tractor pull's tributary area. Speculations regarding socio-economic impacts, as well as future research directions, are offered.

3:15 THE ROLE OF EXPERIENTIAL EDUCATION IN THE GEOGRAPHY CURRICULUM. John Hiltner and Bruce W. Smith, Department of Geography, Bowling Green State University, Bowling Green, Ohio, 43403.

Applied geography has generated much discussion within the discipline over the past decade as a result of declining enrollments, departmental reductions and closures, and the erosion of traditional labor markets for geographers.

The objectives of this paper relate to one segment of an applied geography program - the experiential education segment. This experiential segment, which can be in the form of either a departmental internship program or a cooperative education experience, is viewed as a critical component of any applied geography program.

The advantages and disadvantages of the field experience for the student are discussed. However, most of our discussion is about two other issues: 1) the integration of the field experience, as well as applied geography, into the traditional liberal arts geography curriculum; and 2) the nature of faculty involvement in the field experience, the changing roles of faculty, and the faculty commitment necessary for the successful operation of any type of experiential education. Finally, we describe the benefits of the field experiences of students for both the geography department and the individual faculty members.

SECTION F. GEOGRAPHY

POSTER SESSION - OSBORNE HALL GYMNASIUM AUDITORIUM
SATURDAY, APRIL 25, 1987

Board K @ 9:00 AM CASE STUDY OF CHANGE AND PLANNING AT YOUNGSTOWN STATE UNIVERSITY, 1970-1980. Presented by David J. Gemmel, 13009 West Pine Lake Road, Salem, Ohio, 44460.

A case study of two different facility plans for an educational institution helps describe the importance of the local factors when formulating planning assumptions. Caudill, Rowlett, and Scott, an architectural and planning firm, submitted a facilities development plan for Youngstown State University in June 1970. Fleischman Architects submitted another plan in 1984. After describing the 1970s plan and explaining the significant economic and demographic changes in the local decision making environment which occurred in the 1970s, the 1980s plan will be described. How the later plan was influenced by these changes and how the earlier planners could have forecast these changes are also discussed.

SECTION G. CHEMISTRY

MORNING SESSION - JEWISH COMMUNITY CENTER BOARD ROOM 025
SATURDAY, APRIL 25, 1987
B. WENCLAWIAK, PRESIDING

9:30 SUPERCRITICAL FLUID CHROMATOGRAPHY OF CRUDE OIL RESIDUES. Patricia A. Garry and Bernd W. Wenclawiak, Department of Chemistry, University of Toledo, 2801 W. Bancroft St., Toledo, OH 43606

Modified Organic Naturally Occurring Risen or M.O.N.O.R. is the name generally given to the tar-like residue remaining following the refinement of crude oil. The composition of the residue is somewhat valuable depending on the starting material, but it generally consists of high boiling high molecular weight hydrocarbons with chain-like or naphthenic-like structures.

The solubility of any one constituent is characterized by several parameters including its volatility at the extraction temperature, the nature of the solvent, the solvent density and the pressure. The dramatic influence of the solvent density on hydrocarbon solubility can be further examined using supercritical fluid chromatography.

Supercritical carbon dioxide has already been established as a suitable mobile phase in the chromatographic separation of high molecular weight hydrocarbons. Negative temperature programming can be used in conjunction with this technique in order to gradually increase the density of the mobile phase allowing for separation of each component. This technique seems more suitable in characterizing M.O.N.O.R. samples. Once optimum conditions are established in separation of oil refineries in order to salvage hydrocarbons up to C_{25} to C_{30} from the asphalt residual.

9:45 VIBRATIONAL OVERTONE SPECTROSCOPY OF THE N-H OSCILLATOR Yasmin A. Ranasinghe, Nandani Rajapakse, Deanne L. Snavely, Department Of Chemistry, Bowling Green State University, Bowling Green, OHIO, 43403.

Even though most organic liquids and gases appear to be transparent to visible light all of these compounds possess a very weak ability to absorb light in the visible region. Transitions responsible for these absorptions correspond to excitation in the vibrational motions of the molecule. These excited states are called highly excited vibrational overtone states. These highly excited vibrational overtone levels are extremely important to chemists because all chemical reactions involve vibrational excitation.

By obtaining the laser photoacoustic absorption spectrum(PAS) of interesting model compounds we can study the overtone transition energies, relative intensities, and band contours. We have obtained the PAS of the N-H stretch vibrator in a series of cyclic compounds Pyrrole, Pyrroline and Pyrrolidine. From these spectra, we have determined the mechanical frequency and the anharmonicity constants and compared these values with those for the straight chain N-H compounds. A general comparison of the spectroscopy of the N-H and C-H stretching vibrations is included.

10:00 SYNTHESIS AND PROPERTIES of 1,3-DIALKYL-1,2-DIHYDRO-2-OXOPYRIMIDINIUM SALTS. Thomas O. McCullough, Department of Mathematics and Applied Science, University of Cincinnati, Cincinnati, Ohio 45221 and Barbara J. Barker, Department of Chemistry, Xavier University, Cincinnati, Ohio 45207.

Our continuing interest in the chemistry of quaternary ion containing compounds has led to preparation of a series of 1,2-dihydro-1,3-dimethyl- and 1,3-diethyl-1,2-dihydro-2-oxopyrimidinium salts.

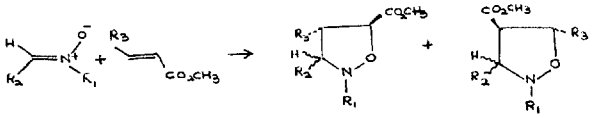
The general method of synthesis consists of condensing the dialkylurea with 1,3-propanedial, which is generated from malonaldehyde tetramethyl acetal in an acidic-ethanolic medium.

Two separate condensation syntheses of the nitrate, bromide, and perchlorate salts have been performed. Spectral (mass, nuclear magnetic

resonance, infrared, and ultraviolet-visible) properties of these compounds are to be discussed and compared with those properties of other previously reported 2-oxopyrimidinium salts.

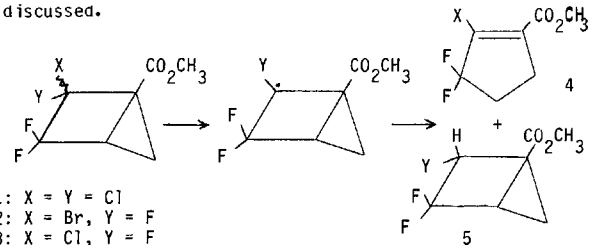
10:15 EFFECT OF EXTENDED CONJUGATION ON NITRONE CYCLOADDITION. G.U. Gunawardena and T.H. Kinstle, Dept. of Chemistry, Bowling Green State University, Bowling Green, OH 43403.

Regioselectivity of 1,3 dipolarcycloaddition reactions of nitrones with moderately electron deficient dipolarophiles such as , -unsaturated esters are very sensitive to the nature of the nitrone and the reaction conditions. This is due to the fact that the HOMO-LUMO energy levels of such dipolarophiles are comparable with those of nitrones, leading to a mixture of HOMO controlled and LUMO controlled transition states. We have recently studied the effect of extended conjugation in the nitrone on the regioselectivity as well as on stereoselectivity using two such nitrones, C-styrylN-methylnitrone and C-styryl-N-phenylnitrone. The results of their cycloadditions with methylacrylate and methylcrotonate were compared with the corresponding cycloadditions of C-phenyl-N-methylnitrone and C-phenylN-phenylnitrone. The differences will be discussed in the presentation.



10:30 FREE RADICAL REACTIVITIES OF FLUORINATED BICYCLOPENTANES. A Admasu and T.H. Kinstle, Dept. of Chem, Bowling Green State University, Bowling Green, Ohio 43403

It is well known that ring opening reactions of bicyclo[2.1.0]pentanes are very rapid if they occur in concert with relief of some or all of the 54 kcal of strain in the molecule. For example, formation of a free radical in the 2-position leads to complete and rapid ring opening to produce cyclopentene. We have recently extended our researches on fluorinated bicyclo[2.1.0]-pentanes to include formation of the C-2 free radical from compounds 1-3 and have found 24%, 89% and 92% respectively of retained bicyclic structures 5 in the products. The stereochemistry of structure 5 and a rationale for the effects of fluorine on the course of the reaction will be discussed.



1: X = Y = Cl
2: X = Br, Y = F
3: X = Cl, Y = F

SECTION G. CHEMISTRY

AFTERNOON SESSION - JEWISH COMMUNITY CENTER
BOARD ROOM 025
SATURDAY, APRIL 25, 1987
D. DOLLIMORE, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 SOLVENT SELECTION FOR THIN-LAYER CHROMATOGRAPHY OF Cd, Zn, Ni and Cr CHELATES. Arshad Parvez and Bernd W. Wenclawiak, Department of Chemistry, University of Toledo, 2801 W. Bancroft St., Toledo, OH 43606.

We have used Snyder's solvent triangle to find a simple approach for the solvent selection in thin-layer chromatography of metal chelates on normal stationary phases and for high pressure liquid chromatography on reversed phases.

Three different ligands (diethyldithiocarbamate DDTC, acetylacetone ACAC, 8-mercaptoquinoline TOx) coordinated to four different central ions (Cd, Zn, Ni and Cr) have been investigated.

We will discuss our results with respect to separation, solvent and ligand effects.

2:15

Nitrogen Adsorption Isotherms at Room Temperature on Coal and Pitch Resin Extracts and the Mechanism of Adsorption.

D. Dollimore and A. Turner
Department of Chemistry, University of Toledo, OH, U.S.A. and Lancashere Tan Distillers, Manchester, U.K.

Nitrogen Adsorption isotherms onto cool and pitch resins obtained by the solvolytic fractionation process have been obtained at a series of temperatures close to the ambient. This allows accurate measurements to be made if a suitable pressure measurement device is available. It is concluded from thermodynamic data derived in the limiting care when molecular coverage approaches zero that the condition of the nitrogen film adsorbed onto the surface is in a supermobile state.

2:30 HEAVY METAL AFFINITY LABELING OF THE CATALYTIC SITES OF ENZYMES. Lisa MacDonald and Daniel J. McLoughlin, Department of Chemistry, Xavier University, Cincinnati, Ohio 45207

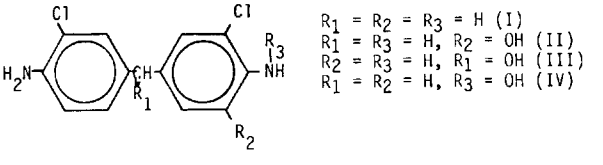
The etheno briged nucleotide compounds C-AMP, C-ADP, C-ATP were reacted with mercuric acetate at low pH and the resulting mercury derivatives isolated by crystallization. Excess mercury was removed by chromatographic procedures. The mercury derivatives of C-AMP and C-ADP were insoluble and difficult to utilize in further studies. However, the mercury derivative of C-ATP was soluble. The Hg-C-ATP UV spectrum was examined as a function of pH and the spectra were found to be significantly shifted from those of the pure etheno compound. The fluorescence of the C-ATP was found to be totally quenched upon binding mercury.

The Hg-C-ATP derivative was examined as to its effect upon the catalytic activity of selected enzymes. Glutamate Dehydrogenase was inhibited by Hg-C-ATP and the extent of this inhibition was dependent upon pH. The Hg-C-ATP derivative did not function as a substrate for Firefly Luciferase, but did inhibit. (Supported by ACS-PRF Grant 16627-B3)

2:45 SYNTHESIS OF CARCINOGENIC METABOLITES OF MOCA. N.K. Illangasekare and T.H. Kinstle, Dept. of Chemistry, Bowling Green State University, Bowling Green, Ohio 43403.

Aromatic amines such as benzidine, 2-naphthylamine and 2-aminofluorene have long been suspected and more recently well established to be mutagens and carcinogens. We are interested in evaluating the mutagenecity and carcinogenecity of methylene-bis-orthochloroaniline abr. MOCA(1), which is widely used in the production of urethane polymers.

It has been documented that oxidized metabolites are the true carcinogens for several primary aromatic amines. We are therefore developing synthesis of three possible metabolites of MOCA, specifically the two C-hydroxy compounds II and III and the N-hydroxy derivative IV. Alternative methodologies using benzenoid or diarylmethane precursors will be discussed during the presentation. Studies of the reaction of IV with guanosine, other nucleosides, and DNA will be undertaken and the results discussed.

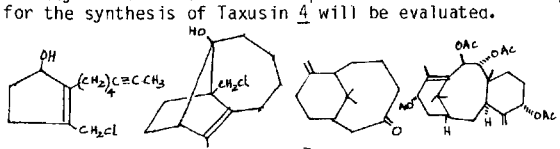


$R_1 = R_2 = R_3 = H$ (I)
$R_1 = R_3 = H$, $R_2 = OH$ (II)
$R_2 = R_3 = H$, $R_1 = OH$ (III)
$R_1 = R_2 = H$, $R_3 = OH$ (IV)

3:00 A SYNTHETIC APPROACH TO THE BICYCLO[5.3.1] UNDACANE RING SYSTEM OF THE TAXANE. R.J. Rajapakse and T.H. Kinstle, Dept. of Chem., Bowling Green State University, Bowling Green, OH 43403

The taxanes are represented by a group of naturally occurring substances isolated from the European Taxus baccata and the Japanese Taxus cuspidata. All of these compounds have a common tricyclo[9.3.1.0]pentadecane skeleton as in 4. Our research goal is to develop a new synthetic entry to the polycyclic ring system present in the Taxane family. Our synthetic approach 1->2->3 for the bicyclo[5.3.1]undecane ring system 3 is schematically outlined below.

Cyclization of enynol 1 to 2 is similar to a procedure used by W.S. Johnson in a synthesis of Longifolene. Synthesis of 1 using 2-methoxy cyclopentenone and 1-bromohept-5-yne as starting materials will be discussed in the oral presentation, as will its cyclization under a variety of conditions. Development of a similar strategy for the synthesis of Taxusin 4 will be evaluated.



1. 2. 3. 4.

3:15 THEORETICAL STUDY OF C_2 AND C_2^-: X $^1\Sigma_g^+$, a $^3\Pi_u$, X $^2\Sigma_g^+$ AND B $^2\Sigma_u^+$ POTENTIALS
Jeffrey A. Nichols and Jack Simons, Chemistry Department Malone College, 515 25th St. N. W., Canton, Ohio 44709

We employ multiconfigurational self-consistent field and multiconfigurational electron propagator methods to characterize the X $^2\Sigma_g^+$ and B $^2\Sigma_u^+$ states of C_2^- and the X $^1\Sigma_g^+$ and a $^3\Pi_u$ states of C_2 over a wide range of bond lengths (1.0-1.9 Å). We find a systematic difference of approximately 0.3 eV in the relative positioning of our anion- and neutral-state potentials compared to the anion-neutral spacing in the best curves constructed from experimental data. Once this energy shift is taken into consideration, all four of our computed potential energy curves are in reasonably good agreement with experimental information. However, there remains a substantial difference in the relative positioning of our B $^2\Sigma_u^+$ and a $^3\Pi_u$ curves, compared to the best available experimental data, at larger bond lengths. The relevance of this discrepancy and of our other data to the present state of experimental knowledge on C_2^-/C_2 is discussed.

SECTION H. SCIENCE EDUCATION
FIRST MORNING SESSION - CATTELL LIBRARY 49
SATURDAY, APRIL 25, 1987
MARIAN A. MOECKEL, PRESIDING

9:00 EVOLUTION AND THE CHALLENGE OF CREATIONISM: A SENIOR LEVEL SYNTHESIS COURSE AT OHIO UNIVERSITY REPRESENTING A NON-CONTROVERSIAL APPROACH TO A CONTROVERSIAL TOPIC. William D. Hummon (Chair, President's Committee on Evolution/Creationism, OAS), Dept.of Zoological & Biomedical Sciences, Ohio University, Athens, OH 45701.

4 Q.Cr. Description: An examination of two ways of knowing, scientific and religious, as exemplified in the controversy on evolution and creationism. The course is a non-judgmental forum for openness and dialogue. Objectives: Students are encouraged to further their understanding of: (1) the scientific method, (2) the nature and extent of evidence regarding organic evolution and special creation, and the diversity of thought within each, (3) the issues and strategies of conflict, (4) the arenas of confrontation, and (5) the implications of the outcome for both science and religion. Students are expected to grapple with both the stated and the underlying positions on all aspects of the matter and to comprehend the issues sufficiently well to present them in discussions (or role-playing sessions). Requirements: Ca. 1000 pp. of reading; written "reflection" papers weekly, 2-3 pp. dbl spaced, with emphasis on content, clarity of presentation and development of topic more than on length. Contents of papers will initiate class discussion. Aim: The aim is to dialogue, not debate, to seek an atmosphere of mutual edification, understanding and reciprocal respect, not one of antagonism and distrust. Grades are based on writings, class participation and maturation gained, not on one's final position regarding the issues.

9:15 WHAT'S GOING ON? A STATUS REPORT OF SCIENCE-SOCIETY-TECHNOLOGY-ENVIRONMENT EDUCATION. John F. Disinger and Marylin Lisowski, ERIC Clearinghouse for Science, Mathematics, and Environmental Education, 1200 Chambers Road, Columbus, OH 43212

Environmental education and science-technology-society education for grades K-12 deal with similar content, have overlapping goals and objectives, and employ or recommend similar teaching approaches. But they appear to be operating essentially in isolation from one another.

A national survey of state education agencies has produced a summary of activity at the state, and to some extent the local, levels in Science-Society-Technology-Environment Education. Results will be presented and implications discussed.

9:30 ALASKA : A FIELD STUDY FOR HIGH SCHOOL STUDENTS
Doug Wynn, Science Department, Westerville North High School, Westerville, Ohio 43081

A one - credit field study program is offered by the Westerville Schools. The science course meets in the evening and concludes with a 35-day field study to the Western states and Alaska. Students attend classes, complete 5 notebooks, a photo collection, and field logs. The problems and successes of developing the program, obtaining approval, raising funds, and conducting the actual field study, are presented with slides and discussion.

9:45 SCIENCE CURRICULUM FOR GIFTED STUDENTS IN GRADES 8-12. Claudia T. Melear, The Ohio State University, Instruction & Research Computer Center, 1971 Neil Ave. R. 406, Columbus, Ohio 43210.

Effective instructional models for gifted students have been described by Van Tassel-Baska. A program of instruction based on these models was designed and implemented in a Georgia High School. Traditional science classes, as well as non-traditional class offerings were taught. The curriculum was designed for individualization of instruction to promote creativity and self-direction in each learner. Community and parental support was a part of the program design. Students won national recognition for their project work.

10:00 PRUDENT MANAGEMENT OF CHEMICALS IN THE ACADEMIC CHEMISTRY LABORATORY
WENDY A. WALTON, Department of Chemistry, The Ohio State University, Columbus, Ohio 43210

Hazards in the academic chemistry laboratory can be minimized significantly by the prudent management of chemicals. Such management entails a careful consideration of chemical purchasing, storage and disposal policies. Purchasing only the quantity of chemicals that can be consumed within a reasonable period of time minimizes the accumulation of reagents that otherwise might deteriorate with time. Appropriate storage of the chemicals that must be retained necessitates a consideration of their chemical natures to avoid storing incompatible substances together. Requirements to enable safe storage of chemicals will be presented, including an emphasis on the importance of labeling as described by The OSHA Hazard Communication Standard. Prudent disposal of unwanted chemicals in accordance with current EPA hazardous waste disposal guidelines also will be discussed in detail.

10:15 SCIENCE CONCEPT DEVELOPMENT USING COMPUTER SIMULATIONS.
Robert E. McNemar, Ph.D.,Director of Academics, Columbus Public Schools, Columbus, Ohio 43207

The microcomputer was used to simulate science activities in an instructional environment to accelerate the development of science concepts with middle school students.

Cognitive theorists emphasize the role of the students' motivation as the key factor in their intellectual development. This motivation can include the students' desire to satisfy their curiosity, master challenging tasks or reduce the incongruities and uncertainties encountered in their environment. Students form theories about the environment and the relations among its different phases.

Piaget describes how the developing student changes ideas about number, cause, time and space. Students first represent their environment in terms of their own activities, experiences, then moves to a limited set of generalizations based on specific knowledge. Finally students develop the ability to make valid and abstract generalizations about the nature of reality.

A prominent part of teaching concepts is the use of instances to illustrate the concept. Science students are exposed to concepts of various levels of difficulty, from the simple machine to the complexity of atomic structure. They must be able to distinguish a positive instance of a concept from a negative instance in order to comprehend the concept.

10:30 **SOME USES OF VIDEODISC TECHNOLOGY IN THE CLASSROOM.** Claudia T. Melear and Evelyn K. Jackson, The Ohio State University, Instruction and Research Computer Center, 1971 Neil Avenue, Columbus, Ohio 43210.

Many science videodiscs are now available for use by the classroom teacher. The videodisc can be used as a visual resource to replace more frequently used slides and film strips. Several alternative uses for incorporating the use of the videodisc in the clasroom will be demonstrated. A literature review of videodisc technology will be available and funding sources discussed. Many videodiscs will be on hand for inspection and workshop participants may get some hands on experience. No previous knowledge of this medium is assumed.

SECTION H. SCIENCE EDUCATION
SECOND MORNING SESSION - CATTELL LIBRARY 46
SATURDAY, APRIL 25, 1987
DAVID E. LEWIS, PRESIDING

9:00 SCIENCE ALLIANCE. Leah Klusch, Science Fair Coordinator, Alliance City Schools, 200 Glamorgan Street, Alliance, Ohio 44601.

The Science Alliance Program is an aggressive, multidisciplinary, broad based program of the Alliance City School System to stimulate students grades 6 through 12 to be active in science research thought, projects involving independent science experimentation and science competition With the support of the administration and an active enthusiastic presentation to the students, faculty and community, the program was initiated in September 1986, 7 months before the scheduled science fair. It was documented that enthusiasm among the teachers and students was strong and interest was high. Students wanted to do science projects and enjoyed research thought, if stimulated.

Development of the program included improvement of the science materials in the media centers, classrooms, inservice opportunities for faculty, field trips for students. The Science Alliance Program was further developed to include science competition teams from each middle school and the high school. The program has stimulated a 550% increase in science project participation and a refreshing resurgence of enthusiasm among the science faculty and administrative staff. A generous grant from the Timken Foundation was sought to upgrade our media center materials, lab supplies and funding for special programs.

9:30 ON-LINE COMPUTER TESTING FORMATS: STUDENT PREFERENCES. John F. Gwinn (Biology) and Loretta Beal (Computer Based Education) The University of Akron, Akron, Ohio 44325.

Three courses at The University of Akron use on-line computer testing where the scores determine a significant portion of the student's grade. We have previously reported on the very favorable acceptance of such testing by students.

On-line computer testing offers several strategies that are not possible with traditional paper and pencil tests, such as immediate corrective feedback and knowledge of score. The testing formats and procedures used by Audio-tutorial Anatomy and Physiology (ATAP) and Nutrition Fundamentals differ in significant ways.

Surveys were administered to students from each class as well as to students having completed both classes. An analysis was made of general satisfaction with each format as well as comparative preferences.

Students strongly prefer an on-line format which provides the flexibility of paper and pencil: ability to skip questions until later and ability to change answers. Students with experience in only one format tended to favor the familiar format when both were described. Students were more divided on whether feedback was more useful immediately after each response or at the end of the test.

Further refinement of the format, testing, environment, and its incorporation into a course will further enhance this attractive alternative to traditional paper and pencil testing.

9:45 NUCLEAR SCIENCE CURRICULUM DEVELOPMENT FOR HIGH SCHOOL SCIENCE PROGRAMS. David M. Weaner and Patricia L. Klein, Westerville City Schools, 950 Smothers Rd., Westerville, Ohio 43081.

Often, provisions are made in our educational system to provide reinforcement learning for different disability groups. Rarely are programs geared toward students of average to gifted status. The need for materials of this type was one of many recommendations emphasized in the government report A Nation at Risk. In partial response, the Nuclear Science program in Westerville and the Nuclear Engineering Department of Ohio State University has submitted to the National Science Foundation a proposal for developing a five tier curriculum program in the broad area of nuclear science. At its first level, the program contains material for on-site visits to various nuclear facilities. At its fifth level, students work with professional researchers on independent projects. Discipline areas range from physics and chemistry to biology, medicine, and ecology. A prime concern is to avoid being "site specific;" the material should work well for any science teacher across the U. S. This presentation outlines the NSF proposal and highlights the rational, goals, and implementation of the proposal.

10:00 BOATLOAD OF KNOWLEDGE: THE OHIO RIVER AS AN OUTDOOR CLASSROOM. Teresa M. Cavanaugh, William J. Mitsch, Ph.D., and Gary W. Mullins, Ph.D. School of Natural Resources, The Ohio State University, 2021 Coffey Rd., Columbus, Ohio 43210-1085.

This paper will give an overview of Boatload of Knowledge: The Ohio River as an Outdoor Classroom, sponsored through the Ohio River Basin Consortium for Research and Education with partial funding by the Virginia Environmental Endowment. Boatload of Knowledge is a course for graduate students in environmental sciences that will cover 710 miles in 15 days, from Pittsburgh to Louisville, aboard a houseboat. The trip borrows its name from an original journey on the Ohio River led by Robert Owen in the early 1800s.

Topics to be covered in the course include: human use of the Ohio River for industry, power generation, and recreation; the effects of land-based activities on the water quality of the Ohio River; the geology, fauna, vegetation, and groundwater resources of the Ohio River Basin; and the history and future of the Ohio River Basin. The instructors will be faculty, scientists, and other representatives from Consortium member institutions. Students will be selected from a competitive application process.

The Ohio River Basin Consortium for Research and Education is an organization of universities, colleges, and corporations established to foster communication among environmental researchers and educators in the Ohio River Basin.

10:15 **USING COMPUTEREYES® AND PRINTSHOP® TO STIMULATE INTEREST IN A COMPUTER LITERACY COURSE. Ed Corley (National Trail HS, 6940 Oxford-Gettysburg Rd., New Paris, OH 45347)**

ComputerEyes® is a video acquisition system designed for Apple, Commodore, and IBM computers. It allows use of a black and white video camera to capture graphics for use in BASIC programs. With the aid of one of several graphics "dump" programs (Printographer® will be shown), images may be printed on any dot-matrix graphics-capable printer (such as the ImageWriter or Epson).

A software program available for ComputerEyes® allows the graphics produced to be converted to PrintShop® format for use in signs, banners, etc. printable by the PrintShop® program.

Uses for each program in a computer literacy class will be discussed. If you have any ways you like to use these programs, be prepared to share them.

(ComputerEyes® is a registered trademark of Digital Visions, Inc.; The PrintShop® is a registered trademark of Broderbund Software, Inc.; Printographer® is a registered trademark of Roger Wagner Publishing.

SECTION H. SCIENCE EDUCATION
FIRST AFTERNOON SESSION - CATTELL LIBRARY 49
SATURDAY, APRIL 25, 1987
J. DAVID WHITTINGTON, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 OHIO'S EDUCATION FOR ECONOMIC SECURITY ACT (EESA) PROGRAM: HIGHER EDUCATION. G.D. McKenzie, Dept. of Geology and Mineralogy, and M. Lisowski and C.A. Browning, Dept. of Educational Theory and Practice, The Ohio State University, Columbus, OH 43210.

The basic purpose of the EESA Program is to improve the skills of teachers and instruction in mathematics, science, computer learning, and foreign language and to encourage greater student access to those fields of study. This program, under Public Law 98-377, addresses the need for better educated citizens to meet national economic needs. Federal funding for Ohio's higher education portion of the program in the first year included $900,000 for teacher training (207b), supplemented by $50,000 in state funds, and $240,000 for improving student understanding and performance (207c). An advisory committee assisted the Ohio Board of Regents staff in developing guidelines for Requests for Proposals for both the 207b and 207c programs. Proposals were ranked by evaluation panels; 16 grants were made under 207b and 14 under 207c. The Ohio EESA program has provided increased opportunities for collaboration between higher education, elementary and secondary education, private industry, and non-profit organizations, has responded to a state need for teacher training intensified by new state certification requirements, and has emphasized collaboration between teacher education and academic departments.

2:15 ASSESSMENT OF OHIO'S HIGHER EDUCATION NEEDS IN RESPONSE TO THE EDUCATION FOR ECONOMIC SECURITY ACT PROGRAM. G.D. McKenzie, Dept. of Geology and Mineralogy, and C.A. Browning, Dept. of Educational Theory and Practice, The Ohio State University, Columbus, OH 43210.

Assessment of faculty, curricula, facilities and equipment needs and access to instruction in the sciences, mathematics, engineering, and foreign languages was made according to EESA guidelines. A spring 1986 survey of 4-year public and private colleges produced responses from 10 of 12 public and 30 of 51 private 4-year institutions. Faculty qualifications were estimated by degrees held. Significant shortages of faculty exist now in engineering, computer science, and other areas of science. Projections for 5 years show little change. Curricula continue to evolve and are funded partly through state programs and private grants. Equipment needs are greatest in the sciences and engineering. Blacks and Hispanics in Ohio are underrepresented in college and in mathematics and physical sciences. Women are proportionally represented in college and in biology, but are underrepresented in engineering, physical sciences, and computer sciences. In teacher education disciplines, Hispanics are underrepresented by 20%, Blacks by 50%, and Asians by 70%. Addressing college faculty shortages and discipline underrepresentation requires long-range strategies that will permit and encourage a wide choice of study areas and careers for those attending college.

2:30 THE REPRESENTATION OF WOMEN SCIENTISTS IN COLLEGES OF AGRICULTURE Barbara E. Cooper and Janet L. Henderson 204 Agricultural Administration Building, 2120 Fyffe Road, Columbus, Ohio 43210

The goal of the research was to gather descriptive statistics on women employed as agricultural scientists with academic rank in colleges of agriculture at U.S. Land-grant universities. A list of 514 women faculty in the agricultural sciences at the 70 Land-grant universities was generated by college administrators. Twelve of the colleges have no women agricultural scientists. Seventy percent of the colleges have between one and 20 women agricultural scientists. The highest number of women agricultural scientists employed in any one college is 27. In relation to the total population of women agricultural scientists, the agronomy/plant science discipline has the highest number of women scientists (19.2%). The agricultural engineering discipline has the fewest number of women scientists (1.1%). The smallest colleges of agriculture (i.e., fewer than 36 faculty members) have the highest proportion of women agricultural scientists. Women scientists represent 4.6% of the total college of agriculture faculty in the 70 land-grant universities. There is a low representation of women agricultural scientists in all geographic regions of the U.S.

3:00 A MODEL FOR MATRICULATION OF BLACK GRADUATE STUDENTS IN PREDOMINATELY WHITE COLLEGES OF EDUCATION FOR THE YEAR 2001. Mary Ann Flowers, E. Jean King and Nelson Strobert, 1460 Commonwealth Drive, Akron, Ohio 44313.

A definite need exist for increasing the number of minority earned doctorates to serve the multicultural, multiracial, multiethnic and multilingual public school student population in the year 2001. This study utilized survey and ethnographic instrument to report the responses of black earned doctoral graduates from a predominately white mid-western college of education. The questionnaire and interview processes were developed to collect information on the recruitment, intervention and retention of black graduate students in a college of education. Specifically, the research instruments addressed three areas of concern: 1) What characteristics must be present at predominately white institutions of higher education to attract black graduate students? 2) What support systems are necessary to retain black graduate students? 3) What components of a graduate program operates to enhance the efficacy of black graduate students? Data results led to the development of a model for matriculation of black graduate students in predominately white colleges of education for the year 2001.

3:30 AN INNOVATIVE FIELD GEOLOGY COURSE IN WYOMING GIVES TEACHERS THE OPPORTUNITY TO EXPERIENCE THE "OLD WEST". Philip Stoffer and Robert McWilliams, Geology Dept., Miami Univ., Oxford, Ohio 45056

We led 31 primary and secondary teachers on a one-month long excursion to northwestern Wyoming during the summer of 1986 to see, hear, taste, smell, and feel the geologic wonders of the Yellowstone, Tetons, and Wind River Basin region. The course objectives were to foster the interchange between the teachers in the university and the schools, provide continuing education in geology for teachers, and to help teachers collect materials for classroom demonstrations and exercises. We believe the experiences of the 1986 class will enable us to focus even more on the general and specific needs of teachers in 1987.

3:45 MIAMI UNIVERSITY'S SUMMER FIELD GEOLOGY WORKSHOP FOR SCIENCE TEACHERS. Ed Corley (National Trail HS, 6940 Oxford-Gettysburg Rd., New Paris, OH 45347), Phil Stoffer (Geology Librarian, Miami University, Oxford, OH45056).

Miami University has sponsored a summer Field Geology Workshop for undergraduate Geology majors at Dubois, Wyoming, for many years. Under the direction of Dr. Robert McWilliams, Professor of Geology at Miami, a similar course was offered for elementary and secondary teachers for the first time during the summer of 1986. The purpose of this session is to discuss the workshop and offer information about the coming year's workshop.

Mr. Corley will describe last summer's workshop from a participant's viewpoint, using 2x2 slides to illustrate course activities.

Mr. Stoffer, one of the course's instructors, will present information about the 1987 workshop and procedures for signing up for the 1987 workshop.

4:15 INTERDISCIPLINARY FIELD TRIP ENHANCES CREATIVITY AND AWARENESS
ELIZABETH M. OBARA, Department of Science, Newton Local School, Pleasant Hill, Ohio 45359

A well planned interdisciplinary field trip allows students to explore various sensitivities and emotions. Value systems are enhanced, allowing a spontaneous creativity to radiate from students that otherwise often show a lack of interest toward intellectualism. Feelings of self worth, confidence and acceptance promote curiosity, awareness and enjoyment in learning new things. Dealing with problems, develops leadership capibilities and more importantly invites knowledge sharing, developing "think tank" capabilities in groups. This becomes extremely productive. Individual physical and mental self challenge bolstered by group support allows for a student's ego growth and developed self awareness. Life is more than just science or just math or just English, it is a symphony of all things good and bad and how we learn to deal with it, provides us with our humaneness. The outdoors is the ultimate laboratory because it stimulates the imagination and motives learning.

SECTION H. SCIENCE EDUCATION
SECOND AFTERNOON SESSION - CATTELL LIBRARY 46
SATURDAY, APRIL 25, 1987
MARIAN A. MOECKEL, PRESIDING

2:00 A SYMPOSIUM: THE SCIENCE TEACHER AS A PROFESSIONAL. arranged by Marian A. Moeckel, Edgewood High School, 5005 Oxford State Road, Trenton, Ohio 45067.

Four science teachers who have received recognition at the state or national level will discuss professionalism, how they stay current, their professional memberships and activities, their accolades, and how to get involved.

Presentors include:

Lawrence Bader, Physics, Rocky River High School Presidential Award for Excellence in Science

Susan Sharpe Leach, Earth Science, Jones Middle School, Upper Arlington, 1987 Ohio Teacher of the Year

Toni Miller, Physical Science, Spring Hill Middle School, Akron, NSTA Search for Excellence in Science Education State Nominee

Spencer E. Reames, Biology, Benjamin Logan High School, Zanesfield, 1986 Presidential Award for Excellence in Science

Following their presentations there will be a question/answer - discussion period.

3:30 PROFESSIONAL SCIENCE TEACHER ASSOCIATIONS AND THE SCIENCE TEACHER. Victor J. Mayer, The Ohio State University, 1945 North High Street, Columbus, OH 43210.

Today's science teacher is becoming highly involved with professional science teachers organizations. This is one of the most significant developments in science education over the past two decades. Evidence is provided in the spectacular growth of the National Science Teacher Association over the past five years and that of its state affiliate, the Science Education Council of Ohio. One reason for this growth is the increased level of quality of services provided by the associations. Also, however, the level of professional identification offered by the associations helps to account for their popularity among science teachers.

3:45 SCIENCE & SOCIETY IN ENGLAND. James Walker, Jackson Middle School, Massillon, OH

Amidst renewed concern regarding science education in the United States (N.S.F., A.A.A.S. et al), there exists a noteworthy movement which is known by the initialism S.T.S. (Science, Technology, & Society). While a fairly recent thrust in our country, the movement toward a more socially relevant view of science education has been under way in England for over ten years. As the 1986 recipient of Battelle's professional development award, I had the opportunity to study briefly English science education "K-12" (our designation) by joining Dr. & Mrs. Herbert Thier of U.C. Berkeley for an N.S.T.A. seminar at London's Roehampton Institute last July. My presentation will focus upon current science education while also familiarizing the audience with some of the more traditional, even charming aspects of English public (again, our term) education as well. How would you like a half-hour break for tea in the faculty dining hall each morning?

4:00 SURVEY - TO DETERMINE THE EMPHASIS OF COURSE CONTENT IN A HIGH SCHOOL BIOLOGY CURRICULUM. William R. Bingle and David E. Lewis, Perry High School, 3737 Harsh Ave. S.W., Massillon, Ohio 44646

Traditional approaches to the teaching of high school biology should, quite possibly, be reevaluated by high school biology teachers. A survey of 54 biology professors from 19 colleges and universities was conducted to determine where emphasis should be placed in a high school biology course for college bound students. The schools surveyed were selected on the basis of frequency of attendance by former students of Perry High School in Massillon, Ohio.

It was discovered that the teaching approach of choice was biochemical (molecular). More specifically, it was found that the study of cells and cell functions, genetics, evolution, and ecology were areas of primary concern. These took precedence over areas such as invertebrates, microbiology, and dissection.

While the results of this survey may not be statistically significant for use by all schools, we feel that it has direct application to our students in preparation for successful college careers.

4:15 INDEPENDENT INVESTIGATIONS IN CHEMISTRY AS A MEANS OF STIMULATING CREATIVE THINKING. PEI-HSING LIN WU, GRANDVIEW HEIGHTS H.S., 1587 W. 3RD AVE., COLUMBUS OH 43212

Miniprojects were carried out by individuals taking chemistry at Grandview Heights H.S. during last quarter of full year course in 1985/86. A ten working-day period was set aside for actual experimentations. The purpose of the miniproject was to allow each student to do something of his/her choice, to apply what had been learned, to use scientific methods to correlate facts, to arouse interest in science. Upon completion the project was orally presented to the class. Evaluation of student performance was based on the following criteria: knowledge achieved; effective use of scientific methods; clarity of expression; originality and creativity. Over a 2-yr. period, 52 different experiments were chosen by 95 individuals. These experiments related to 24 topics generally found in high school textbooks.

Students felt it was a worthwhile activity and appeared to have benefited from the following: in-depth study on a scientific problem; hands-on experience on research; developed confidence and ability to solve problems; increased self-esteem; developed ability to organize; related chemistry to daily life; stimulated independent thinking, reinforced originality and creativity.

This project was supported by Grant-to-Teachers Program, Martha Jennings Foundation. This money made it possible to provide resources necessary to bring about quality, independent work in our school setting.

4:30 BIOLOGY BEYOND LECTURE--TEACHING ENVIRONMENTAL COURSES WITHOUT LABS TO UNIVERSITY LIBERAL ARTS STUDENTS IN OHIO. George E. Klee, Dept. of Biological Sciences, Kent State Univ, Stark Campus, Canton, Ohio 44720

A Change in General Education requirements at Kent State University in 1983 led to a large enrollment increase in 2 traditional non-majors courses. Consequently, required labs were dropped due to lack of available lab space, equip and assistants.
This presentation includes a description ot a number of innovative ways to help students become more actively involved in an environmental biology course oftered without laboratories. The methods have been class tested in a number of sections on three different campuses ot the KSU Regional Campus system, in three separate counties, over 3½ years. Student pertormances and evaluations will also be summarized. Some ot these methods should have general application to the increasing number ot Liberal Arts science survey courses being given nationwide.

4:45 CONSUMER CHEMISTRY: DEMONSTRATIONS, ACTIVITIES AND EXPERIMENTS
N.Susan Bakaitis, Findlay College
1000 N. Main Street, Findlay, OH 45840

In this presentation a series of activities will be described which have been used to motivate and inform non-science students about basic science principles as they apply to daily life. The presenter will distribute information on the drug, cosmetic, and household cleaning products experiments conducted in high school and college chemistry courses for non-science majors. A list of sources for additional activities will be made available to the participants.

SECTION H. SCIENCE EDUCATION
POSTER SESSION - OSBORNE HALL GYMNASIUM AUDITORIUM
SATURDAY, APRIL 25, 1987

Board L @ 9:00 AM **MYTH AND MANIA IN SCIENCE EDUCATION.** Morris Leland Martin, 157 Griswold Street, P. O. Box 593, Delaware, Ohio 43015.

While its trumps and tinsel vaunt of excellence, science education is on a banana peel. Its societal roles, risks, and tolerances are tendered, threshed, and tinted by the whimsies of some with flawed perceptions. Consequently, the minds and bodies of our schools' students and teachers are immersed in jeopardy.

The author will discuss the deleterious influence of probationary, juvenile offenders whose prespriptions for "cures" involve sensitive lab sessions. His concerns on popular science demonstrations and school procedures which release carcinogens, teratogens, suicide-inducing agents, and other hazards will be vented. The sacrifice of science excitements and information to the "starched curriculum" and computer-craze will be trounced.

Published complaints by NEA members--and reports of fudged evolutionary evidence--inspired the author to present probing explorations of "evolutionary creationism". Occupational ramifications for students will be noted.

Techniques of restoring rhyme and reason to science education will be set forth.

Board M @ 9:00 AM BACKWARD MASKING - HEARING A HIDDEN TAPED VOICE BACKWARDS - CAN THE MIND UNDERSTAND AND RESPOND?, Gordon R. Stauffer, 1002 E Fourth, Dover, Ohio 44622

To test the ability to decode, understand and respond to verbal messages played backwards, 27 high school students were read 10 gibberish statements - each played backwards 10 times. After each statement, students answered a multiple choice test question with a one word answer from among a choice of 5. These same students repeated this test 7 times over seven days.

Results were startling and conclusive without need of complex statistics. Instead of the expected 20 % probability of responding correctly by chance, these high school students scored, overall, 39 % - about 95 % higher on their very first test! During the course of the seven day testing, composite scores steadily increased from 39 % to 89 % - about 305 % higher than chance expectancies. High initial scoring indicates the mind's great ability to decode backward speech, while rapid steady increase in scoring during the 7 testing sessions reflects the mind's ability to rapidly learn speech backward. Individual scores ranged widely with 3 students scoring near, or below chance levels and another three students scoring in the 90's near perfect scores. Decoding ability appears to range from none in some people to near perfect in others.

Adjusting a conventional tape recorder to play backwards is explained for those wishing to repeat these findings.

Board N @ 9:00 AM THE USE OF INTERACTIVE VIDEODISC INTERFACED WITH AN APPLE IIe AS A MOTIVATIONAL TOOL. David E. Lewis, Perry High School, 3737 Harsh Ave. S.W., Massillon, Ohio 44646.

Interactive videodisc has proven to be a valuable motivational tool in high school biology classes. The quality of the images available and flexibility of programming options greatly inhance standard biology activities. Interactive programs can be developed or individualized by the teacher to cover a wide range of topics.

Students have had a positive response to material presented using interactive videodisc. Ouality of notetaking has improved and students have developed a more concrete visual reference point for subsequent lessons.

SECTION I. ANTHROPOLOGY AND SOCIOLOGY
MORNING SESSION - BETHEL TEMPLE ROOM A
SATURDAY, APRIL 25, 1987
N. JANE MCCANDLESS, PRESIDING

9:30 THE TAUNTON MAP: PROTO-TYPE FOR THE "LOST HURON" AND NICHOLAS SANSON MAPS? David M. Stothers, Ph.D., Director, Laboratories of Ethnoarchaeology, The University of Toledo, Toledo, Ohio 43606

An old map, hand-drawn on an animal skin was recently discovered in the archives of the British Ministry of Defense in Taunton, England. This map, the Taunton Map, was earlier (Stothers 1983) believed to be a possible candidate for the famous "Lost Huron" map mentioned in the Jesuit Relation of 1640 (JR 1640:18:227-235). However, comparative analysis of the general geographic configuration of the eastern Great Lakes and St. Lawrence Valley; in addition to a similar comparison of the named and located native American ethnic (tribal) groups inscribed on the Taunton, "Lost Huron", and Sanson maps of 1650 and especially 1656, suggest that all of these cartographic documents were based upon the same information source, and were derived from and based upon one another. Analysis of internal data on the Taunton map suggests it was compiled subsequent to the 1628 census, but prior to the 1639 census undertaken by missionaries among the Huron in New France, and the establishment of the Jesuit mission, Ste. Marie among the Hurons, in the year 1639. New interpretations based upon comparative analysis of these interrelated maps, and their relative dates, strongly suggest that the Taunton map is not the "Lost Huron" map, but instead it may be the proto-type from which the "Lost Huron" and later 1650 and 1656 maps of Nichols Sanson were compiled.

9:45 SANDUSKY TRADITION MORTUARY EVOLUTION: ARCHAEOLOGICAL REFLECTIONS OF AN EMERGENT ETHNIC ENTITY. Tim Abel, Laboratories of Ethnoarchaeology, University of Toledo, Toledo, Ohio 43606.

It was written by V.G. Childe (1956:9-10) that "continuity of tradition imposes on all members of the society in question a common pattern of behaviour....resulting in the production of standard... burial rites." Recent research pertaining to the Sandusky Tradition, or historically the Mascouten, mortuary complex (ca. A.D. 1000-1643) has delineated an evolving sequence of mortuary morphology; progressing from individual primary interment, giving rise to secondary multiple interments. It is suggested that this sequence represents a changing social attitude toward the affirmation of ethnic identity.

10:00 SURVEY OF WOODLAND SITES IN WAYNE COUNTY, OHIO. Roger Rowe, 775 Western Drive, Wooster, Ohio 44691.

Historically, Wayne County, Ohio has not been a center of major archaeological research. More recently, however, the activities of the Wayne County Historical Society's Archaeological Committee have resulted in the inventory of numerous archaeological sites. While archaeological resources dating from Paleo-Indian times (11,000 B.C.) through the recent Euro-american past are not uncommon in the area, recent attention has been focused on remains of the Woodland period (800 B.C.-A.D. 1300).

10:15 FAUNAL REMAINS FROM THE SCIOTO COUNTY HOME SITE (33SC17). Jonathan Bowen, 419 Sandusky Ave., Fremont, Ohio 43420.

The Scioto County Home site (33SC17) is located on a low finger-like ridge protruding from the base of Raven Rock at the mouth of Careys Run Hollow. The site overlooks the extensive Ohio River bottomland just downstream from the mouth of the Scioto. A Late Archaic midden radiocarbon

dated at 3060±270 B.C. (Beta-17170), 2160±70 B.C. (Beta-18091), and 1350±110 B.C. (Beta-18093) yielded thousands of faunal specimens. Analysis of the remains from this 1.8 m midden suggests that deer and mussels were the major animals harvested. Hundreds of additional specimens were recovered from a later component, consisting of a 15 cm Newtown Late Woodland midden radiocarbon dated at A.D. 780 ±70 (Beta-18286) and a large pit feature dating to emergent Fort Ancient times about A.D. 1000-1100. While deer remains also dominate the later sample, mussels are absent. Elk, absent in the Late Archaic, are present in the Late Woodland/emergent Fort Ancient faunal sample. Hunting and butchering tools recovered from the Late Archaic midden include McWhinney Heavy Stemmed and Merom/Trimble-like points, as well as three-quarter grooved axes. Only non-diagnostic knife/choppers were recovered from the Late Woodland/emergent Fort Ancient component. The analysis of thirty-three flotation sample heavy fractions from the Late Archaic midden suggest that hickory nuts and walnuts joined deer and mussels as major dietary components.

10:30 THE FOX SITE Daniel C. Fox
7603 Wahl Rd.
Vickery, Ohio 43464

The Fox Site is located 1/4 mile east of Whites Landing, Ohio, mainly between Wahl Road and U.S. Rt.6. The site consists of seven main components, five of which are located south of Wahl Road. All artifacts found at the site were recovered by suface collection, between 1983-1986, the majority of them being of Archaic origin. These include numerous lithics, some grit-tempered pottery, stone beads, and miscellaneous other artifacts. The site is bordered by Little Pickerel Creek on the east, and the Sandusky Bay to the north. If land conditions and waterways were very similar to what they are now, the site would have had nearly ideal conditions for the subsistence of various cultures, from the Archaic period through Woodland times.

SECTION I. ANTHROPOLOGY AND SOCIOLOGY
AFTERNOON SESSION - BETHEL TEMPLE ROOM A
SATURDAY, APRIL 25, 1987
N. JANE MCCANDLESS, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 "HOW'S YOUR LIFE SATISFACTION, NEIGHBOR?"
Robert A. Daniels Department of Sociology
The University of Akron Akron, OH 44325

This multiple regression analysis of life satisfaction is an attempt to determine if neighborhood-related factors account for variance over and above that explained by individual characteristics. The sample (N=781) used is the 1982 Akron Area Survey conducted by the University of Akron. The hypothesis that several individual-level variables are statistically-significant in determining the amount of satisfaction that an individual draws from life was supported. A second hypothesis, that neighborhood-context variables will be statistically significant in determining life satisfaction, was not supported. However, support was found for a third hypothesis: the degree of both neighborhood friendship ties and neighborhood-area involvement are significant in explaining life satisfaction.

2:15 SEX ROLE MESSAGES IN THE THEMES AND LYRICS OF CONTEMPORARY MUSIC: A 25 YEAR PERSPECTIVE Karen Croyle Dept. of Social Sciences University of Pittsburgh at Bradford Bradford, Pa. 16701

This study investigates change in sex role messages in popular song over a 25 year period. 60 songs based on year-end ratings from Billboard Magazine were analyzed between 1960 and 1985. The results indicate a significant change in sex role messages between 1960 and 1985. Although women continue to be defined in traditional roles, their position of power in love relationships has increased. Furthermore, men were found to be portrayed less stereotypically, generally in terms of emotionality and loneliness.

2:30 EFFECT OF NON SEXIST LITERATURE ON SEX ROLE ATTITUDES: Violet Robinson, Department of Social Sciences, University of Pittsburg at Bradford, Bradford Pa. 16701.

Educators are constantly seeking new ways of conveying ideas to students. Using a sample of 60 undergraduate college students at a University in Northwest Pennsylvania the effect of non sexist literature on the sex role attitudes of college students is examined. The results suggest effective teaching and non sexist literature are cause for change in the traditional sex role attitudes of undergraduate college students.

2:45 AN EXAMINATION OF THE MULTIPLE REGRESSION MODEL: THE CASE OF JOB SATISFACTION AMONG NURSE ASSISTANTS EMPLOYED IN NURSING HOMES.
Naoko Oyabu, Department of Sociology, University of Akron, Akron, Ohio 44325.

This study tests the effectiveness of alternative linear regression models in explaining job satisfaction among nurse assistants employed in nursing homes. The data from 123 nurse assistants employed in nursing homes in northeastern Ohio are utilized. A comparison of different sequential model selection procedures is performed. The assumptions of regression analysis are examined.

3:00 Seeking Social Support
Janet A. Michello
University of Akron, Sociology Department
Akron, Ohio 44325

This paper reports on a study designed to evaluate predictions made by social resources models regarding the choice of supporters in personal networks. According to the social resources perspective seekers of social support choose helpers based on the nature of the problem (instrumental or expressive) and the strength of different social support ties. This research attempted to separate the instrumental and expressive contents of ten selected problems and tested whether individuals choose ties based on the instrumental or expressive components of the problem. Results indicate an overwhelming preference for strong ties regardless of the characteristics of the problem. In addition, rates of choice appear to be affected by the structure of interpersonal networks. The finding that individuals show a tendency to choose "family first" poses a problem for social resources theories of choice behavior because they predict choices to weaker ties for instrumental problems. It was also found that when problems contain high levels of emotional intensity respondents selected professional helpers with increasing frequency. Therefore, weaker ties e.g. professional counselors, may have strength in providing expressive support as well. Similarly, when problems are perceived as being practical, respondents increased their choice of strong (family) ties and weaker ties also.

3:15 A STUDY ABOUT THE RELATIONSHIPS BETWEEN THE ECONOMY AND MENTAL ILLNESS IN TWO OHIO COUNTIES
Donna M. Levkulich Dept. of Sociology, Kent State University, Kent, Ohio 44242

The purpose of this research was to ascertain a comparison between various economic indicators and manifestations of social pathology. This examines the relationship between unemployment statistics and rates of outpatient usage of mental health clinics. The study was conducted in Mahoning and Columbiana Counties, two Ohio counties having some of the highest unemployment in the nation during the period 1975-85. The case study was undertaken in order to explore specific variations of a common general theme found in research literature on mental illness; namely the relationship between economic downturns and increased manifestations of social pathology, particularly mental illness.

The results of the study support the following conclusions.

1. The resulting mental illness which develops after economic downturns and loss of jobs is both a social and economic problem.
2. The economic cost of mental illness is observed in direct cost, indirect costs or the amount of money lost in earnings.
3. To effectively deal with this psychosocial problem, a concerted effort is needed by federal and state government in providing mental health programs.

3:30 **A COMPARISON OF ON-CALL SCHEDULES IN FIVE RESIDENCY PROGRAMS. Duane Wages, Suburban South Family Physicians, 2818 South Arlington Road, Akron, Ohio 44312, and T. Neal Garland, Department of Sociology, University of Akron, Akron, Ohio 44325.**

Choosing Family Practice as a career specialty frequently is done by medical students in spite of existing negative stereotypes regarding Family Practice residencies. One aspect of this unfavorable portrayal involves alleged unfair on-call schedules during residency training. This study reports a statistical comparison of the on-call schedules of Family Practice residents with the schedules of residents in four other specialty programs through which the Family Practice residents rotate. A comparison of weekday, weekend, holiday, and total on-call days revealed only one instance where Family Practice residents received unfair treatment. The results of this study question the allegation that Family Practice residents are subjected to unfair on-call scheduling practices in the hospitals studied.

3:45 PROFESSIONAL AND ORGANIZATIONAL FACTORS IN RECOGNIZING AND REPORTING FAMILY VIOLENCE. Richard O'Toole, J. Patrick Turbett, and Anita W. O'Toole, Department of Sociology, Kent State University, Kent, Ohio 44242.

Two methodological procedures were used to discover how professional socialization and organizational structure and procedures affect recognition and reporting of family violence. Qualitative responses of physicians, nurses, teachers and social workers to vignettes depicting potential abuse were analyzed to find professional differences in how data are acquired in the diagnostic process. Interviews were conducted with professionals to discover how organizational factors, e.g., procedures, division of labor, authority patterns, goals, policy and budget affect the recognition and reporting process.

4:00 JUVENILE ANTISOCIAL BEHAVIOR AND CULTURAL COMPOSITION: A COMPARISON. Louis M. Ockunzzi 6684 Parma Park Blvd., Parma Heights, Ohio 44130

Delinquency and unruliness were analyzed in a 1982 Cleveland study compared to cultural and racial composition. The evidence seems to corroborate certain aspects of cultural conflict and transmission theories. Cultural composition of Cleveland neighborhoods may be casually linked to delinquency and unruliness in Cleveland.

Presently there are 32 neighborhood groups focusing on community organization, redevelopment, and revitalization. Also, 42 social and cultural organizations serve recreational, social, and cultural needs of youth, the elderly, and the family. Organizations like these must rally citizens to tackle the problems of delinquency and unruliness.

Our study found that delinquent and unruly behavior is present in every census tract in Cleveland. The juvenile court and service organizations have not been able to solve the problems of delinquency and unruliness. A city-wide project seems to be necessary. In theory, juvenile behavior, whether positive or negative, reflects the successive social experiences that juveniles have had in the family, play group, and neighborhood. These influences must be used to have a positive impact on juvenile delinquency and unruliness. Our paper will show the analysis and demographic comparisons.

4:15 INTEGRATION OF HUMAN SERVICES: A NATIONAL COMPARISON. Gary P. Galazin, U.S. General Accounting Office, Suite 350 Plaza Nine, 55 Erieview Plaza, Cleveland, Ohio 44114

We sent questionnaires on integrating human services to 50 states. The number of states that integrated services at one or more delivery units is significant for some program services but almost non-existent for others. For example, most states offer at least some colocation between AFDC and Food Stamp programs; however, only two states indicated they colocate any other program services with low-income housing.

More than half of the states have started an integration demonstration project(s) since October 1983 and about 34 percent of the state legislatures have considered legislation concerning service integration since January 1985. Most states believe federal agencies have done little to encourage integration and most likely will not greatly encourage states to integrate services in the future.

Even though a majority of states would like to achieve greater service integration, they do not know what outcomes might result from integration. The paper will elaborate on the data obtained from the states on integration.

4:30 APPLYING FOR FEDERAL BENEFITS: COMPLEXITY UPON COMPLEXITY. William F. Laurie, 15787 Forest Hills Blvd., East Cleveland, OH 44112

We analyzed the process of applying for Pell grants (student loans) and other benefit programs. The process begins simple--two people interacting--a client and a caseworker. From this we see the addition of others in the forms of third parties who provide information to verify the data given to the caseworker by the client. Then, the addition of other agencies who have computer files that contain information on the client that is used to determine if the information given by the client is accurate or not. And then, to the programs that have numerous eligibility factors that have various combinations across programs. And finally, to the differences in definitions of the same factor across programs. What appeared simple gradually becomes more and more complicated.

Some factors are verified in the same way at all locations. Other factors are verified in different ways depending on the location. Still other factors are verified at some locations but not at others. And still other eligibility factors are verified at some locations while other locations consider such verification unnecessary.

The paper will discuss the differences in verifying data and slides will be used to show the complexity.

SECTION J. NATURAL RESOURCES

MORNING SESSION - TIMKEN SCIENCE HALL 100

SYMPOSIUM: SPACE AGE CONTRIBUTIONS TO RESOURCE MANAGEMENT

SATURDAY, APRIL 25, 1987

ROSANNE W. FORTNER, PRESIDING

9:00 CENTER FOR MAPPING AT OHIO STATE UNIVERSITY John D. Bossler, Director, Center for Mapping, Ohio State University, Columbus, Ohio 43210-1247

Information collection, processing and transmission is one of the most rapidly growing sectors of the economy as the U.S. moves toward an information society. The descriptors of the earth, herein called Maps, rank near the top of the types of information that will tax the energies of public and private organizations as available space and resources become scarcer. The planning for the rational use and management of the earth's limited resources is receiving more and more attention from the citizenry and, therefore, from politicians and public policymakers. The Ohio State University Center for Mapping is perfectly positioned to respond to the mapping challenges presented by the information society. The center is off to a good start, having obtained a grant from NASA for the commercialization of space data. The status of the center, the commercialization program and related issues will be presented.

9:15 SATELLITE IMAGERY FOR DECISION MAKING IN NATURAL RESOURCES AND AGRICULTURE. Craig B. Davis. School of Natural Resources, The Ohio State University, 210 Kottman Hall, 2021 Coffey Road, Columbus, Ohio 43210.

Real-time satellite mapping and resource information systems analysis are important new tools for resource decision makers. Researchers from natural resources, forestry, horticulture, and landscape architecture are testing the use of real-time mapping to enable resource managers to respond rapidly to man-made or natural changes in forests, parks, and urban areas. Agronomists, agricultural and civil engineers, and entomologists are collaborating on three study sites to examine the use of satellite imagery and environmental modelling to predict soil erosion rates and pest infestations, inventory crop and organic residue cover, determine soil drainage requirements, and monitor tillage and cropping practices. Agricultural economists are

modelling the farm decision-making process to assess how farmers might use remotely sensed information and are examining the use of satellite-generated information in farmland appraisal, monitoring land transactions, and "packaging" farmland to enhance investment opportunities.

9:30 REMOTE SENSING FOR IMPROVED OCEAN ROUTING AND RESERVOIR OPERATION. Scot E. Smith and Mark R. McCord, Civil Engineering Department, Ohio State University, 2070 Neil Avenue, Columbus, Ohio 43210.

We discuss the use of remotely sensed data in routing ocean vessels and controlling large reservoirs. Remote sensing can be used to obtain more timely and accurate measurements of reservoir sedimentation and of ocean currents, weather, and waves. Better information on the ocean environment, which serves as input to routing decisions, can decrease fuel consumption, increase safety, and improve schedule adherence, thereby resulting in significant cost reductions. Improved information on sediment loads in reservoirs, which cost American utility companies hundreds of millions of dollars per year, can be used to make better decisions on reservoir releases. We are currently exploring barriers to the increased use of remote sensing in ocean routing and strategies for overcoming them, as well as implementing hydrodynamic models which use remotely sensed data for forecasting sedimentation and operating reservoirs.

9:45 "BATTELLE PROPOSED TASKS FOR THE OSU CENTER FOR THE COMMERCIAL DEVELOPMENT OF SPACE: REAL-TIME SATELLITE MAPPING." A. George Mourad, Battelle Columbus Division, 505 King Avenue, Columbus, OH 43201.

Battelle proposed two satellite remote sensing tasks to the OSU Center for Mapping. The first is on gas and pipeline monitoring. The overall objective of this task is to work with the gas industry in developing a satelite system capable of identification of new gas sources, detection of leaks, monitoring of pipeline conditions and locations. The second task is for monitoring of sea and lake ice. The overall objective of this second task is to bring into being a satellite-based, commercially supported system for monitoring ice in lakes and arctic regions of interest to U.S. shipping, oil and gas and other companies. The general approach, in both tasks, involves the definition and understanding of the end users' requirements and how satellite remote sensing technology can be applied for meeting these requirements. Preliminary results of the research effort will be presented and discussed at the symposium.

10:00 COMPUTER ASSISTED MAPPING IN THE CENTER FOR MAPPING Joseph C. Loon, Department of Geodetic Science and Surveying, The Ohio State University, 1958 Neil Avenue, Columbus, Ohio 43210-1247.

The flexibility of being able to assemble a composite map of different levels of map data, and to update and extract those levels in a timely manner as new information becomes available, is most efficiently done with a computer assisted mapping system processing data in digital form. The utilization of such a system in all phases and in all kinds of mapping within the Center for Mapping will be presented.

10:15 THE MAP USERS' INFORMATION NETWORK OF THE CENTER FOR MAPPING. Dr. Robert L. Vertrees, School of Natural Resources, The Ohio State University, 2021 Coffey Road, Columbus, OH 43210

A Natural Resources Information System (NRIS) Program is being planned for initiation in 1987. Its objectives will be: (1) to obtain and make accessible many types of computerized spatial data about natural resources, (2) to conduct research to integrate or jointly use these data in specific resource management fields, and (3) to develop means of delivering research results via geographically dispersed networks of microcomputers. The Program will have a computer research lab on the Columbus campus. Researchers from several O.S.U. departments will use the lab to attain Program objectives. The Program and lab will be administered by the School of Natural Resources. The lab will be linked to the College of Agriculture Computer Network that includes microcomputers in every county and district office of the Ohio Cooperative Extension Service. It will also be linked to other campus computer facilities, including those of the Center for Mapping that will provide digital map information about land, agricultural, and water resources. It its function as the Map Users' Information Network of the Center, the Program will be the focal point for research to integrate or jointly apply information from the Center with data from other sources and to develop prototype models for distributing the integrated or jointly applied information and data over microcomputer networks.

10:30 SPACE TECHNIQUES AND GEODYNAMICS Ivan I. Mueller, Dept. of Geodetic Science and Surveying, Ohio State University, Columbus, OH 43210-1247.

Advanced space technology such as laser tracking of artificial satellites and the Moon, and Very Long Baseline Interferometry is routinely being used globally to monitor tectonic place movements, earth rotation and crustal deformations. The presentation briefly describes some of these techniques and the most recent results.

SECTION J. NATURAL RESOURCES
AFTERNOON SESSION - TIMKEN SCIENCE HALL 100
SATURDAY, APRIL 25, 1987
GARY W. MULLINS, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 TWO AEROBIC GRAM POSITIVE RODS WHICH DEGRADE PARA-CHLOROPHENOL. CONSTANCE M. KRAMER and Martha M. Kory, Department of Biology, University of Akron, Akron, OH 44325.

Para-chlorophenol is a toxic waste product of industry. Removal of this substance and related compounds is an important consideration in wastewater treatment. Two organisms which degrade this compound were isolated from an aerobic digester containing a mixed microbial population. The level of para-chlorophenol was determined by ultraviolet absorbance at 241nm. Both organisms isolated were able to remove para-chlorophenol with an efficiency greater than 97% when incubated in minimal medium containing 100 mg/L of the phenolic compound. Increase in cellular numbers during the degradation process was determined by an increase in absorbance at 686nm. One of the two isolates grew as the level of para-chlorophenol decreased. However, the other organism showed no concomitant increase in cell numbers as the amount of para-chlorophenol decreased. The organism which grows with para-chlorophenol as a substrate appears to be a member of the genus Arthrobacter. The other organism is also a coryneform Gram positive rod. The fact that one organism does not grow while degrading para-chlorophenol may be important in that it decreases the number of bacteria that must settle before effluent can be released from a wastewater treatment system.

2:15 **SEASONAL CHANGES IN THE ALLELOPATHIC EFFECTS OF GOLDENROD ON RED OAK, WHITE OAK, AND MUNG BEAN CUTTINGS.** S. H. Patel and M. M. Larson, 210 Kottman Hall, 2021 Coffey Rd., The Ohio State University, Columbus, Ohio 43210.

Goldenrod (*Solidago altissima*) is a common herbaceous species found in abandoned fields and stripmined lands in Ohio. Other research has demonstrated that goldenrod foliage contains allelopathic toxins. This research investigated the allelopathic effects of goldenrod on red (*Quercus rubra*) and white (*Q. alba*) oak seedlings. Also, mung bean cuttings were tested as a bioassay for the presence of toxins in water extracts of goldenrod.

Goldenrod foliage was collected at eight different times during the growing season, air dried, and added in varying amounts (2, 4, 6, and 8 g.) to vermiculite in 1-liter containers planted with oak seedlings. Although goldenrod foliage inhibited root dry weight increase by as much as 32%, no consistent trend with season of collection or amount added to containers was found other than a suggestion that September collected foliage may be the most inhibitory.

Fifty 2.5 by 60 cm long glass tubes filled with vermiculite were each planted with one white oak seed and watered with extracts of dried goldenrod foliage. Extracts of 3 g goldenrod/liter of water tended to stimulate shoot and root growth whereas 12 g/l reduced leaf dry weight 28% and root elongation 42% in certain seasonal collections. Rooting of mung bean (*Vigna radiata*) cuttings in goldenrod extracts showed a similar trend.

Goldenrod definitely contains allelochemicals that are harmful to red and white oak seedlings. Allelopathic inhibitors in goldenrod foliage, as it grows in clones, may vary more with morphological age than with season of collection. The mung bean rooting bioassay proved to be a reliable method to screen plant material for the presence of allelopathic compounds.

2:45 THE GLOBALIZATION OF TRADE IN RENEWABLE RESOURCES: EFFECTS ON INDIVIDUAL QUALITY OF LIFE AND BIOLOGICAL DIVERSITY. Bruce D. McCoy and Judith Maxwell, Research Associate and Assistant Professor, School of Natural Resources, The Ohio State University, Columbus, OH 43210.

This paper explores the theories of stability and resilience in biology and ecology to draw conclusion regarding the resilience of human and economic systems. Where economic development and growth are associated with the enhancement of comparative advantage via specialization in production, the result has been a decline in regional self-sufficiency and diversity. While the oligopolization of renewable resource industries enhances the ability to respond to short-term economic phenomena, this may negatively impact the resilience of nature ecosystems and the ability of these firms to respond to unforeseen changes. Political instability may arise as individual incomes are increasingly impacted by volatile world commodity prices.

3:00 EXTENDED FIELD TRIPS FOR NATURAL SCIENCE EDUCATION. David E. Todt, Shawnee State University, Portsmouth, OH 45662

Extended field trips have long been used by science/environmental educators to introduce students to environments not readily accessible during a 2 or 3 hour lab. This presentation provides a review of the literature regarding the value of such field excursions with an emphasis on evaluation techniques.

A short description of the extended field course in semi-tropical ecology offered by Shawnee State University will be included. This "spring break" course to Okefenokee Swamp and Cumberland Island National Seashore has been offered for several years as a special topics course. Students receive three quarter hours of biology credit for a 10 day trip which involves wilderness canoeing and backcountry backpacking. Pre and post-trip papers are required of the students.

A checklist for planning and organizing extended field trips will be distributed and discussed. Major areas covered by the checklist are course goals, course content, site selection, course recruitment, budgeting, transportation, food, and lodging.

3:15 PROJECT WILD: AN INTERDISCIPLINARY, SUPPLEMENTARY ENVIRONMENTAL AND CONSERVATION EDUCATION PROGRAM EMPHASIZING NON-DOMESTICATED WILDLIFE. Barbara Byers Garono. 616 South Depeyster, Kent, Ohio, 44242.

The directions taken with our technologies are very much dependent upon values held and choices made, individually and societally. Two elements of society play key roles in shaping future environments: resource management and education. Project WILD is a joint effort between these two elements of society, founded by the Western Association of Fish and Wildlife Agencies and the Western Regional Environmental Education Council. The state of Ohio, through its Department of Education and Department of Natural Resources, Division of Wildlife, has been an associate state sponsor since 1984. The goal of Project WILD is to assist learners of any age and in any setting to develop awareness, knowledge, skills, and commitment to result in informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment upon which all life depends. The instructional activities are organized into four major subject areas: language arts, science, social studies, and mathematics. Each of the Project WILD instructional activities has been developed to correspond to a carefully designed curriculum framework, moving learners from awareness and appreciation to responsible human actions. Project WILD is an excellent set of teaching materials available to those who attend instructional workshops offered by staff-trained leaders.

4:00 STATUS OF THE BOBWHITE QUAIL IN KNOX COUNTY, OHIO. Robert Priddy, Mt. Vernon Nazarene College, Mt. Vernon, Ohio, 43050.

In two successive winters, 1976-1977 and 1977-1978, severe blizzards depressed the Ohio bobwhite quail (Colinus virginianus) population 94% below the average of the previous 17 years. In Knox County, the decline continued for three years following the blizzards even though climatic conditions favored the normal spring to fall increases.

During the four-year period, 7 April 1981 to 27 September 1984, the Division of Wildlife, ODNR, artificially stocked 1,070 F_1 bobwhite quail in Knox County. The released birds carried the heredity of bobwhites that had survived the severe blizzards. The restocking temporarily supported an increase in the population but the level was below the year (1979) following the blizzards. One year after the restocking program (1985), the population declined.

Knox County is in the northern part of the bobwhite quail range where weather and farming practices seriously affect the dynamics of the population. The county is a rural community with varied topography which requires conservation practices to hold the top soil. This study indicates that other game species benefit from the conservation practices, but bobwhite quail have not regained the population level of the 17 years prior to 1976.

4:15 An Evaluation of the Educational Effectiveness of Visitor Center Exhibits on Knowledge Gain, Attitudes, and Behavior of Adult Visitors to the Old Woman Creek National Estuarine Research Reserve. Marjorie Pless and Rosanne W. Fortner, The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, OH 43210.

Each year 160 million people visit science centers, zoos, aquaria, and a variety of other science museums and nature centers. This study sought to measure knowledge and attitudinal changes among adults as a result of exposure to visitor center exhibits at one such nonformal learning center, Old Woman Creek National Estuarine Research Reserve. A range of methodologies was used. Multiple choice evaluation forms (both paper and computerized) were randomly assigned through the use of the Separate-Sample Pretest-Posttest Design. Unobtrusive observations were made concerning the length of time visitors were spending at each exhibit and in the center, frequency of visits to each display (attracting power), patterns of movement through the center, social interactions at each display, and the amount and types of assistance requested of the volunteers. These observations were later compared to score changes in related knowledge items. The implications suggest that such a methodology can be quite useful in evaluations of other nonformal learning centers.

4:30 ASSESSMENT OF LEARNING OUTCOMES IN NONFORMAL EDUCATION SETTINGS: THE OLD WOMAN CREEK EXAMPLE. Rosanne W. Fortner, The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, OH 43210.

Traditional learning outcomes can often be achieved through nontraditional education sources, such as museum visitation, recreational experiences or the like. When nontraditional education is assessed in the traditional ways, however, great care must be taken in interpretation of results. The objectives and the techniques of the assessment must match those of the education setting, or else a false picture of program effectiveness may emerge.

This presentation summarizes research assessing the effectiveness of two types of education programs at Old Woman Creek National Estuarine Research Reserve. Traditional assessment techniques were used with mixed results, more positive for the traditional school program. Results indicate the need for evaluation tools for nonformal education that have rigor and quantitative results equivalent to traditional techniques yet match the nonformal goals of the information source.

SECTION K. GENETICS AND CELL BIOLOGY
MORNING SESSION - MAIN 39
SATURDAY, APRIL 25, 1987
THOMAS GREGG, PRESIDING

9:00 THE TRUE OBJECTIVE OF MENDEL'S PAPER. Alain F. Corcos and Floyd V. Monaghan. Department of Natural Science. Michigan State University. East Lansing, Michigan 48824.

It is our contention that Mendel's paper was not a search for the laws of inheritance as it was generally believed, but for the laws of the formation of hybrids. The experiments were of such a nature that they could be analyzed from an alternative viewpoint and were so interpreted in 1900.

9:30 ISOLATION AND GENETIC CHARACTERIZATION OF ANTIBIOTIC-RESISTANT MUTANTS OF CHLAMYDOMONAS REINHARDII. Michael J. Dorsey, Department of Biology, John Carroll University, Cleveland, Ohio 44118.

Wild-type Chlamydomonas reinhardii (2137 wt^+) cells were mutagenized by exposure to ethyl methanesulfonate. Isolation of antibiotic-resistant mutants was attempted using fusidic acid, novobiocin, or naladixic acid as selective agents. Successful recovery of fusidic acid-resistant and novobiocin-resistant mutants was achieved. All mutants were tested for cross-resistance to novobiocin, naladixic acid, and fusidic acid. Each mutant showed resistance to only one antibiotic. The inheritance pattern of the resistance trait was characterized using zygote clone analysis, and a non-Mendelian pattern was found for all mutant colonies tested.

9:45 A POSSIBLE ROLE FOR CHROMATIN DIMINUTION IN THE DEVELOPING EMBRYOS OF ACANTHOCYCLOPS VERNALIS (COPEPODA) David M. Standiford Department of Zoology Miami University Oxford, Ohio 45056

In the Copepoda diminution is characterized by elimination of large portions of chromatin from somatic cell chromosomes during the early cleavage divisions of development. Information on the behavior of developing oocytes in A. vernalis has lead to the formulation of a hypothesis concerning the nature of this diminuted DNA. In the developing oocyte, during meiotic prophase I, a large vessicle forms in the nucleus. This vessicle reactes with silver stain and has been shown to contain RNA and presumably it represents the nucleolus. The dimension of this nucleolus is about 8000 times larger in volume than the normal somatic cell nucleolus, suggesting that very large amounts of rRNA are being produced. Based on this observation and others, the hypothesis is that the diminuted DNA contains rDNA sequences which are necessary to increase rRNA production during oogenesis. Once the rRNA is produced, the excess rDNA can be removed during diminution since its presence would only burden somatic cells. Currently, in situ hybridizations using labeled rDNA are being performed to test this hypothesis.

10:00 CLONING OF LYSINE GENES OF THE YEAST, SACCHAROMYCES CEREVISIAE. Christopher W. Borell and J. K. Bhattacharjee, Department of Microbiology, Miami University, Oxford, Ohio 45056.

Two different pathways are used for the synthesis of lysine. The diaminopimelic acid pathway is used by bacteria and plants, and the α-aminoadipate (AA) pathway is used by yeasts and other higher fungi. Eight specific enzyme steps and more than twelve non-linked genes are required for the AA pathway of Saccharomyces cerevisiae. Mutants from lys2 and lys5 complementation groups are blocked at the AA reductase step in which AA is converted to AA-semialdehyde. For a molecular biological study, we have cloned several lysine genes from the S. cerevisiae genomic library (YEp24) by functional complementation of lysine auxotrophs to prototrophs. The cloning of the LYS5 gene in the plasmid pSC5 was confirmed by its ability to transform lys5 mutant X4004-3A to Lys5+ transformants with a high efficiency. The Lys5+ transformants exhibited AA reductase activity and plasmid loss characteristic. The cloned LYS5 gene was located in a 7.5 Kb DNA insert of the plasmid pSC5 and exhibited unique restriction sites. Plasmids isolated from Lys5+ S. cerevisiae cells transformed Escherichia coli to amp^R and the inserted DNA when used as a probe hybridized to the pSC5 plasmid but not with the YEp24 vector or the cloned LYS2 gene.

10:15 DIRECT SCREENING OF TICKS FOR ROCKY MOUNTAIN SPOTTED FEVER GROUP RICKETTSIA USING RECOMBINANT DNA PROBES. R.C.Hoop, K.Poetter, C.Pretzman*, P.S.Perlman and P.A.Fuerst. Dept. Genetics, The Ohio State University, Columbus, OH 43210 and *Ohio Dept. Health Vector Borne Disease Unit, Columbus, OH 43210.

The intracellular bacteria R.rickettsii, type species of the genus Rickettsia, is the etiologic agent of Rocky Mountain Spotted Fever (RMSF), a disease transmitted to man by ticks. The Ohio Dept. of Health Vector-Borne Disease Unit (ODHVBDU) uses the IFA test to identify rickettsial organisms in ticks taken from potentially infected individuals, or collected in public health screens. Like other serologic assays, however, IFA does not detect significant titer rises until at least a week after the onset of illness. Additionally, surface antigens of rickettsiae other than R.rickettsii also react with RMSF antisera. We are adapting the Quick-blot hybridization procedure to detect specific rickettsial DNA in host tissue. This technique uses chaotropic salt to fix DNA from whole cells to nitrocellulose within one hour. Radioactively-labeled cloned plasmids containing random R.rickettsii or R. bellii DNA sequences have been used to successfully detect rickettsiae in crude tick homogenates, and in Vero cell cultures infected from these homogenates. Results obtained by this method agree with IFA test results of ODHVBDU, yet do not depend on individual immune responses to infection. Responses are unambiguous in showing virtually no background signal due to tick, Vero, or contaminating bacterial DNA. Species specific DNA probes are being developed.

10:30 MOLECULAR EVOLUTION WITHIN THE BACTERIAL GENUS RICKETTSIA. P. A. Fuerst, K. Poetter, J. Clark, C. Pretzman* and P.S. Perlman, Dept. of Genetics, The Ohio State University and *Vector-Borne Disease Unit, Ohio Department of Health, Columbus, OH 43210

Rickettsia are obligate intracellular gram-negative bacteria, which normally inhabit specific arthropod vectors (either ticks, mites or insects) but may grow in mammalian cells where they cause diseases such as typhus or Rocky Mountain Spotted Fever. We have used methods of molecular genetics to investigate variability within and between species of the Spotted Fever Group (SFG) of Rickettsia. Isolates of several species have been studied using cloned DNA segments from R. bellii and R. rickettsii. Restriction fragment length polymorphisms (RFLPs) reveal remarkable homogeneity between strains of R. bellii collected throughout Ohio, even when comparing strains collected 8 years apart. No more than a single restriction enzyme recognition site differs between any two Ohio strains, indicating polymorphism of less than 0.5%. Only slightly more heterogeneity is seen when strains from other parts of the U.S. are compared. RFLPs indicate the phylogenetic relationships between the members of the SFG, in particular showing no special clustering of either non-pathogenic or pathogenic species. DNA sequencing of the rRNA genes has been used to compare the genus with other gram-negative bacteria. A strong affiliation exists with the bacterial group containing Agrobacterium tumerfaciens and other intracellular plant associated bacteria.

SECTION K. GENETICS AND CELL BIOLOGY
AFTERNOON SESSION - MAIN 39
SATURDAY, APRIL 25, 1987
RICHARD ESSMAN, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 A NEW POLYCHROMATIC TECHNIQUE FOR GENOME ANALYSIS. Jong S. Yoon, Dept. of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403

In recent years, there have been several developments in various techniques, such as chromosome banding, for the detection of gene or chromosomal rearrangements. However, due to limited resolution and identification of genes (bands) many problems still remain, since all of the available techniques have been monochromatic. Our long-time attempts to develop a new polychromatic technique have been achieved very recently (Yoon, 1986). This new polychromatic technique will significantly increase our capacity to analyze the rearrangements of genes and chromosomes, as well as to distinguish the evolutionary relationships of the genes for closely related species and homosequential species. This technique will be most advantageous for studies of cytogenetics, phylogenetics and gene regulation in general. Further development and applications of this new technique will be an invaluable advance not only for Dipteran genetics, but also for human genetics.
(Supported in part by U.S. NSF grant BSR-8400615).

2:30 DIFFERENCES IN FEMALE RECEPTIVITY TO REMATING AMONG WILD POPULATIONS AND AMONG LABORATORY POPULATION OF DROSOPHILA MELANOGASTER. H. Henry Fukui and Mark H. Gromko, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403.

The time of the return of sexual receptivity following mating in female Drosophila melanogaster was shown to be significantly different among three wild populations. The total progeny counts as well as measurements of sperm dependence also indicated that there were significant differences among the tested wild populations in reproductive characteristics. Similar reproductive and behavioral measures were also compared among wild type laboratory populations. Three different culture methods were shown to have significant effects on these variables. Of the culture techniques used, a method that maximizes outbreeding and minimizes selection seems to be the best way to maintain the original behavioral and reproductive characteristics. Further it was shown that a high P' (a measure of first male effectiveness in causing females to delay remating) may be more common in inbred laboratory populations and less common in natural population.

2:45 SEGREGATION AND TRANSMISSION OF CHROMOSOME AND CHROMOSOME SEGMENTS IN COCKERELS HETEROZYGOUS FOR AN APPARENT CENTRIC-FISSION. G. A. Bonaminio and N. S. Fechheimer, The Ohio State University, Department of Genetics, Columbus, OH 43210

Segregation behavior of a reciprocal translocation involving the long arm of chromosome-1 and a microchromosome was studied in Leghorn chickens. The same five males, from which testis was taken to observe the array of secondary spermatocytes (n=200) produced with various balanced and unbalanced chromosomal complements, were also used as sires of embryos. Karyotypes of 377 embryos were observed at one day of incubation. Complementary products of segregation did not occur in the expected ratios of 1:1 in secondary spermatocytes. An excess of spermatocytes with deficiency of the long arm might be a result of lagging of this arm at MI. Its centromere was from a microchromosome. In the samples of secondary spermatocytes and embryos 52.5% and 49.6% respectively contained balanced chromosome complements. A significantly higher proportion of duplications and deletions of the long arm was seen in embryos than in secondary spermatocytes. Conversely a lower proportion of duplications and deletions of the short arm was seen in embryos than in secondary spermatocytes. Apparently spermatogenic cells bearing different unbalanced genomic contents are not equally viable or fertile.

3:00 THE MOLECULAR BASIS OF LEAF VARIEGATION IN HOSTA SPECIES. N. S. Kirkpatrick, W. A. Tozier, K. G. Wilson, and C. D. Mitchell. Dept. of Botany, Miami University, Oxford, OH 45056.

The genus Hosta is known for its many variegated varieties. It is believed that variegation in Hosta is the result of one or more cytoplasmic mutations. Analysis of the genetics of several varieties has shown the mutations to be inherited in a maternal fashion. By analyzing the chloroplast DNA of wild type and mutant tissue,we will attempt to show that the site of mutation is the chloroplast.

3:15 THE CYTOCHROME OXIDASE SUBUNIT II GENE FROM CARROT CONTAINS AN INTRON. F. J. Turano[2], M. B. Ericksen[1], L. R. Debonte[2], K. G. Wilson[1], and B. F. Matthews[2]. [1]Department of Botany, Miami University, Oxford, OH 45056 and [2]USDA-ARS Plant Molecular Genetics Laboratory, Beltsville, MD 20705.

Evidence is presented for the presence of an intron in the cytochrome oxidase subunit II (COX II) gene isolated from Daucus carota var Danver's. This is the first report of an intron in the COX II gene from a dicotyledonous plant. The existence of the COX II intron was verified by restriction mapping, hybridization with specific maize and wheat probles, and partial sequencing. Hybridization data show that regions of the carrot COX II intron are homologous to the maize COX II intron and to the wheat COX II intron-insert. A comparison of the restriction maps of the COX II genes from pea, Oenothera, maize, wheat, and rice will be presented.

3:30 ISOLATION AND CHARACTERIZATION OF RNAs FROM CARROT EMBROYOIDS DURING SOMATIC EMBRYOGENESIS. Rabbi, M. F. and Wilson, K. G., Department of Botany, Miami University, Oxford, OH 45056.

Explants from carrot cv. Denver were grown on solid-agar medium containing Murashiga-Skoog (MS) medium with 0.5 ug/L of 2,4 - D for tissue culture. After 6 weeks of growth, both tap-root and leaf explants from carrot formed friable calli-formations, which were then transferred to liquid MS medium with 1 ug/L of 2,4 - D for embryogenic developments. Three weeks later, the somatic embryoids, thus formed, were retransferred to fresh MS liquid medium with 0.1 ug/L of 2,4 - D as well as medium containing no hormone. The carrot embryoids were grown for several generations through repeated subculturings. After 21-23 days of growth in liquid media, total RNAs of embryoids were isolated and purified from both hormone-treated and without hormone media. The isolated RNAs were then identified and characterized by urea-agarose electrophoresis.

SECTION L. MATH AND COMPUTER SCIENCE
MORNING SESSION - TIMKEN SCIENCE HALL 120
SATURDAY, APRIL 25, 1987
MOHSIN M. JAMALI, PRESIDING

9:00 A COMBINED SPEAKER AND DIGIT RECOGNITION SYSTEM. M.M. Jamali, N. Mohankrishnan*, M. Shridhar*, University of Toledo, Electrical Engineering Dept., Toledo, Ohio 43606.

With the rapid growth in the area of VLSI technology, it is possible to build custom hardware for real-time implementation of combined speech and speaker recognition algorithms. This can be done by either developing powerful and versatile processing elements or using those available commercially. The area of parallel processing can also be exploited to increase the throughput, towards the achievement of the goal of real time implementation. This work is directed towards the development of a high speed architecture for real-time application of a simultaneous speaker verification and digit recognition system. In order to achieve this goal, an algorithm for combined speaker verification and digit recognition is formulated. An architecture is then developed for real-time execution of this algorithm. The hardware structure proposed by the authors utilizes commercially available components and parallel processing techniques to obtain high throughput rates.
*N. Mohankrishnan, Dept. of Elec. Engr., Univ. of Detroit, Detroit, Michigan, M. Shridhar, Dept. of Elec. Engr., University of Michigan (Dearborn), Dearborn, Michigan.

9:15 THE NEW METHOD TO DETECT PARALLELISM IN COMPUTER PROGRAMS Dr. Fatemah Abdollahzadeh The University of Toledo, 2801 W. Bancroft. St. Toledo, Ohio 43606

Existing techniques which are used for recognizing parallelism in a program can be used during the semantic analysis and code generating stages and at run time.

To date no one has attempted to detect relationships between parts of a program during syntax analysis,i.e., changing the grammar used for a serial program to one more suitable for a parallel program.

We have shown how an operator precedence grammar can be changed to an operator grammar, by making use of the property of associativity. This operator grammar G_1 yields several different parse trees, one of which is the most suitable for parallel execution.

Then, we give a context sensitive grammar, based on ambiguous operator grammar G_1, which described the structure of arithmetic expressions for a parallel programming language. The grammar gives rise to generalized operator precedence relations capable of indicating the associativity of like operators. This chomsky type 1 grammar is capable not only of deriving semantically equivalent expressions but of actually performing the tree balancing. It also detects possible vacancies in a subexpression into which other smaller subexpressions can be inserted.
The applicabiity of these grammars is discussed, as is the extension of tree-balancing to entire programs.

9:30 A THEOREMETRIC APPROACH TO ESTABLISHING THE REDUCTION OF THE HETEROTIC SUPERSTRING THEORY TO THE OBJECTS AND INTERACTIONS OF THE STANDARD MODEL. LUNDBERG/Wayne R. 2609 Hilton Dr., Kettering Ohio 45409

A theorem which produces geometric objects in four-space and proves the equivalence of Rishons and said objects is presented. This geometric version of the Rishon is then used to construct Quarks such that the connection to closed-loop string theory is manifestly evident. A theorem which demonstrates that exactly three families are generable in this way is given. Strong and weak interactions are graphically, and group-theoretically exemplified. The equivalence of the geometric model and the group-theoretic model is thus proven. A system of handling group-theoretic objects and interactions via Rubik's cube is defined. This restricted cube group also is shown to generate exactly three families. A combinatorial proof that exactly 496 members exist in the restricted cube group, as defined, is given. Thus the value of the foregoing system is well established. Several areas in need of detailed research are discussed.

9:45 DESIGN OF AN EXPERT SYSTEM SHELL USING PROLOG. Ian Moraes and Krzysztof J. Cios, Dept. of Elect. Eng., Univ. of Toledo, Toledo, OH 43606.

An expert system basically consists of a knowledge base, an inference engine and a user interface. A substantial portion of this study was devoted toward the inference engine, which is the major component of an expert system. An inference engine's function can be simply described as that of drawing conclusions from facts represented in the knowledge base. The shell developed was oriented toward building an expert system for the diagnosis of coronary artery stenosis. Due to the varying nature of this application, the modulating boundaries of locations of obstructions in the three major coronary arteries, both statistical and fuzzy inference techniques were employed in the inference engine. Logic programming language, Prolog, was used since it is specifically applicable to projects such as development of expert systems. However, a special interpreter facility was built on top of Prolog to enable one to obtain a fuller understanding of the shell's reasoning processes. The trace facility provided by Prolog is not particularly flexible to the system requirements, as a more comprehensive explanation of the shell's reasoning. The shell was tested using an artificially generated knowledge base. The primary motive behind developing the shell as opposed to using a commercially available one, was because a shell was needed that was custom-designed to meet the specifications and an inference engine, in particular, that could be modified when needed.

10:00 A CERTAIN KIND OF INFERENCE ENGINE. Liu Ning and Krzysztof J. Cios, Dept. of Electrical Eng., Univ. of Toledo, Toledo, OH 43606.

A current expert system knowledge base consists of facts, procedures and judgement rules in problem domain. The purpose of this study was to develop a learning algorithm which would enable the computer to deduce more general rules from facts and rules in a knowledge base, thus making a system more powerful. To provide these learning capabilities, first the problem-solving process human beings use was analyzed. Briefly, humans apply a particular algorithm which they have as a set of some rules in mind to a problem at hand which is a particular data set. The process of problem-solving is one of transferring data from one state into another by using rules. If by tracing those changes of data a computer could drive logically equivalent rules to those applied then such a computer acquires "intelligence". Such an inference engine is proposed to trace the changes and do deductions. It consists of search strategies and a general knowledge base. First, the system was loaded with general concepts deducted from a separate data set. Second, the system did deductions from sequenced data samples to obtain the general rules being used perhaps outside the computer. The number of rules generated depends on the size of the knowledge base. One of the more difficult tasks was ordering the rules properly according to the given information. This task is referred to as the third kind of deduction. The general knowledge base is referenced frequently for all kinds of deductions and so is a crucial part of the algorithm.

10:15 EXTRACTING EDGES FROM TL-201 IMAGES. Ayman Sarieh and Krzysztof J. Cios, Dept. of Electrical Eng., Univ. of Toledo, Toledo, OH 43606.

Quantitative analysis of myocardial TL-201 scans indicate accuracy in detecting perfusion defects. However, the noisy TL-201 images necessitate the intervention of an operator to trace around the chamber image with an electronic digitizer to feed into a computer. In this study, a statistical approach based on local characteristics is used for the detection of the left ventricle boundaries from TL-201 heart images produced by a gamma camera. A sliding window shceme with overlap is adopted. The procedure consists of to parts: testing the hypothesis that there exists a significant edge segment in a given window and detecting the edge segment. The hypothesis is tested by examining the modality of the pixels within the window. First, the gray level distribution is tested for bi-modality. Second, the window is divided into equal size regions and the homogeneity of the means and the variances of these regions are tested. For a given window with an edge segment, the edge pixels might be identified by two procedures: 1) pixels between non-homogeneous regions are outlined as edge pixels, these pixels are coded differently according to their directions, 2) edge detection by local threshold computation. Two threshold values are selected corresponding to two gray level values with minimum frequency within the interval of least frequency count. A chain code scheme is used to connect the edge pixels. In case of discontinuity, the smaller threshold is used to bring out pixels to complete the chain-coded edge segment.

10:30 REAL TIME TASK PLANNING SIMULATION. Raymond E. Freasier and Krzysztof J. Cios, Dept. of Elec. Engr., Univ. of Toledo, Toledo, OH 43606.

As a robotics application of knowledge engineering, the design aspects of real time robot task planning are delineated and examined with the emphasis on efficient methods of implementing the robot task planning systems. In order to achieve better overall performance with the robot task planning system, it is apparent that a task planning system residing in a separate computer from the robot kinematics controller would be desirable. The task planning system could then receive data from the robot kinematics controller and measurement systems (such as a computer vision system or tactile sensors) and in turn send a position command to the controller. To investigate the aspects of performing this type of operation on a real time basis, a robot task planning system was generated utilizing the logic programming language Prolog. In a separate computer, robot kinematics, a robot kinematics controller, and measurement systems were simulated. The prupose of the simulation is to investigate the capacity of the task planning system to be interfaced with available robot computer controllers in order to accomplish real time trajectory control of any robot. A major concern is the method of measurement of the robot task planning system's computational time requirements (including both a maximum time requirement and a time requirement probability distribution) and the effects of varying time requirements upon overall system performance. The characteristics of the interface specifications are enumerated.

10:45 SECTION BUSINESS MEETING

SECTION M. PSYCHOLOGY
MORNING SESSION - BETHEL TEMPLE ROOM B
SATURDAY, APRIL 25, 1987
ROBERT GANDEE, PRESIDING

9:00 PLANNING FOR THE INDUCTION YEAR: A MODEL BASED ON FIRST YEAR FOLLOW UP OF TEACHER EDUCATION GRADUATES Dr. Carolyn R. Benz and Dr. Pearlmarie W. Goddard, The University of Akron, Zook 228, Akron, OH 44325

The induction year almost always projects the new teacher into a full-time professional role for the first time. Designing a model for an "internship year," "a fifth year training," a "mentor teacher program," "apprenticeship" all have been considered from time to time and many such programs have been implemented. This paper shows potential components of an apprenticeship program for first-year teachers based on data collected during first-year follow up studies of both new teachers and their supervisors. A model is presented which contains knowledge, skills, attitudes, and values that should be addressed in a first-year induction program. These components were proposed on the basis of perceived needs of both first-year teachers and their supervisors. The model suggests process for carrying out such a program, objectives of such a program, and how such a program can relate harmoniously with preservice teacher education will be included. The structure and

function of the induction year model is based on data collected over a five-year period from five groups of first-year teachers--graduates of The University of Akron College of Education. The general findings of teaching competencies where statistical significant results can infer a real need are reported. These findings will substantiate the validity of the model suggested.

9:15 THE CIRCUMPLEX MODEL OF CRISIS COPING. Karen Cimini and Darrell Greene. University of Akron Counseling and Special Education Department, Carroll Hall 127, Akron, OH 44325

The orthogonal axes poles of the Circumplex Model of Crisis Coping (CMCC) are defined as individual and systemic, and approach and avoidance. The model provides a method of delineating individual and system patterns of approaching and avoiding during conflict and crisis and identifies functional and dysfunctional coping processes. Behaviors in each quadrant are created and maintained by individual and systemic homeostasis. The CMCC defines 3 concentric areas. The innermost circle represents optimum adjustment described as balanced movement between and within individual and system and functionally balanced movement between approach and avoidance. The middle circle represents lack of movement and continued emphasis by the individual or system in one or another of 4 areas of focus or distraction. Sustained emphasis in one area can inhibit use of alternate coping resources and exacerbate conflict between individual and the system. The outermost circle represents severe dysfunctioning. Movement to this region is created by polarization between individual/system and approach/avoidance. Dysfunction is most severe when the individual and the system join at either end of axis 2, thereby disrupting homeostasis.

9:30 THE TEACHING/LEARNING PROCESS: STATE OF THE SCIENCE CIRCA 1987. Ralph F. Darr, Room 301A, Zook Hall, The University of Akron, Akron, Ohio, 44325

This paper is a report of on-going research into the factors that influence the teaching/learning process in the classroom. In particular, the author is attempting to assess the impact of recent calls for educational reform on educational practices. The primary source of data for this paper is the literature of educational psychology. Focus is upon the relationship between student learning and (1) teacher characteristics, (2) student characteristics, and (3) instructional/organizational characteristics in the classroom. Teacher characteristics are reviewed from the perspective of: (1) student evaluations of instructors, (2) demographic data, and (3) instructor's personality traits. Student characteristics are viewed in terms of: (1) personality traits, (2) past academic performances, and (3) learning styles. The instructional/organizational section will consider selected instructional factors: (1) control techniques of the instructor, (2) course structures, (3) instructional styles, and (4) use of instructional support systems - e.g. computers, programmed instructions. The direction of further integrative research will be reviewed.

9:45 GENDER DIFFERENCES ON MEASURES OF ACADEMIC ACHIEVEMENT AND PERSONALITY AMONG TWINS. Christopher Kline, David V. House, and Carolyn Benz, The University of Akron, Akron, OH 44325.

The Psychological literature concerning individual differences has been long established with regard to gender in Academic Achievement and personality variables (locus of control and self esteem). The purpose of this study was to test these established ideas by controlling for environmental factors. One ideal way to control for environmental factor is to use twins. The problem in the past has been trying to find enough twins to conduct a study with sufficient power. Subjects were 2713 twins who participated in The High School and Beyond survey. The hypotheses of this study were: 1) that females would have a higher mean reading achievement score than males, 2) that males would have a higher mean math achievement score than females, 3) that males would be rated as more internal on locus of control scales, and 4) that there would be no gender differences in measures of self esteem. Multiple linear regression analysis procedures were used to test the hypotheses. The study has significant implications in the fields of development and counseling psychology.

10:00 DOES INDUCED DEPRESSIVE MOOD DIFFER FROM INDUCED ELATION IN ITS EFFECTS ON MEMORY CONTENT? Carolyn Wiandt McClure, The University of Akron, Akron, Ohio 44325.

The present study used the Velten Mood Induction Procedure (1967) to examine the effects of mood on remembrance of past events. Sixty-two female undergraduate students participated in one of four experimental conditions: induced depression, induced elation, demand depression, or demand elation. Neither negative nor positive mood resulted in a differential effect in memories. It appears that mood induction was not successful. Demand subjects reported dependent measures in concordance with experimental expectations. A literature review suggests that the Velten statements act as cues to suggest the mood they are trying to achieve. Studies have shown the Velten Procedure to have a cognitive effect on subjects. It appears that these previous results may be facilitated by weak demand situations. Weak experimental demand makes it appear as though subjects did not respond to experimental demand. Rather than cognitively effecting subjects, it appears that Velten's Mood Induction Procedure gives strong demand to mood induction subjects and weak demand to experimental demand subjects.

10:15 **TEMPORAL ORGANIZATION OF SEQUENTIAL STIMULI IN 9 AND 13 YEAR OLD CHILDREN. Christopher L. Edmonds, Dept. of Psychology, Univ. of Toledo, Toledo, OH 43606.**

Inefficient organizational learning strategies in children are a well documented phenomenon. Children are typicaly asked to spontaneously recall, or sort pictures or words printed on cards into piles which belong together. Young children (9 years) demonstrate simple associative organization of information while older children (13 years) demonstrate complex, categorical sorting or recall. Inherent in these tasks is the verbal loading of the stimuli to be learned. Older children are more verbally proficient than younger and not surprisingly do perform better than young children. A nonverbal learning task was used in this study to examine whether or not young children are capable of learning complexly organized stimuli as well as older children. Results from this study show no differences between 9 and 13 year old children in terms of their ability to learn complexly organized nonverbal stimuli, and that the absence of stimulus organization equally effected both age groups in terms of a performance decrement.

10:30 ASPIRATIONS OF GOING TO COLLEGE FOR EXCEPTIONAL HIGH SCHOOL STUDENTS: CONTROLLING FOR ABILITY LEVEL, SEX, RACE, AND S.E.S. Richard J. Pontius, 6143 North Oval Drive, Clinton, OH 44216.

The purpose of this study was to determine if high school students with disabilities significantly differ from non-disabled students in future plans to attend college. The two groups were also compared in terms of their perceived ability to complete college, lowest level of education they would be satisfied with, and the amount of education they believe they will attain. The population consisted of sophomores and seniors from the 1980 High School and Beyond Project. The study included students who are visually handicapped, orthopedically handicapped, or have a specific learning disability, speech disability, or a physical condition which limits work or affects chances for more education.

SECTION M. PSYCHOLOGY

AFTERNOON SESSION - BETHEL TEMPLE ROOM B
SATURDAY, APRIL 25, 1987
ISADORE NEWMAN, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 MIRROR IMAGE ORIENTATION PERCEPTION IN TEN-MONTH-OLD INFANTS
Kenneth E. Urban, Systems Research Laboratories, Dayton, Ohio 45440 (Work performed at The University of Toledo, Toledo, Ohio)

A group of 32 infants aged 301±7 days were shown a series of randomly-generated twelve-sided polygons in an attempt to assess their perception of mirror images. In contrast to previous studies of this ability in infants, the same types of stimuli were used for both the obliquely and orthogonally oriented stimuli. This rectified an experimental confound which may have affected the outcome of the previous studies. A familiarization-test paradigm was used to evaluate the infants' performance. Statistical analysis of the looking times from the experiment yielded no effect for orientation of the test stimuli, although there was an effect for a secondary fatigue measure. There was no demonstrable effect for the primary fatigue measure, however. In conclusion, evidence from the present study gives no indication that infants perceive differences between stimuli and their mirror images. Changes to the methodology of this study are recommended which may yet provide answers to orientation perception in infants.

2:15 MULTIVARIATE EVALUATION DESIGN: A SUGGESTED MODEL FOR MENTAL HEALTH SYSTEMS. Isadore Newman and Carolyn Benz, The University of Akron, 302 E. Buchtel Avenue, Akron, OH 44325.

Mental health agencies are under more and more pressure to account for public funds, which are becoming less and less forthcoming in this "post-Gramm-Rudman" era. Compounding this situation is the fact that there are multiple stakeholders in need of information. Individual stakeholders often require individual kinds of information, e.g., a funding board may need one set of data while an advocacy group may need another. There is no one criterion that fundamentally underlies the evaluation-research design. To meet this need a multivariate design encompassing multiple stakeholders is presented in this paper. First of all, the case for such a design is built from current social and political realties vis a vis the mental health system. Secondly, the design is graphically depicted in the paper. Third, all state mandated components are described in detail along with data to be collected (qualitative and quantitative), and planned multivariate analyses of data are suggested.

2:30 THE EFFECTS OF MATERNAL WORKING HABITS AND MONITORING OF SCHOOL WORK: AS IT PERTAINS TO THE CHILD'S PLANS TO ATTEND COLLEGE.
Rita Cowan, 1820 Northmoreland, Cuyahoga Falls, OH 44221.

The impact of the working mother in today's society has social ramifications not yet realized. This investigation focused on students whose mother worked before elementary school, during elementary school, and/or during high school. The study utilized the 1986 High School and Beyond Data Set, which consists of 58,000 student sample cases throughout the nation. Sex, race, and S.E.S. were among the differentiating variables used to test for variance within the population. Item questions pertaining to self concept and locus of control were used as covariates. The findings of this study have implications for parents and educators who are involved with the rearing and development of today's children given society's changing nuclear family.

2:45 ENCOURAGING BALANCE: SYSTEMIC THEMES AND THE FOCUS OF TREATMENT FOR PERSONS WITH AIDS AND THEIR SIGNIFICANT OTHERS. Karen Cimini and DarrellGreene. University of Akron, Counseling and Special Education Department, Carroll Hall 127, Akron, OH 44325.

AIDS is having a profound influence on individuals, dyads and families throughout society. Because of the length of illness and its turbulence, persons with AIDS are frequently returning to their family of origin for support and physical care. In addition to the pain and stress of the disease, families of origin and current partners often face issues surrounding sexuality, death and unresolved historial themes which may interfere with present ability to make contact and withdrawal from content concerns. Systemic issues consistently appearing in the therapeutic context are presented in the following thematic areas: 1. Reintegration into the Family of Origin; 2. The Family of Origin and Death; 3. The Heterosexual Husband or Wife; 4. The Gay Lover; 5. Bisexual Relationships. Each theme is explored as it is manifested psychologically and pragmatically for the person with AIDS and their significant others. Treatment focuses on balance in the therapeutic process. Present systemic dynamics are balanced with historical assessment of functioning and resources. Coping is encouraged by assisting movement between individual and systemic forces through experience and affect about the disease process, and individual and systemic distancing by nonfocusing, through functional distractions.

SECTION M. PSYCHOLOGY
POSTER SESSION - OSBORNE HALL GYMNASIUM AUDITORIUM
SATURDAY, APRIL 25, 1987

Board 0 @ 9:00 AM HOPE: A PILOT STUDY OF RACIAL DIFFERENCES
Mary Ann Goff, 1420 Londondale Parkway, Apt. 132B, Newark, Ohio 43055 and S. Staats, Dept. Psychology, The Ohio State University, Newark, Ohio 43055

Psychologists have recently began to study positive as well as negative emotions (Diener, 1984; Staats, 1985). Positive emotions and attitudes make behavior more likely to occur and therefore made the possibility of positive reinforcement more likely to occur also. Hope is thus seen as a precursor to success. The present study is based on a convenience sample of black and white non-institutionalized adults. Various measures of hope, optimism and well-being were obtained. The measures of hope correlated as predicted and were negatively related to a measure of hopelessness (Beck, 1985) which supports the validity of the measures. A preliminary analysis of the data from ten black and ten white persons ages 32 to 81 indicates a similar degree of well-being for blacks and whites but a greater amount of hope for blacks as measured by the Hope Index ($t=2.24$, $p < .05$). If this differences is reliable, it would be consistent with expectations of increasing success by black persons.

SECTION N. JUNIOR ACADEMY
FIRST MORNING SESSION - OSBORNE HALL 21
SATURDAY, APRIL 25, 1987
BRIAN FRY, PRESIDING

9:00 FOUND: A LOST OHIO FARMHOUSE. Paula S. Powers, 725 Bevis Road, Columbus, Ohio 43202

Found: A Lost Ohio Farmhouse, is a study of a vacated farm site. Archeological techniques were used to build a scientific model of the farmhouse that once stood in Delaware County, along the Olentangy River. The study began by mapping the area's trees location, indentations in land forms and taking note of other structures on and around the land. The research continued with excavation. By probing the area; the sidewalks, stairs, and patios were uncovered. The excavating continued by digging away overgrowth and removing soil samples of loose fill dirt that covered the foundation of the once existing farmhouse. The investigation went on to turn up old records in the Delaware County Court House. Maps and county property records were discovered revealing the owner and important facts of how the house was structured. This information, along with information obtained by observing other houses in the area helped determine an idea of the shape and style of the house. The results of this investigation is a drawing of the farmhouse in question. The two-story, metal roofed structure was probably built around 1910.

9:15 HYDROPONICS
Michael A. Headings
7115 Rd. 30 West, DeGraff, Ohio 43318

In my research in the field of hydroponics, I discovered the best hydroponics apparatus and growing mediums for different plant species. The great importance of proper mineral balance and the effect on the plant when an imbalance occurs was an important aspect of my experimentation.

I found the proper technique for raising plants

in a hydroponic environment and also how to control various diseases and insects effectively. The cost of building several different hydroponic environments dealt heavily into my research. I analyzed the drawbacks to and potential of hydroponic farming for future generations in agriculture.

During my experimentation I found the importance of proper lighting and constant temperature for the raising of hydroponically grown plants. The delicate pH balance was a major concern of mine.

Through my research I have gained technical knowledge that has given me the incentive to pursue more experimentation and research in this new and exciting field of agriculture.

9:30 "A MODEL FOR A PRODUCTIVE SELF-SUFFICIENT ECO SYSTEM" Aaron Godwin, 3592 W. 322, Orwell Ohio, 44076

As the relation between our society and environment grows increasingly complex, questions of how to reduce pressures induced by humans on ecological systems become ever important. I have designed a model for a multi-stratified Ecosystem capable of providing food and clear water for higher life forms such as mammals and then re-utilize their waste in a closed system. While this model reflects in abstract form the processes at work in any ecosystem, it is valuable as a tool to explore ways to promote harmony between environment and its inhabitants. It has applications as diversified as a high tech space station, to aiding in the real socio-environmental problems being encountered in famine and drought stricken areas like central Africa. Two basic problems in any Environmental System are the exploitation of food and water resources by organisms and the subsequent recycling of their waste. In a natural open environment these processes are kept in Dynamic Balance. But as the Ecosystem becomes more closed (either intentionally as in a space station or through overpopulation and Ecological Stress) Maintaining these balances becomes critical. The closed, self-supporting cycle in my model is based on Cloraphyta (green algae) as a food and oxygen producer as well as water purifier for higher organisms. The system also provides fertilizer, to be recycled in the system, for a variety of Agri-products. To increase efficiency, I have taken care to match complimentary organisms and utilize technology to create optimum light and nutrition.

9:45 PROTEINS AND AMINO ACID NUTRITION, Jeff Warner, 592 St. Rt. 44, Hartville, Ohio, 44632

Some kinds of amino acids cannot be derived from other kinds in your body; therefore, they must be supplied in the diet. Substances such as these are known as essential amino acids. This study is concentrating on the essential amino acid lysine, an amino acid that is present in only small ammounts in the protein gliadin from wheat and the protein zien from corn. Lysine is essential in rats, chickens, and man. Human populations dependant on grains as a sole source of dietary protein suffer from lysine defficiency; this is an extreme problem in Ethiopia, where starvation is evident and people are forced to rely solely on corn for food.

In my experiment, 4 rats were fed a diet of 40 grams of wheat, which contained approximately 2 decigrams of lysine. 4 more rats were fed a diet of 40 grams of corn, which contained approximately 2.5 decigrams of lysine. The symptoms exhibited by the rats were similar to those experienced by humans; loss of hair, decrease in activity, and not enough serum albumin being produced, resulting in failing osmotic pressure between the blood vessels and tissues.

Dr. Edwin Mertz of the Purdue University agronomy department discovered a mutation that made the breeding of high-lysine corn possible. A program is now being developed to make this high-lysine corn available to the Ethiopians who need it.

10:00 SMOKELESS TOBACCO: ITS USE AND ABUSE Jeanne L. Vitka 4420 Millwater Drive Powell, Ohio 43065

Throughout history tobacco has been used in many forms by man. Recently, an increasing number of young boys are chewing smokeless tobacco despite the health hazards it presents. What influences boys, particularly boys in central Ohio, to chew tobacco? Through my science fair project I tried to anwser this question.

I developed a survey to discover what percentage of boys in central Ohio chew tobacco or dip snuff and why they use it. Surveys were sent out to over 16 schools in Columbus and surrounding areas. Sixteen hundred students representing seven schools completed the survey. Results indicated that 24% of the boys were frequent users of smokeless tobacco. Nearly 3/4's of the users believed smokeless tobacco was safe.

Although my project may not stop the use of smokeless tobacco, I wanted to bring to attention how dangerous it really is.

10:15 CAN LOUD MUSIC HAVE A PERMANENT EFFECT ON HUMAN HEARING LOSS? Nikki D. Hall, 13032 Air Hill Road, Brookville, Ohio 45309.

The human ear contains tiny hair cells that turn sound waves into messages the brain can understand. We humans can damage or destroy these tiny hairs by subjecting them to loud music with headphones or rock concerts. The critical level starts at 70 decibels and many concerts exceed 110 decibels. In my experiments, I found that of the 18 teenagers tested with a headphone, 55% were normaly listening to music over the 70 decibel level. I have concluded that young people are unaware of the damage they are causing at the time because the hearing loss is minimal, but with time and continued abuse, the damage will be considerable.

10:30 COMPUTER CONTROLLED PROSTHETIC LEG Stephen Cameron 305 W. Morenci St., Lyons, Ohio 43533

Research into the use of myoelectric robotic controls has shown a need in the area of leg prosthetics and may also have applications in N.A.S.A.'s new hard-shell space station spacesuit. In this project, I have developed a prosthetic leg that will move by many means of control. They are: hand held controller, manual computer control, limb position sensor, and a myoelectric sensor. Further, this leg will mimic human muscle movement without the bulky and unnatural cables, pulleys, and elastic bands being used today. Feedback to the computer gives an accurate indication of the limb's location. This location is given relative to the body and not to gravitational forces.

CONCLUSION: Relatively simple electronic circuits can interface with the computer and use myoelectric impulses to trigger natural and much more powerful human movements in robotic and prosthetic devices. The simplicity and low cost of these devices make the system very attractive for commercial application.

10:45 DEVELOPMENT OF A LASER REFRACTOMETER TO INDICATE CHANGE IN THE REFRACTIVE INDEX OF A GAS. J. Andrew Markiel, 6376 Thrasher Loop, Westerville, Ohio 43081

This project measures the change in the refractive index of a gas within a sample tube caused by replacing a pure sample gas with air. In a darkened room, a laser beam passes through a refractometer, which divides and then recombines the beam, forming an interference pattern on a screen placed two meters from the refractometer. The tube is originally filled to capacity with a sample gas and placed within the refractometer, and any change in the amount of the gas will cause the lines or fringes of the interference pattern to shift their position. The pure gas is removed from the tube and the number of fringes that pass a fixed point is recorded along with the volume removed. The experiment has been performed with both hydrogen and oxygen gas. The data, especially at higher removal volumes, shows consistent reliability of the equipment. For hydrogen, there is a direct relationship of five cubic centimeters of hydrogen removed to an interference shift of one fringe line. A simple electronic alarm device is also used. The circuit's phototransistor conducts a current only when it is absorbing light energy. When a shifted fringe hits the phototransistor, the circuit is designed to light a light bulb as a warning signal. This applica - tion of the experiment is geared toward the monitoring of controlled environments.

SECTION N. JUNIOR ACADEMY
SECOND MORNING SESSION - OSBORNE HALL 27
SATURDAY, APRIL 25, 1987
DAVE WEANER, PRESIDING

9:00 A RESEARCH ON UNCONSCIOUS LEARNING
Chris Smerchansky, 10306 Tallmadge Rd., Diamond, Ohio 44412

The following presentation is an introduction to the hypothesis that teaching and learning is possible during the unconscious state of mind. This experiment involved a series of basic word comprehension tests taken by two individuals. Four existing words and their corresponding non-existing words were repeated during different time intervals while the individuals were in the process of an unconscious state of mind, known as sleep. The following day a simple test was taken to record the amount of words that could be recollected from the test. In essence, the different tests revealed many interesting aspects on the subject of learning.

9:15 THE EFFECTS OF LIFESTYLES ON BLOOD PRESSURE
Sheri Bunch, 20100 Meranda Rd., Maplewood, OH 45340

The society is becoming very aware of the "Silent Killer", hypertension. Blood pressure is determined by many factors. I chose to study its effects with varying lifestyles. I first composed a survey asking a series of questions relating to sex, age, weight, salt consumption, amount of sleep, and dietary, smoking, drinking and exercise habits. First I determined their blood pressure rate with a sphygmomanometer. The subject was then asked to do jumping jacks for one minute. Their blood pressure was taken immediately after the exercising and 5 minutes later. It was first taken to give an idea of their normal reading, and after exercising to see if the rate increased. The most important reading was 5 minutes after exercising. It showed how well their blood pressure returned to its normal rate. Each subject's blood pressure increased after exercising, but the rates decreased at different levels due to their different lifestyles.

I found that the higher the age and weight, the higher the blood pressure. One hundred percent of the men had a higher systolic rate at all three readings. However, 55% of the women had higher diastolic readings. Those who always added salt to food, didn't get much sleep, and drank alcoholic beverages had higher rates than those who didn't.

I conclude that those who practice a moderate lifestyle are more likely to live a healthy life with lower blood pressure.

9:30 ALCOHOL-WATER TURBULENCE.
Deron A. Walters, Upper Arlington H.S., Upper Arlington, OH 43221
2353 Cambridge Blvd., Upper Arlington, OH 43221

The turbulent mixing encountered when alcohol comes into contact with a water surface was investigated. The hypothesis was that this phenomenon is caused by surface tension forces of the interacting water and alcohol. Several types of experiments were performed, using different methods of bringing the alcohol in contact with the water. Many of these involved qualitative observations of the character and properties of the effect. The most important quantitative data were taken using a very sensitive shadowgraph apparatus to view the interaction. Using this apparatus, a new detail of the effect was rendered visible: a flow pattern resembling an array of petals radiating from a central drop area. This was seen for certain concentrations of alcohol in the drop and in the pool to which it was added. The threshold for the turbulent effect was measured in terms of the alcohol concentration in the drop for several alcohol concentrations in the pool to which it was added. According to these data, the effect depends on a difference in surface tensions between that of the drop and that of the pool. This difference must be above the threshold difference of 4 to 9 dynes/cm for the turbulent phenomenon to be seen. Based on this and various qualitative data, it was concluded that the effect is caused by the imbalance between the surface tensions of water and alcohol.

9:45 NICHE DIFFERENTIATION IN STREAM FISHES
Eric Kent
Southeast High School
8423 Tallmadge Rd.
Ravenna, Oh. 44266

In this study a correlation was looked for between fin size and the area of the stream in which the fish occur. The hypothesis stated was that there will be no difference in fin area to body length ratio in fishes collected from different niches of the same stream. Using a siene, fish were collected from pools, riffles and raceways of two northeastern Ohio streams. Water depths and speeds varied between 1-36 inches and 0-2.19 mph. Measurements were taken on fin length, width, and total body length. The fin length and width were used to find fin area. This was used as the x coordinate. The total body length was used as the y coordinate. Linear regression analysis was used to find a slope of best fit for each niche. Correllation analysis was then used to determine if a statistically significant relationship exists between fin area and niche placement. A correlation of .085 was found between the riffle and pool. A correlation of .13 was found between the riffle and the raceway, and a correlation of .96 was found between the pool and raceway.

10:00 URANIUM CONCENTRATIONS AT FERNALD
Kevin William Hoffman, 605 Hackberry Dr. Westerville, Ohio 43081

In the past months much attention has been focused upon emmissions of radioactive uranium at the United States Department of Energy's Fernald Feed Materials Plant. This report is a direct result of all the attention focused on Fernald. It is an attempt to determine the concentration of uranium in the soils surrounding the plant.

Twenty-four representative soil samples were collected, appropriately tagged, and prepared for testing. They were irradiated at the OSU Nuclear Reactor Lab for four (4) hours at ten (10) KW. Following irradiation, the emmissions from the samples were counted in a Germanium-Lithium detector. This gave a determination of activity which could then be converted to concentration in parts per million.

The samples were inter-compared and also judged against two standards,soil-5 and a low grade uranium ore. An average of 11.4 ppm uranium was found, with a high, just outside the perimeter, of 104 ppm. Comparison of this with the 1770 ppm of the low grade uranium ore showed that the uranium level was well within acceptable limits. The future could lead to a much more extensive study of the soils, using over 1000 samples at varying depths to determine how far down the uranium has penetrated. A second idea would be to study the edible plants to decide whether they have absorbed any uranium. For now, those questions go unanswered.

10:15 PHYSICAL AND CHEMICAL DIFFERENCES IN STREAMS TRIBUTARY TO FURNACE RUN, AND INFLUENCE OF TERRAIN, SUMMIT COUNTY, OHIO.
Erica Ann Corbett, Western Reserve Academy, Hudson, Ohio 44326

Furnace Run, a southeastward flowing tributary of the Cuyahoga River, drains ca. 20 square miles in Cuyahoga and Summit Counties, Ohio. Development of tributaries to Furnace Run is unequal, with shorter streams of higher gradient on the northeast side. The probable explanation is close proximity of bedrock (Cuyahoga Group and Berea Sandstone) to the surface on the northeast side, whereas glacial till, sand, silt, and clay mantles more thickly the bedrock surface on the southwest. The explanation is supported by water well data, comparision of bedrock and topographic surface elevations, and the map of surficial materials of Summit County, Ohio (Van Horn, 1979). Six tributaries to Furnace Run, generally within the Cuyahoga Valley National Recreation Area and in basins with minimal development, were sampled in June, 1986 near their mouths and analyzed for major chemical constituents. The null hypothesis, that concentration of a constituent from the southwest is $\leq$ the constituent from the northeast, was rejected. Major differences were found. In fact, highest values for pH, S.C., calcium, magnesium, sodium, chloride, sulfate, and carbonate in waters from the northeast are less than lowest values in waters from the southwest. Furnace Run, both upstream and downstream, had a composition intermediate to the tributaries, but more closely resembles tributaries on the southwest, as indicated in Piper diagrams.

10:30 THE RELATIONSHIP BETWEEN TEMPERATURE AND RESISTANCE IN METALS by Gregory Heibel 4114 Winfield Road, Columbus, OH 43220

This project is a demonstration of the relationship between temperature and resistance in metals. Six different types of metal wires, including atimony, copper, and copper alloys were utilized for the experiment. The wires were wound around balsa wood bobbins, and placed in various temperatures. The temperatures were 20 degrees C, 100 degrees C, 0 degrees C in ice water, and minus 195.8 degrees C, achieved by placing the bobbin in liquid nitrogen. The resistance was determined by utilizing a 10.5 ohm resistor, and hooking it up to a 1.5 volt battery. The voltage drop across the resistor was measured, and the resistance was calculated. The resistance was measured eight separate times for each temperature and all six of the metals. In addition, there were replicates taken where there may be some possibility of error. The data that was received showed that there is a trend with all of the measurements, that is that the liquid nitrogen had the lowest resistance of all, followed by the ice water, the room temperature, and the boiling water. We also determined that the relationship between the resistance at minus 195.8 degrees C and 100 degrees C is direct. This can be used to measure the temperature of the surroundings.

10:45 THERMODYNAMIC PRINCIPLES OF RUBBER ELASTICITY

Tobias Pace
249 Brookhaven
Cincinnati, Ohio
45215

The purpose of this lab was to investigate and apply thermodynamic principles of rubber through experimentation of rubber elasticity. An external force of 0.5kg was applied to rubber bands of different lengths and widths. The band was heated for one minute, which caused it to contract, rather than expand. The length of the band from stretched to relaxed position was measured. Determination of the value signs of H(change in enthalpy), S(change in entropy) and G(change in free energy) was achieved in relation to the spontaneous change using the Gibbs-Hemholtz Equation (G= H - T S) for standard free energy change for the experimental system:

Rubber band(STRETCHED)=Rubber band(RELAXED), from observations, H was positive, S was positive, and G was negative.

H is irregular because it has a positive value; but the reaction from stretched to relaxed was spontaneous. The G was negative, therefore, the T S must be greater than H. This accounts for the increase in work done on the system as expressed by the equation:

Work=K(grams) G(9.8 m/s) x L(length of contraction)

SECTION N. JUNIOR ACADEMY
FIRST AFTERNOON SESSION - OSBORNE HALL 21
SATURDAY, APRIL 25, 1987
BRIAN FRY, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 FIBER OPTICS: Steven Harris 5828 Frazer Ave. N.W. N. Canton, Ohio 44720

My science project is on Fiber Optics in communication. I have also covered the manufacturing of fiber. Fiber starts as a hollow glass tube that is ten feet long. The inside is then sprayed with germanium dust. The tube is then heated and forced to collapse. A hair like strand is drawn and layered with a protective coating. The reasons for fiber over standard copper cable are obvious. For one, fiber can never give cross talk. Fiber optic cable can be used inall forms of communication. Fiber can be used to transmit telephone messages, video or data. I did an experiment to try and figure out why copper cable gets cross talk and why it is not possible to get cross talk in fiber cable. There are three ways to get cross talk; one, water penetration, two is wire touch and three is electromagnetic jump. I proved my electromagnetic theroy. When two wires are close to each other one gives off an electromagnetic field. Being that copper cable is based on electric impulses, the electric impulses from one cable can jump to the second cable. When the afore mentioned happens you have one form of cross talk.

2:15 THE EFFECT OF PERFORMANCE ON THE LEVEL OF ASPIRATION Christine Dembeck, 6893 Laird Avenue, Reynoldsburg, Ohio 43068

The purpose of this project was to discover the effects of performance on the level of aspiration on a task involving perceptual motor-ability. Initially, an individual was required to establish a goal and then attempt to attain his goal. After acquiring prior knowledge from past performances, an individual determined a new goal.

The experiment consisted of two tests. The procedure in the first examination began by testing twenty subjects: ten males and ten females, between the ages of fourteen and fifteen, who were in the ninth grade with above average grades in school. Each subject was to choose another subject of the same gender. Two tests, Test A and Test B, were then distributed to each pair. These two tests were not identical, yet both had the same objective. Matching symbols to digits, each subject was to complete one test. In the second testing, there were twelve subjects: six males and six females, between the ages of fourteen and fifteen, who were in the ninth grade with average to above average grades in school.

The hypothesis was that if a subject performed well on a task assigned to him, he would continue to perform well. Likewise, if a subject performed poorly on an assigned task, he would continue to perform in this manner. Even though there were variables that were unable to be controlled, my hypothesis proved true.

2:30 ARTIFICIAL ORGANS Michael Yeager, 6209 Waterloo Road, Atwater, Ohio 44201

The objective is to see if a high school student can develop, and construct the following artificial organs and power units with minimal medical knowledge and funds. They are: seamless implantable heart; implantable kidney; and implantable lung; and hand. Drive units as follows: main and portable for the artificial heart and lung.

The procedure is to design a series of artificial organs, with each stage of the series having one or more of the flaws corrected until the suitable artificial organs are produced. In the same manner the drive units; main and portable were produced. The biocompatability factor was tested by exposing the material used to canine tissue and observing any changes, and by collecting research data of others.

Through following the before mentioned procedure I have obtained the artificial organs as follows: heart, lung and kidney which have proven to be biocompatable with canine blood and tissue. A stationary drive unit capable of sustaining the artificial organs indefinitely. A portable drive unit to give the patient greater mobility for 30 minutes.

2:45 SPECTROSCOPIC EVIDENCE FOR THE NON-CYCLIC NATURE OF LOW TEMPERATURE CURED POLYIMIDES Deborah A. Czerniawski, 15806 Normandy Ave, Cleveland, Ohio 44111

Polyimides, as the result of the imidization of polyamic acid, have long been thought to be thoroughly cyclized and INTRA-molecularly linked. In a new approach to the analysis of polyimides, INTER-molecular or linear linkages were actually found to predominate. Polyimide thin films were the subject of diffuse-reflectance (DRIFT) and absorbance spectroscopic analyses for interpretation of their bonding structure. Model compounds were spectroscopically examined to clarify band assignments and structural interpretations pertaining to the polyimides. The polyimide is formed when polyamic acid cures. The development of those bands indicative of the non-cyclic or INTER-molecular bonding was tracked through diffuse-reflectance spectroscopy during time and heat studies of curing polyamic acid. In order to establish exactly which bands were present, second derivatives were taken of the original spectral results in all cases. Ring closure to give cyclic imide structures is evidenced by a strong peak at 1780 m-1. Formation of INTER-molecular imide linkages is characterized by a doublet at 1740/1720 m-1. Using the new method of obtaining absorbance spectra from such films, three bands were observed, 1780, 1740 and 1720 m-1. The 1740/1720 doublet shows the presence of INTER-molecular, linear imide linkage. Polyimides, therefore, are not what they appear and are thought to be.

3:00 CAFFEINE IN ANACIN AND TYLENOL
Debra Jean Hounshell
11612 State Route 122
Camden, Ohio 45311

The purpose of this study was to determine the amounts of caffeine in Maximum Strength Anacin tablets and Extra Strength Tylenol tablets. It was hypothesized that Maximum Strength Anacin tablets contained more caffeine than Extra Strength Tylenol tablets. An experimental approach was used to determine which tablet contained the most caffeine. Eight experiments were performed which isolated the caffeine from the tablets. The results of the experiments were analyzed. The study determined that Maximum Strength Anacin did have more caffeine. A surprising result was the fact that Extra Strength Tylenol also had caffeine. The effects of caffeine to the human body should be considered by people when deciding which pain reliever to take.

3:15 EGG INJECTION FOR THE PREVENTION OF COCCIDIOSIS IN CHICKENS. Christine Rohr, Perry High School, 3737 Harsh Ave. S.W., Massillon, Ohio 44646.

Coccidiosis is a disease of the intestional tract of many animals. It is of primary concern in broiler chickens because of its size limiting affects. Injecting chicken eggs with coccidia oocytes would be an easier and more economical approach to solving the coccidiosis problem than traditional treatment.

Chicken eggs were injected on day three of incubation with varied dosages of coccidia oocytes, in hopes of finding a dosage that would allow chickens to hatch with an immunity to coccidiosis. This procedure is very different from the current approach, which is to deliver the medicine in the feed.

Results to this point have been less than successful, but continued attempts are being made with different vaccines at varied dosages.

3:30 MOVEMENT OF LIPID SOLUBLE SUBSTANCES INTO THE EGG YOLK OF JAPANESE QUAIL (Coturnix coturnix japonica). Mark DeRoy, Perry High School, 3737 Harsh Ave. S.W., Massillon, Oh. 44646

Lipid soluble substances taken orally by a Japanese Quail hen can pass into the egg yolk. Sudan black was used as a test substance because it was easy to see when it infiltrated the yolk. Sudan black is a lipid-soluble dye commonly used in poultry experiments.

After the eggs were laid, they were boiled and sliced to observe if the dye was present in the yolk. Using this method, it was possible to determine the exact day in which the dye entered the yolk. Upon slicing, dark rings were observed in the egg yolk showing that the dye did indeed pass through into the yolk. This standard was then used to test a number of other fat soluble molecules.

3:45 IMPRINTING A BEHAVIORAL STUDY, Robyn M. Klusch, 721 South Rockhill, Alliance, Ohio 44601.

Using the findings of Konrad Lorenz, E.H.Hess, and W. James as a starting point, I developed a three part experiment involving the imprinting of ducks. I imprinted the ducklings to the human voice, human stimulation and an object. I then developed an experiment to imprint them to each other and form a flock. Imprinting is a type of early learning that forms the basis for a young animals attachment to its parent and keeps the young in a safe situation for a short period of time. Hess identified that young ducks and geese will imprint to the first moving object they see. James documented that ducklings would imprint to an inactive non-living object. Lorenz was able to imprint goslings to himself in their natural environment. A group of ducklings were stimulated ten days prior to hatch with a recording of my voice. Newly hatched ducklings were imprinted to my touch and voice. Another duckling, unstimulated before hatch was imprinted to an object. After two weeks of reenforced imprinting and data collection the ducklings were successfully imprinted into a flock except for the ducklings imprinted to the object. A control group was not imprinted. I concluded that the ducklings could be imprinted to voice, touch and an object and that some could be imprinted back into a flock.

SECTION N. JUNIOR ACADEMY
SECOND AFTERNOON SESSION - OSBORNE HALL 27
SATURDAY, APRIL 25, 1987
DAVE WEANER, PRESIDING

2:00 FROM WIND TUNNEL TO AIRPLANE
Rodney D. Hartman, 1305 Coonpath Rd., N.W.
Lancaster, Ohio 43130

The purpose of this project was to test airfoils and fuselages in a wind tunnel, that was designed and built, and use this information to construct a flying ultralight aircraft model. The wind tunnel, which utilizes a venturi, uses 6 fans to pull air through the testing chamber. Two testing mechanisms were designed and built. One was for testing airfoils and the other for testing fuselages. Fourteen airfoils were designed and built. They were made using balsa wood ribs and spars. They were then covered with mylar. Eight fuselages were designed and built, utilizing balsa wood construction. They were covered with silk-span and sealed with airplane dope. The airfoils and fuselages were tested in the wind tunnel at different angles of attack. The airfoils were tested for lift, drag, and wing loading. The fuselages were tested for drag. The results were recorded and compared. A model airplane was built using the best airfoil and the most practical fuselage. The airplane was then flight tested and observed. The information from the observations was recorded and used to design an improved version of the airplane.

2:15 THE EFFECT OF A FUNGICIDE ON THE GERMINATION AND VIGOR OF SOYBEAN SEED Melissa Beuerlein, 469 Willow Lane, Mt. Gilead, Ohio 43338

Each year about half of Ohio's three and one half million acres of soybeans are planted with seed saved by farmers from the previous year's harvest. This seed is usually cleaned of weed seed and other foreign material but is rarely treated with a fungicide to protect the young seedling from seed and soil born diseases.

A study was conducted to determine if a fungicide, Vitavax 200 - a registered trademark of Gustafson and a mixture of Carboxin and Thiram, would improve the germination percentage and seedling vigor of soybean seed saved for planting a second year. The study involved the treatment of two month old seed and fourteen month old seed of an experimental breeding line, SF-3, with Vitavax 200. Appropriate untreated controls were also evaluated. Both vigor and germination tests were conducted on the four seed lots. The procedures developed and used by the American Organization of Seed Certifying Agencies were followed. Each test was conducted four times on each of the four groups of seed.

Results of these tests indicate that the germination test was not a reliable indicator of the true quality and vigor of the different groups of seed. The vigor test appeared to be a better indicator of the expected field performance of the different groups of seed. The fungicide greatly improved seedling quality.

2:30 DESIGN OF A CATAPULT
Jacques LaRose
9249 Gilbert Road
Ravenna, OH 44266

This project consisted of research and development of a computer simulation for a generic catapult launching a generic sphere, implementing a for/next loop with variable inclinations, height(with gravity and air resistance), and density and radius(of the sphere). Also included are variable time intervals and a variable to compensate for possible stipulations between the simulation and the real world. This was used to determine both the terminal angular velocity of the throwing arm and the initial force needed to achieve a prescribed distance. A catapult was then designed to achieve the goals established by the simulation. This design was to fit within a cubic foot of space and did not use metal other than for fasteners(nails and hooks).

2:45 THE CREATION OF A FIBERGLASS SOLAR CAR

Matt Tipple
42860 WebsterRd.
LaGrange,O.44050

I am designing a fiberglass solar car with the bare elements to work with. The car is a scale of modern technology to be aerodynamic and functional. I designed the body and made it at a fiberglass plant in Lorain County. It has a uni-body construction, and all aluminum suspension, so that nothing will corrode. The car has independent front and rear suspension.
I am comparing my uni-body construction, as described above to a model I constucted last year that was composed of a heavy steel frame and fiberglass body.

3:00 **TRYPANOSOMA LEWISI INDUCED PARASITEMIA IN RATTUS.** Leann Kelly. Benjamin Logan High School Box 98 Zanesfield, Ohio 43360.

Trypanosoma lewisi is a blood parasite in the rat. The purpose of this project was to study the effect of immunosuppression, by Cyclophosphamide, upon the level of blood parasites in rats.

Trypanosoma lewisi, strain number ATCC 30085 was injected intraperitoneally into a rat. Blood was collected for reinfection after six days. A drop of blood was injected intraperitoneally into two rats. Immunosuppression was acheived by injection of 100 mg/kg body weight of cytoxan, Cyclophosphamide, one day pre-infection. Blood samples were taken from the tail two days after reinfection and periodically thereafter. Five fields were randomly chosen. In each field, the number of trypanosomes and red blood cells were counted. T-tests were conducted to determine the significance of the results.

In the suppressed rats, there was a significantly higher level of parasitemia than in the control rat. In all rats, there was a rapid rise in parasitemia from day three to day seven of the infection. A crisis occured on day eight and a gradual fall continued thereafter. Young rats were significantly more susceptible to the infection than older rats. Immunosuppression lowered the immune response of rats to parasitemia caused by Trypanosoma lewisi.

3:15 THE EFFECTS OF PLANTVAX TECHNICAL AND BAYLETON 25 ON VERTICILLIUM ALBO-ATRUM Benjamin Pyles, 11086 Co.Rd. 104 Belle Center, Ohio 43310

Verticillium albo-atrum is a plant pathogentic fungi that attacks over 300 species of plants. It enters a host through root invasion and causes a vascular wilting disease.

Previous research indicated that Plantvax Technical and Bayleton 25 could be used for control of V. albo-atrum. In vitro tests, field and laboratory studies were conducted. Further studies include the effects of varying concentrations of these chemicals, comparisons of fruit production, and the economic feasibility for commercial use.

This research indicated that two applications of double recommended concentration of Bayleton 25 significantly increased the size of the plants and amount of fruit produced. Tandem applications of double strength Plantvax Technical then Bayleton 25 gave similar results. The plants were larger in this trial, but slightly fewer tomatoes were produced.

3:30 NON-ENZYMATIC BROWNING OF NONFAT DRY MILK Rene' M. Minor, 215 Mainsail Drive, Westerville, Ohio 43081

The process of non-enzymatic browning takes place in dry milk when a carbohydrate or a reducing sugar combines with a protein. The most frequently encountered reducing sugar in milk is lactose. Milk proteins contain the common amino acid lysine. When amino acids and reducing sugars are exposed to conditions in which they are able to bond, the milk starts to turn brown. In 1912, a Frenchman, L.C. Maillard, proposed a reaction mechanism for the browning of milk. The Maillard reaction consists of three stages. The coloring occurs mainly in the final stage. The coloring agent consists of melanoidin or Strecker Degradation which results in discolorization. Non-enzymatic browning causes a distortion of flavor and color of milk. It decreases the nutritional value; protein is lost, and with it, essential amino acids. Parameters include temperature, duration of heating, moisture level above zero and below ninety percent, and reducing sugars. Acidic pH values inhibit, and alkaline pH values accelerate the process. Metal ions copper and iron contribute to this occurance; sodium and potassium have no effect. This investigation is concerned with the effect of metal ions in the browning process and the possible treatment with ethylenediamine tetraacetic acid (EDTA) to inhibit browning.

SECTION N. JUNIOR ACADEMY
POSTER SESSION - OSBORNE HALL GYMNASIUM AUDITORIUM
SATURDAY, APRIL 25, 1987

Board A @ 2:00 PM ALCOHOL: THE NUMBER 1 DRUG Mary Catherine Augenstein
610 Third Street
Marietta, Ohio 45750

Alcoholism is an uncontrollable need for alcohol. A person with this uncontrollable need for alcohol is called an alcoholic. This disease is a serious form of drug abuse.

There are three stages of alcoholism. The first stage is when the person drinks to calm nerves, i.e. business meetings or social events.

The second stage is when a loss of control begins. The alcoholic starts lying about drinking and begins an increased dependance on alcohol.

The third stage is called the "late" stage. This is when the alcoholic thinks his responsibilities get in the way of his drinking. During this stage the brain starts to deteriorate.

Heavy and prolonged drinking can lead to damage of the brain, heart and liver.

Possible effects on the brain are loss of memory, affected judgement, sleep disturbances and stroke. Researchers have also discovered that drinking can kill brain cells and brain cells cannot be reproduced.

Heart disease in some cases is caused by heavy drinking. Damages to the heart are disturbances in heart pumping and rhythm abnormalities. This can cause high blood pressure or heart attack.

When the liver is scarred from long-term drinking cirrhosis of the liver or cancer may also develop.

Board C @ 2:00 PM A STUDY OF CYCLONIC STORMS J. Spencer Rezkalla, 241 S. East St. Box 343, New Holland, Ohio 43145

Each year hurricanes and tornadoes cause millions of dollars of damage. I experimented and learned about these storms through the use of a homemade hurricane generator. I also studied other forms of weather which are influential in the development of these storms. The generator I constructed was a wooden box with sliding glass panels (used to control rotation). A pan of water at the bottom provided steam when heated to show the funnel. Cool air entering the sides caused the steam to rotate. I conducted a few experiments and observations. One interesting thing was it appeared that one column rose from the bottom, while one formed at the top and descended downward and met the other. I suspended an object from a string down into the funnel. It whirled around the vortex until it was thrown from the funnel. The object when suspended in the center remained still. Using a small aluminum can to detect slight changes in air pressure was inconclusive. Some scientists say small funnels whirl within a tornado. I observed two funnels, one within the other: one rotating clockwise; the other, counter-clockwise. Hopefully, one day through more research man will be able to control these violent storms.

Board E @ 2:00 PM CEA: HOPE FOR THE FUTURE Carol Rogers, 916 Scarff Road, New Carlisle, Ohio 45344

CEA (Controlled Environment Agriculture) is a method which maximizes growth and productivity while minimizing growth space requirements.

Hydroponics is the science of growing plant in solutions containing all the necessary minerals. It is used widely in CEA.

Climate-control systems clean the air and keep temperature, light, and nutrition levels constant in CEA buildings. The efficiency of these systems is one factor in controlling costs by minimizing wastes.

CEA's utilize space in seemingly impossible extremes. CEA buildings have been placed in deserts, abandoned mines, and frigid areas. They could even be placed on space stations. Whether in space or on Earth, CEA has a prosperous and promising future ahead.

Scientists are using genetics to speed up, or as in the case of gene-splicing, replace evolution. Two such techniques are tissue culture and cloning.

The food of our future will be a more cosmopolitan variety. We will, with the help of CEA's, produce more food, of a finer caliber, in smaller space, for less money than ever before. High tech crops, grown in space, deep underground, and deserts offer a sensible alternative to our limited and traditional agrarian methods.

Board G @ 2:00 PM

THE PSYCHOLOGY OF SELF-ESTEEM

Megan M. Matthews
3206 Hermosa Drive
Youngstown, Ohio 44511

For this project, two studies were conducted. The object of the first study was to support the theory that the self-esteem of females drop as they progress through grade school. Questionnaires were distributed to students in all reading and math classes before the exam asking for grade level, sex and subject, stating the number of questions on the exam and asking for the estimated number correct. After tests were completed, actual percentage correct was recorded, and scores were separated by sex. Results: girls' actual scores were almost consistently higher than the boys' scores in both reading and math. The girls' estimates, however, while starting out between 1-5% higher than the boys', plummeted far below the boys' estimates by 4th grade, supporting the hypothesis that the female self-esteem actually does lower as they progress through the grade school years. In the second study, the number of biographies on women at the school's library were counted as opposed to the number on men. It was found that there were approximately three times as many on men as there were on women.

Board I @ 2:00 PM

ARTIFICIAL INTELLIGENCE: THE ABILITY OF COMPUTERS TO DETERMINE CAUSAL LINKS BEWTWEEN GOALS AND RESULTS.

Mark R. Schweizer, 5350 Swepstone, Canton, OH. 44708

Artificial intelligence (AI) requires tedious hours of data entry to enable an expert system "to make decisions." In more complex human thought, goals are not directly linked to results by just one action, but are achieved through many intermediate steps. In AI, rather than enter all the possible links leading to a goal and entering the best choice for each situation, it would be better to communicate the established goal with the computer. Then allow the computer to determine the appropriate steps to reach the goal most efficiently.

Several software examples were written to test this hypothesis. The primary example modified a game in which the computer was given only the rules as opposed to instruction for each possible situation. From these rules alone, the computer determined the best steps to achieve a win.

Board K @ 2:00 PM

TEEN SUICIDE

Carla Schrodi
Rt 2, Box 92, Van Wert, Ohio 45891

Suicide is the third leading cause of death for adolescents ages 14-24. Every 90 minutes someone in this age group will end their lives. The force behind the suicides appears to be social changes. Job transfers and other family mobility causes adjustment problems. The increase in divorce rates also contributes. The media certainly plays a part: by the time a teen has finished high school, they will have seen 17,000 violent deaths on TV. Also there are simply more young people than ever before: therefore, the competition is greater and failure to achieve damages fragile self-esteems. The methods by which the suicides are executed and the incidents that provoke them are very complex. The breaking up of a romance may cause a girl to overdose on pills; a boy may shoot himself. Boys tend to choose violent methods whereas girls choose non-disfiguring methods. In any case, suicide is an "all-too-permanent solution to a temporary problem." Interestingly, 65% of all suicides are somehow related to anger toward parents: the main reason for this is lack of communication. But the most overwhelming and frightening discovery of all is that it is the brightest and most sensitive teen that we are losing to suicide.

Board M @ 2:00 PM

DETECTION AND MEASUREMENT OF PYRITIC SULFUR IN COAL. *Elizabeth M. Ulrich*, RR#1, Junction City, Ohio 43748.

The presence of sulfur in the form of pyrite in Ohio coal reduces the value of the coal and creates pollution problems. This paper presents five methods of detecting and measuring pyrite in coal. The first method is physical inspection of the coal. The various appearances of pyrite are described. The second method, sink float, utilizes the differing specific gravities of pyrite and coal to seperate high sulfur coal from low sulfur coal. The third method, combustion, followed by analysis of the combustion products, is the most commonly used method in the field today. The last two methods image analysis by computer and x-ray absorption are currently under development. In both methods the coal is finely ground and compressed into a disc. Computer analysis of the disc is done by scanning the disc with a video camera attached to a microscope. The computer is programmed to recognize and count pyrite partices. X-ray analysis of the disc is done by exposing the disc to an x-ray beam and then measuring the absorption of the x-rays. A thorough understanding of the scientific principles underlying these methods will help provide answers in the search to make Ohio coal both economical and environmentally safe to use.

Board O @ 2:00 PM

THE ANALYSIS OF ACORNS

Michael O'Reilly
817 Wellmeier Ave.
Dayton, Ohio 45410

The purpose of this project was to explore the nutritional value in acorns and their vitamin C content. The hypothesis of this study is that the known (naturally occuring) amino acids will be present in acorns, along with a high concentration of vitamin C.

The results indicate a high amount of certain amino acids, as well as the presence of vitamin C.

SECTION O. ENGINEERING

FIRST MORNING SESSION - MAIN, HOOVER ROOM
SATURDAY, APRIL 25, 1987
R. FRED ROLSTEN, PRESIDING

9:00 WELCOME, ROBERT L. LEIBENSPERGER
VICE PRESIDENT - TECHNOLOGY
THE TIMKEN COMPANY, CANTON

9:05 SELECTING A BEARING WITHOUT A CATALOGUE. B. J. Cabe. The Timken Company, Canton, OH 44706.

This session will explain bearing selection methodology and why it is engineering resource intensive in modern application analysis. The presenter will describe the logic and capabilities of a newly developed computer program available through an international time-sharing network, SELECT-A-NALYSIS, and demonstrate its use as essentially, an "Electronic Bearing Selection Manual" by way of a portable terminal and supporting video equipment. Finally, principles of information management will be reviewed in the context of future enhancements to the program that would effectively provide the design engineer with not only a powerful analytical tool, but a broad based, design decision support system providing greater time to refine and improve the design itself.

Time permitting, participants will be given an opportunity to test the software using pre-constructed but typical application examples.

9:45 LUBRICANT VARIATION EFFECT ON TAPERED ROLLER BEARING FATIGUE LIFE. C. A. Moyer, Research Department, The Timken Company, Canton, OH 44706.

A bearing fatigue testing rig has been modified to specifically test bearings in various lubricants. Using a least-of-four test procedure, short duration screening tests could be run in the rig with significant results. Of the testing completed, lives and failure modes are given for 16 test groups and 10 different lubricants. In general as the specific film thickness decreased, bearing life decreased and failure mode shifted from material associated to surface associated. The tests run in a sulfur-phosphorus EP additive did not follow the above rule but still fatigued by Inclusion Initiated failure even under fairly thin film conditions.

10:00 SHEAR STRESSES IN CURVED BEAMS
D. D. Raftopoulos and W. Qassem
The University of Toledo, Toledo, Ohio 43606

This analysis deals with shear stresses in curved beam by two methods, (a) the curved beam approach and (b) the elementary theory. Shear stress equations have been derived for trapezoidal and elliptical cross sections and put in their simplest forms. The stress factors (ratios between the shear stresses due to elementary theory and Winkler's approach) have been investigated and presented in graphical manner. It is concluded that the stress factors are symmetric with respect to y-axis for all the values of Vy/Vz. For the same sign convention of both Vy and Vz, the shear stress factors always greater than unity and increases with the increase of the y-axis, even though they do not affect the general variational behaviour along z-axis. Opposite behaviour is noticed as the fibers become closer to the interior surface of the beam. The thinner the width of the beam the faster the shear stress variations along any fiber perpendicular to y-axis. The increase of R_2/R_1 (ratio between the exterior and interior radii of curvatures) does increase and decrease the stress factor at the exterior and interior fibers respectively. Even though the elementary theory is used for shear stress analysis in straight beams, it is unreliable in beams having initial curvatures. This is due to the high disparity between the straight beam theory and Winkler's approach results.

10:15 UNSYMMETRICAL BENDING STRESSES IN CURVED BEAMS
W. Qassem and D. D. Raftopoulos
The University of Toledo, Toledo, Ohio 43606

This study deals with the unsymmetrical bending stresses in curved beams whose centroidal axis are circularly curved. Equations of bending stresses in trapezoidal and elliptical cross-sectional beams have been derived by using both the elementary theory and the curved beam approach. The neutral planes were established and the unsymmetrical and uniaxial bending stress factors (ratios between the elementary theory bending stress and Winkler's approach) have been determined. In general, it is found that the stress factors at the exterior and interior fibers varies for various radii of curvatures of the same cross-sectional beam. It is also found that the stress factors decrease with My/Mz on the negative y-axis. Opposite behaviour is noticed at the points located on positive z values. The two theories produce different results at every point on the beam cross-section. This discrepancy yields infinite stress factors at some points mainly when the beam is subjected to biaxial bending moments. In the case of a beam subjected to uniaxial bending moment about z-axis, the stress factors are high for higher ratios of R_2/R_1 (ratios of exterior and interior radii of curvatures). In conclusion, the elementary theory is not an advisable approach for analyzing stresses in beams of initial curvatures, and the Winkler's curved beam approach is the most appropriate solution available to designers.

10:30 CABLE TORQUE, Warren Knapp, Blount Engineering, Montgomery, AL 36330; and R. Fred Rolsten, Wright State University, Post Office Box 1604, Dayton, Ohio 45401

A cable is a simple machine. The construction of cable results in inherent torque but the misuse of cable can result in trapped torque. Both torque types are analyzed mathematically and experimental data are obtained which verify the mathemation approach.

10:45 DEVICE TO MEASURE THE CENTER OF GRAVITY OF A HELMET, Aygun Karakas and R. Fred Rolsten, Wright State University, Main Post Office Box 1604, Dayton, Ohio 45401

Any helmet worn by a human must provide protection to the head and must not contribute to any injury. Therefore, the helmet must have its weight distributed and to coincide as close as possible with the center of gravity (C.G.) of the head. In order to accomplish this, a C.G. device was designed, constructed and tested. The system is in use by the U.S. Army in the evaluation of helmets.

SECTION O. ENGINEERING
SECOND MORNING SESSION - TIMKEN SCIENCE HALL 220
SATURDAY, APRIL 25, 1987
JAMES B. FARISON, PRESIDING

9:45 PARAMETRIC COST ESTIMATING TECHNIQUES FOR EMERGING OPTICAL DEVICES. J. Christian Beins, Instructor, The University of Toledo, Industrial Engineering Dept., 2801 W. Bancroft St., Toledo, Ohio 43606.

Since the development of photodetectors, lasers and fiberoptics, both the diversity and availability of optical components has increased dramatically. Fiber optic sensors already exist to measure pressure, magnetic fields, and acceleration. Because of certain advantages such as immunity to intereference and higher operating frequencies, there is considerable interest in constructing optical storage media and optical digital computers.

Parametric cost estimating is a technique which can be used to quickly obtain realistic system costs, even for developmental systems which have no historical cost data. Certain key "cost drivers" are identified which yield a good cost correlation.

This paper describes some of these optical devices by function. It identifies the most significant cost drivers for them. This correlation is important so that accurate cost estimates for the system can be made at a very early stage of the project development.

10:00 A STUDY OF THE EFFECTS OF COMPUTER AIDED DESIGN ON LIFE CYCLE COST-By Hussein Hamade, Instructor, Industrial Engineering, The University of Toledo, Toledo, Ohio 43606

The objective of this research is to identify and study the effects of computer aided design (CAD) on the different components of a product's life cycle cost. CAD affects the system's/product's progress through design development, manufacturing, field use and logistic support stages, terminating with the disposal of the product. During the design and development phases, CAD increases the productivity of the designer by enhancing the process of visualizing and formulating the product and component subassemblies. During the manufacturing phase, CAD creates much of the data base necessary for product fabrication and assembly. During the field use and logistic support phase, previous CAD work is available to prepare operation, maintenance and training manuals, product catalogs, spare parts lists and product and subassembly diagrams. These last constitute a partial listing of the life cycle functions making up the focus in achieving the objectives for the study. Appropriate data will be collected to permit the identification and quantification of the impact of CAD on life cycle costs. This will provide sufficient information for the development of a model capable of assessing CAD's impact on life cycle costs.

10:15 REVISITING STATISTICAL ANALYSES TO BETTER UNDERSTAND FLOODS IN OHIO. Colby V. Ardis, Chairman Civil Engineering Department, The University of Toledo, Toledo, OH 43606.

Many power models have been developed to determine the magnitude and frequency of floods at ungaged locations. These models are based on the results from standardized procedures recommended by the U.S. Water Resources Council to determine the magnitude and frequency of floods at gaged sites. The data used in these analyses are annual flood peaks that have occurred during the period of record at a gaging station. Managing water resources systems requires a knowledge of flood flow risk during each month of the year. This research builds on the authors previous research and that of others on the statistics of flood risk analysis. The results obtained developing generalized equations for predicting instantaneous flood peaks during any month of the year on any watershed in Ohio will be presented.

10:30 FLY ASHES AND ACTIVATED CARBON AS COAGULANTS FOR MUNICIPAL WASTEWATER TREATMENT. Howard H. Lo and Julianne Piskura, Department of Geological Sciences, and Yung-Tse Hung, Department of Civil Eng., Cleveland State University, Cleveland, Ohio 44115.

Wastewaters for coagulation study were collected from two plants, Central Wastewater Treatment Plant in Solon, Ohio and Southerly Wastewater Treatment Plant in Cleveland, Ohio. In the Southerly plant, water samples after the primary clarifier stage were collected. In the Solon plant, four different treatment stages: primary clarifiers, secondary clarifiers, tertiary filters, and chlorination were selected for investigation. The effects of flocculation were determined by varying either the dosage or size of the fly ashes and activated carbon, which were added to the wastewaters. The flocculation of the wastewaters from the Southerly plant increased when the fly ashes were added with

increasing dosage and particle size ranges (mesh numbers). Similar results were also noted in the samples of Solon plant, but the levels of increase decreased with increasing cleanliness of the wastewaters. The granulated activated carbon altered the flocculation level slightly, while the powdered activated carbon drastically decreased the flocculation level in the Southerly wastewaters. Similar results were also obtained when the Solon wastewaters were used. However, the level of decrease in flocculation with addition of the powdered activated carbon was less drastic as the cleanliness of the wastewaters increased.

10:45 EFFECT OF HEAVY METAL TOXICITY ON THE ACTIVATED SLUDGE TREAMENT OF WASTEWATERS. Majid Zarrinafsar, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

An activated sludge sewage treatment pilot plant was constructed to determine the operational conditions and kinetic parameters. Using an oxygen meter electrode, the immediate effect of the heavy metal ions Cr(VI), Cd(II), Cu(II), Zn(II), and Ni(II) on the respiration rate of microorganisms in the aeration tank of the pilot plant was measured. This experiment showed that the toxic effect of heavy metal ions is immediate and increases as the concentration of heavy metal ion increases. The order of decreasing toxicity was Cu(II), Ni(II), Cd(II), Zn(II), and Cr(VI). An exponential function of type $Y=A\cdot e^{B\cdot X}$ was defined to approximate the effect of each heavy metal ion on oxygen uptake of the microorganisms. The technique proved to be feasible for toxicity measurement of activated sludge process.

SECTION O. ENGINEERING
AFTERNOON SESSION - MAIN, HOOVER ROOM
SATURDAY, APRIL 25, 1987
R. FRED ROLSTEN, PRESIDING

1:30 SECTION BUSINESS MEETING

1:45 ISOLATION OF THE PRIMARY PROCESSES OF A NUCLEAR MEDICINE HUMAN LIVER STUDY USING EIGENIMAGE FILTERING. James Farison and Antoine Abche, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606; William Potvin and Joe Windham, Department of Radiology, Medical College of Ohio, Toledo, OH 43614.

The liver is a vital organ of the human body. Enhancements to liver imaging using the techniques of nuclear medicine may provide improved diagnostic accuracy, making nuclear medicine studies more competitive with other modalities in the detection of liver pathology. As a necessary step toward this objective, the separation of the local anatomical structures in a human liver study is investigated in this paper. The three structures of interest are the liver itself, and the aorta and vena cava from which the liver draws its blood supply.

The characteristic temporal behavior of each structure in a dynamic 90-second sequence of radioactivity images constitutes the "signature" vector description of each region of interest. The eigenimage filter forms a weighted linear combination of the images in the image sequence such that a selected ROI is enhanced and one or more other regions are suppressed. This paper presents the results of the application of eigenimage filtering to human liver nuclear image sequences. They include the visualization of the vena cava, which is not visible in the images of the original sequence.

2:00 BATCH ANAEROBIC FILTER TREATMENT OF MILK WASTEWATERS WITH BIOAUGMENTATION. Frank Mbachu, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

A bench-scale batch anaerobic filter study was conducted to determine the effect of bioaugmentation with six types of bacterial culture products on the treatment performance of anaerobic filters. The products are LLMO, LLMO 150, Solubac 150 of General Environmental Science; Enviroflow DBC plus; Solybac Hydrobac-AN; and Sybron. The filter media consists of pal rings 5/8" in size and one foot high with 3 inches in diameter.

Parameters examined during the test included gas production rate, total organic carbon (TOC) removal, detention time and type and dosage of bioaugmentation product. The feed TOC ranged from 1500mg/l to 3000 mg/l. Results indicate that bioaugmentation improved the TOC removal by a maximum 16% compared to control reactors without bioaugmentation. Bioaugmentation also improved gas production, an end product of anaerobic destruction of organics.

2:15 OPTIMIZATION TEST OF MEDIA IN ELECTROSTATIC COLUMN. Nian-Fa Tang, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

There are five different media materials in the electrostatic column that is used to remove the color from printing and dyeing wastewater. This paper recommends the the optimization test of media composition in the electrostatic column.

Under the fixed condition of wastewater temperature, the volume of flow, direct current voltage and dye quantity in the influent, five media were chosen as variable factors and a orthogonal test was conducted. A orthogonal list is used in the test design. The standards of appraising the result are color removal percentage and the effluent COD values. The data are calculated in the list.

Although there are five variable factors in the test, sixteen tests were made. A satisfactory result was obtained by using the advanced mathematical method. The relationship between appraisable standard and media variable factors is described in the established degression equations. The result of the test provides a reasonable media compostion and important information for further test.

2:30 ANAEROBIC FILTER FOLLOWED BY AEROBIC ACTIVATED SLUDGE PROCESS FOR TREATMENT OF FOOD PROCESSING WASTEWATER WITH BIOAUGMENTATION. Pi-Chang Jen, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

Anaerobic filter followed by the aerobic activated sludge process were conducted for the treatment of simulated food processing wastewater and for the evaluation of the performance of bioaugmentation. Two anaerobic filters and two sets of four aerobic activated sludge reactor were used in the study. The hydraulic detention time for anaerobic filter was 6 hours. The hydraulic detention time of aerobic reactors were 12, 12, 24, and 36 hours for both sets; 4 reactors were with bioaugmentation, 4 reactors were without bioaugmentation. Results showed the TOC removal by the anaerobic filter was 25.2% in the bioaugmentation filter and 23.7% in the control filter. TOC removal in the aerobic reactor was from 88.8% to 93.7%. The results showed anaerobic and aerobic reactors with bioaugmentation performed better than reactors without bioaugmentation in organic removal.

2:45 BIO-AUGMENTATION APPLICATION TO BIOLOGICAL WASTEWATER TREATMENT. Stylianos A. Zachopoulos, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

A bench-scale laboratory study was conducted to determine the effects of bio-augmentation application to the biological treatment of municipal wastewater. Two continuous flow activated sludge reactor runs and three batch activated sludge reactor runs were conducted. Parameters examined were hydraulic detention time, influent organic strength and bio-augmentation application. Bacterial populations were determined and organic removal constants based on bacterial populations were developed. Results indicate that bio-augmentation improved organic loading rate and nitrification performance, but interfered slightly with the settleability of the sludge during the high organic strength wastewater treatment. Bacterial populations were not related to the mixed liquor volatile suspended solids (MLVSS) concentrations, but were related to the organic loading rate. The organic removal followed a first order reaction in the continuous flow reactors and a zero,order reaction in the batch reactors. The organic removal rates were related to the logarithm of the bacterial concentrations in the mixed liquor.

3:00 ANAEROBIC DIGESTION OF WATER HYACINTHS FOR METHANE PRODUCTION. Majid Zarrinafsar, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

With the dwindling supplies of oil and natural gas, alternate sources of non-fossilized carbon are becoming

increasingly important. Solar energy fixation via the carbon dioxide-photosynthetic cycle is responsible for all forms of carbon based fuels. Problems of carcinogenesis and rising planet temperatures due to the "greenhouse effect" associated with increased coal use are spurring the development of biomass fuels.

There are several fuels that can be generated from green plants. Methane, one of the most useful fuels, is easily generated by anaerobic digestion from almost any organic feed. Of particular interest are aquatic weeds such as the water hyacinth, which can serve a dual purpose. The first use is in wastewater treatment lagoons where they remove large quantities of pollutants. After harvest they are anaerobically digested and produce a biogas containing approximately 60% methane.

3:15 CHAOTIC BURSTING IN ADAPTIVE COMPUTER CONTROL
George Shoemaker and Tom T. Hartley, Dept. of Electrical Engineering, The University of Akron, Akron, OH 44325.

In this paper, a specific example is used to show that bursting in an adaptive control system can be understood as a chaotic phenomenon displayed by the closed loop system. Several generalizations are discussed and suggestions are made on how to eliminate the bursts.
Specifically, the system considered is a simple delay system, y(k+1)=b*u(k), with u(k) being an input at time k, y(k+1) being an output at time k+1, and b being a system gain. This system is chosen due to its simplicity and because it accurately represents any physical system that is being sampled very slowly. For the controller, a simple one-step-ahead controller is chosen, u(k)=yset(k+1)/b(k), where yset(k+1) is a desired output at time k+1 and b(k) is an estimate of the system gain b provided by a parameter estimator. The parameter estimator chosen is the quantized least-mean-squares estimator, b(k+1)=b(k)+sgn(u(k))*(y(k)-b(k)*u(k)). For this particular adaptive control configuration, the closed loop system is nonlinear and it displays a variety of dynamics. The response displayed is a function of the system gain b. If the gain is greater than a certain value, response is stable and convergent. However, if the gain, b, is less than this value, the system demonstrates a somewhat familiar period doubing route to chaos. These results are generalized to more complex systems and to other combinations of controllers and estimators.

3:30 VECTOR REPRESENTATION OF COLORS FROM MULTI-SPECTRAL GRAY-SCALE IMAGES. Seemein Shayesteh and James Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606 and Joe Klingler, Image Analysis Research Center, Medical College of Ohio, Toledo, OH 43614.

This paper presents early results from a project directed to the automated detection and classification of colors and colored objects using only gray-scale images. By viewing a colored picture or object successively through a series of distinct optical filters, a multispectral gray-scale image sequence can be generated. For example, spectral filters for the primary colors (red, green and blue) can be used.

Each color in the original picture or object gives different gray-scale values in the respective images of the multispectral sequence. The set of values for each color constitutes a vector called the signature vector of that color for that set of filters. The signature vector can also be represented in terms of the vector basis formed by the signature vectors of the red, green and blue colors. The signature vector itself, or its representation in the red, green and blue signature-vector basis, can be used to characterize each color. These characterizations comprise a color identification directory by which colors can be detected and identified. Experimental results, including the comparison of these alternative representations, are reviewed. Future directions of research are indicated.

3:45 A CONVENIENT LOW-PASS APPROXIMATION TO (1/f) NOISE POWER SPECTRAL DENSITY. Edwyn D. Smith, Electrical Engineering Dept., The University of Toledo, Toledo, OH 43606.

The approximation consists of a sum of terms with constant gain-bandwidth product. The reciprocals (time constants) of the bandwidths are powers of one second.

$$(\alpha/f) = K \sum_{n=0}^{N} 10^{-n}[1+10^{2(a-n)}f^2]^{-1}$$

The spectrum approaches a constant below 10^{-a} Hz; it behaves as $(1/f^2)$ beyond $10^{(N-a)}$ Hz. The turnover frequencies are changed by adding or omitting terms to the low or high frequency end of the sum. The representation is strict-sense stationary and the autocorrelation function is readily obtained.

$$R(\tau) = \pi/2\ K\ 10^{-a} \sum_{n=0}^{N} \exp[-2\pi|\tau|10^{(n-a)}]$$

The result is especially convenient for investigating problems where one needs mathematically tractable autocorrelation function--for example, problems involving non-stationary noise.

4:00 Finite Element Modeling of Spur Gears.
P. Somprakit, Graduate Student
Dr. M. Pourazady, Associate Professor
Dept. of Mech. Engr., U. of Toledo
Toledo, Ohio 43606

Spur gears have been used widely in many applications such as automobile, aircraft etc.. One of the major failures in spur gears is caused by the large tensile stresses in the root fillets of loaded gear teeth. In the recent years, the finite element method has been applied to determine the stresses and the deformations of spur gears. In the present paper, a mesh generation program has been written in Pascal code to generate the finite element models of spur gears. The stresses and the deformations of these models are determined by using the NASTRAN finite element code. A formula to specify the boundary beneath the gear teeth which has no deformation is defined after several model tests. The optimum finite element model is then constructed by combining the mesh generation program with this formula

4:15 ANALYSIS OF A TWO DIMENSIONAL OPEN LOOP MECHANICAL LINKAGE
K. Lee, Dr. M. Pourazady, Mech. Engr. Dept.
U. Of Toledo Toledo, Ohio 43606

A two dimensional two degree-of-freedom open loop mechanism has been designed and built. The linkage is capable of measuring the grid points of a two dimensional finite element model.
The rotations of the two joints-the base joint and the elbow joint, are sensed by linear potentiometers. This forms the inputs to a program which generates the X and Y coordinates of the points using the Kinematic Equations of the links.
The program also includes linear equations obtained from calibrations to convert electrical signals into angles. The devics is connected to APPLE IIe computer through the Game I/O port and the built-in Analog to Digital converter as the interphase.
To preserve accuracy, the sensitivity of the mechanism is studied by taking partial derivatives of X and Y equations with respect to angular displacements of the joints and the length of the links.
An optimum working space for the rotations of the joints is determined through the sensitivity analysis.

4:30 VERTICAL SPRING CHARACTERISTICS OF FOAM CUSHIONS
S.I. Reger, D.L. Hawthorne, L.P. Vervena, T.F. McGovern/Cleveland Clinic Foundation, 9500 Euclid Ave., Cleveland, Ohio 44106

All materials used in orthopaedics for body support carry the risk of causing soft tissue trauma because of the load transfer at the interface. However, an objective assessment of the support materials for individual need has not been developed. The purpose of this work is to obtain a preliminary comparison of the vertical spring characteristics, or stiffness, of the composite soft tissues (muscle, fat, and skin) near bony prominences with the vertical spring characteristics of common foam support cushions.
METHODS: In vivo soft tissue deformations under three compressive loading conditions were obtained from Magnetic Resonance Images of a normal subject and an L-2 level paraplegic subject lying supine on three inch thick polyurethane foam cushions. The loading conditions were: no compression (unsupported, free-hanging), body weight, and a 10 kg sand bag resting on the right iliac crest for maximum compression. Surface pressure was measured for each load and location, and the soft tissue spring constants were determined. The stiffness of the support cushions were determined using the standard indentation load deflection test.
RESULTS: Thicker tissues were observed in the normal subjects, leading to the conclusion that higher pressure gradients must exist in the paraplegic tissues than in the normal. Bony prominences in the paraplegic tissues "bottomed out" under body weight alone, increasing the risk of tissue trauma. The stiffness of the Durafoam showed a reasonable match to the spring constant of the paraplegic trochanteric area. The performance of the other foam did not match the tested mechanical properties of the soft tissue areas.

4:45 THERMAL RESPONSE OF SOLID ROCKET PROPELLANT SUBJECTED TO HIGH FREQUENCY LOADING.
Krishnamurthy Harish, Dr.Mehdi Pourazady, Dept. of Mech.Engr,W Bancroft St,U. of Toledo,Toledo,Ohio 43606.

Solid Rocket Propellants are basically Viscoelastic in nature. Due to the high speed of the rockets, the solid fuel is subjected to a high frequency loading. This causes

convertion of large amounts of mechanical energy to heat, resulting in high temperatures and consequently, failures at resonant frequencies.

To understand this phenomenon, the thermal response of a viscoelastic rod subjected to cyclic loading is studied. The material considered is a model of a solid rocket propellant. The mathematical model takes the form of a set of Non Linear Coupled Partial Diffrential Equations. The non linearity is caused due to the properties of the viscoelastic material being highly temperature sensitive. They are coupled because the dissipation of energy is stress dependant.

A Computer Program has been developed based on finite differences to solve this non-linear system numerically. The results indicate that a significant temperature increase may occur even at low stress amplitudes.

Thermal conductivity, which is a function of temperature has been considered constant in the methods of solution so far. This program considers a varying thermal conductivity, the results of which indicate that noticable errors occur when thermal conductivity is considered constant.

5:00 A HOVERCRAFT MODEL EXPERIMENT. Nikolaos Kiritsis and R. Fred Rolsten. Wright State University, Main Post Office Box 1604, Dayton OH 45401.

The historical development of hovercraft is reviewed and the various engineering designs are discussed. Systems in current use, commercial, military and recreational, will be presented.

5:15 AN ALUMINUM HOVERCRAFT, Aygun Karakas and R. Fred Rolsten, Wright State University, Main Post Office Box 1604, Dayton, Ohio 45401

Recreational hovercrafts are constructed from light weight materials due to engine weights and power limitations. Historically, nonmetals have been used. As an entry to the Aluminum Association Vehicle Design Competition, a hovercraft was designed with trussed rib construction which was fabricated to take advantage of redundancy. This unit placed 4th runner-up in national engineering design competition in 1985 and placed third in 1986.

SECTION Q. ECONOMICS

MORNING SESSION - CATTELL LIBRARY 49

SYMPOSIUM: CURRENT THEMES FOR OHIO ECONOMIC DEVELOPMENT

FRIDAY, APRIL 24, 1987

LEO E. DOYLE, PRESIDING

9:30 WELCOME - LEO E. DOYLE, SENIOR V.P., UNITED NATIONAL BANK, CANTON, OHIO

9:40 RESEARCH AND DEVELOPMENT ACTIVITIES AND REGIONAL ECONOMIC GROWTH. Marianne T. Hill, Ph.D., Economics Department, University of Akron, Akron, Ohio 44325.

This paper examines regional employment generated by research and development activities, with a focus on the Akron area as a case study. It is found that while in general the processes and products developed at R&D facilities may not affect local production, the research activities themselves affect local skill composition, encourage the growth of local firms servicing the facilities, and attract further R&D investment. A time series linear regression analysis shows the rate of growth of R&D in the Akron area is related to the profitability of the parent company but also to local characteristics. A comparison of Akron with other centers for polymer research reveals that growth rates are related to changes over time in cost variables and in variables reflecting the quantity and quality of research-related institutions in the region.

10:00 TRENDS IN ECONOMIC GROWTH OF NORTHEASTERN OHIO. Richard W. Janson, Vera K. Pavlakovic and Dale S. Borowiak. The Janson Industries, 1200 Garfield Avenue SW, Canton, Ohio 44706.

The analysis of trends in American economic growth have been definitively researched by Edward Denison of the Brookings Institute (1986). A similar analysis at the regional level has not received equal attention. The same concepts of potential growth and actual growth are utilized at the regional level to assess the trends of economic growth for northeastern Ohio. The application of Denison's series to the region requires estimation procedures for the major variables. The study assumes that estimation of regional data from the survey based national data will yield reliable conclusions.

The determinants of regional economic growth are evaluated, including productivity change, levels of resource use (labor and capital), change in the quality of resources (education), and residual determinants that represent advances in the application of knowledge, both technical and organizational (innovation). The performance of northeastern Ohio is compared with the national performance.

10:20 THE STARK COUNTY DEVELOPMENT PERSPECTIVE. Mr. Roland L. Theriault, Stark County Development Board, 800 Savannah Avenue NE, Canton, Ohio 44704.

The perspective of the Stark County Development office is presented. Case studies of actual firm expansions are discussed to emphasize the needs and problems of entrepreneurs undertaking new ventures and facing actual or potential markets.

Product development is the key to success in nearly all of these small start-up companies. The product must fill a market niche and the feedbacks from customers must be continuously considered to assure market expansion.

10:40 AN ENTREPRENEUR'S VIEW OF THE PLASTICS INDUSTRY. Robert L. Miller, President. Northern Ohio Engineering Co., 3476 Greenwich Road, Barberton, Ohio 44203.

The perspective of several decades of involvement in the plastics industry is presented, which was garnered through start-up of over 100 extrusion plants in the United States and all over the world. Present activity includes investment in six on-going manufacturing operations in Ohio and Florida.

The mechanism for starting an operation is discussed. This includes a technical approach, a salable product, the agreement among investors, defining the function and agreement with the manager, and financial controls for investors.

Rapid changes now underway within the industry are discussed. These include: (1) changing supply agreements with the major manufacturers; (2) changing product markets, especially engineered plastics where product performance is specified and the polymers and composites are engineered to correspond; (3) shortening product cycles that require continuous adaptation.

11:10 THE UNIVERSITY'S CONTRIBUTION TO RESEARCH AND THE EDUCATION OF LEADERSHIP FOR THE TWENTY-FIRST CENTURY. Martin G. Giesbrecht, Wilmington College, College Street, Wilmington, Ohio 45177.

Research universities working on the frontiers of science have often been cited as a major reason for the location of high tech industries in the Boston and Silicon Valley areas.

How do Ohio universities compare? Our political legitimization, and their curricular program, their research projects, and their faculty are evaluated. Some improvements are suggested.

11:30 LABOR MANAGEMENT COOPERATION IN OHIO. Janet Goulet, Wittenberg University, Post Office Box 720, Springfield, Ohio 45501.

Cooperation between labor and management leads to increased productivity. Labor/management cooperation plans have been tried at all levels of organizations and many have been successful. Many of these participative management plans are so structured that they can be applied in a variety of work settings. The State of Ohio is establishing regional centers to support the transfer of the cooperative skills to Ohio work places. These centers are located throughout the state and their goals and programs will be highlighted.

12 NOON - LUNCHEON
MAIN, HOOVER ROOM

SECTION Q. ECONOMICS
AFTERNOON SESSION - CATTELL LIBRARY 49
SYMPOSIUM: CURRENT THEMES FOR OHIO ECONOMIC DEVELOPMENT
FRIDAY, APRIL 24, 1987
LEO E. DOYLE, PRESIDING

1:00 A BOLD COMMITMENT. Mr. Lee Sholley, The Timken Company, 1835 Dueber Avenue SW, Canton, Ohio 44706.

The Timken Company has made a major commitment to the future of Stark County and Ohio by investing $450 million in its new steel plant. This substantial capital investment assures the Timken Company very high productivity with tap to tap times of less than two hours as contrasted to the traditional six hour cycle.

The various factors included in the decision to proceed with a project of this magnitude were market place assessment, technological innovation, and contemporary labor/management practices.

1:45 THE ROLE OF STATE GOVERNMENT IN FACILITATING BUSINESS TRANSITION. Marianne Hudson and Larry McGeehan. The Thomas Edison Program, Division of Technological Innovation, Department of Development, State of Ohio, P. O. Box 1001, Columbus, Ohio 43266-0101.

The State of Ohio has been a national leader in forging linkages between the business community and the universities. These policy initiatives address the need for continuous technological changes that characterizes the present manufacturing context. Severe global competition is accepted as the norm.

The Edison program of the State of Ohio has established specialized technology centers that are distributed around the state to maximize regional comparative advantage. All of the centers are intended to have world-class potential as research centers. Those centers related to manufacturing provide technology transfer for Ohio firms that are undergoing transition to modern manufacturing methods.

2:15 ROUND TABLE DISCUSSION
DISCUSSANTS:

DALE S. BOROWIAK	RICHARD W. JANSON
LEO E. DOYLE	PAT MATTHEWS
JOSEPH E. EZZIE	LARRY MCGEEHAN
MARTIN G. GIESBRECHT	ROBERT MILLER
JANET GOULET	VERA K. PAVLAKOVIC
MARIANNE T. HILL	BARBARA SHERMAN-ROLLESTON
MARIANNE HUDSON	

SECTION R. ECOLOGY
FIRST MORNING SESSION - TIMKEN SCIENCE HALL 180
SATURDAY, APRIL 25, 1987
HORTON HOBBS, PRESIDING

9:00 **MIAMI WHITEWATER PRAIRIE: A MODEL FOR ECOSYSTEM REESTABLISHMENT** Kim Lutz, Dept. of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006

A seven-year old established prairie was compared with six local relic prairies. The site is unique in that the prairie area is adjacent to a successional old field. The major objectives of the project were as follows: 1) survey of the vegetation, 2) statistical comparison of survey data with relic prairies, 3) determination of prairie stability. Survey data indicates the grasses Sorgastrum nutans and Panicum virgatum dominate the prairie in terms of both importance value and biomass. Many old field species have also assumed dominance in the prairie. Community indices used to determine the similarity of the established prairie to relic prairie data indicate that the established prairie closely resembles mesic prairies in terms of species composition but not in terms of species diversity. Stability was assessed in terms of soil composition and net productivity. Soils in the established prairie were identical to soils in the surrounding forest. Net productivity of dominant species was positively effected by removal of litter, but adversely effected by disturbance.

9:15 STUDY OF GARBRY'S BIG WOODS AQUATIC HABITATS. Deborah Marr and Mark Favorite, Edison State Community College, 1973 Edison Dr., Piqua, OH

This study involves a comparison of three fresh-water habitats--two ponds (one permanent and one temporary) and a creek through the month of July, 1986. It was the intent of this study to inventory the biotic and abiotic data of these habitats for future reference studies of the area. These aquatic habitats are located on land owned by the Miami County Park District. The data, biotic and abiotic, were gathered through various techniques. Included is identification of major macro-invertebrates, macro-vertebrates, and a few micro-invertebrates. Limited abiotic water factors are included. The identification of collections were taken from phylum to genus and some to species. The result of this work indicates that these systems, at this time are healthy and stable. They are excellent examples of three different aquatic ecosystems characteristic of this region of west central Ohio.

9:30 **A COMPARISON OF BEHAVIOR IN 14 OHIO BOG AND FEN WETLANDS. Ralph J. Garono.** Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

The Ohio Department of Natural Resources has acquired more than 5,500 hectacres of land since 1970 at a cost of more than five million dollars. Assessment of habitat quality and methods of management of these areas has been of increasing concern. During the summers of 1984 and 1985 over 37,000 adult caddisflies (Trichoptera) were collected using ultraviolet light traps at fourteen Ohio remnant bog and fen wetlands. One hundred and forty two species were collected and placed into the following eight trophic categories: collector, detritivore, filterer, gatherer, piercer, predator, scraper and shredder. An attempt was made to assess habitat characteristics and homogeneity using caddisfly trophic categories as state variables in comparing the wetland behavior trajectories.

9:45 PRELIMINARY REPORT ON THE EFFECTS OF SURFACE MINING ON THE TRICHOPTERA OF STILLFORK SWAMP NATURE PRESERVE, CARROLL COUNTY, OHIO

JOHN D. USIS, Department of Biological Sciences, Kent State University, Kent, Ohio 44242

Investigations commenced in 1986 into the effects of surface mining on the caddisfly community inhabiting Stillfork Swamp Nature Preserve. The Blum Coal Company began mining activities on November 26, 1985. The permit site is located approximately one mile upstream from the Swamp and will be in operation for several years. Because pre-preturbation baseline data were available and provide a comparative source for evaluating species changes, a long term study (1986-89) was undertaken to quantify changes in the structure of this wetland's caddisfly community. Weekly light trapping made at three collection sites located within the Preserve have been utilized to evaluate changes in trichopteran community composition during the adult emergence period of 1986. Both larval collections and water quality measurements made at various distances downstream from the permit site suggest that distributional and abundance changes have occurred. Although Trichoptera have proven to be viable water quality indicators for many lotic environments, their suitability as quality indicators for wetland environments under stress has not been previously evaluated.

10:00 GROWTH AND ABUNDANCE OF MAYFLY AND STONEFLY NYMPHS SUBJECTED TO HYDROPOWER PEAKING FLOWS. Neal D. Mundahl, Miami University-Middletown, 4200 E. University Blvd., Middletown, Ohio 45042.

Growth and abundance of Ephemerella subvaria, E. invaria, and Isoperla signata nymphs were examined at five riffle sites near a hydroelectric power plant on the Sturgeon River in Michigan's Upper Peninsula. Growth and abundance ($51/m^2$) of E. invaria nymphs were similar at sites above and below the plant. Growth of I. signata nymphs was similar at all sites, but nymphs were 6X more abundant ($46/m^2$ vs. $7/m^2$) below the power plant. E. subvaria nymphs grew more slowly, but were 4X more abundant ($136/m^2$ vs. $33/m^2$), below the power plant. Growth rates of E. subvaria increased as distance below the plant increased, but at 10 km below the power plant were still lower than those above the plant. Changes in water temperature, current velocity, and/or food availability associated with intermittent power plant operation may affect differentially the growth and abundance of macroinvertebrate species living downstream.

10:15 THE IMPACT OF THE VILLAGE OF HIRAM RAPIDS ON THE WATER QUALITY OF THE CUYAHOGA RIVER. ANNA BASS. Department of Biology, The University of Akron, Akron, OH 44325.

Benthic invertebrates were used as indicators of water quality. To investigate possible pollution of the upper Cuyahoga River with household wastes from Hiram Rapids, two sites were selected about 2 km apart, one upstream and one downstream from the village. Each site was sampled once in the spring and once in late summer using a modified shovel sampler. Samples from spring showed 36 taxa upstream, compared to 25 downstream, and in summer the number of taxa was greater at the downstream site - 33 taxa, compared to 28 upstream. However, the Shannon-Wiener index for the upstream sample was 2.99, while the downstream value was 2.56. The spring sample showed a Shannon-Wiener index of 3.75 upstream and 3.67 downstream. In all cases, the downstream samples contained a greater proportion of organic pollution tolerant organisms; this and the lower Shannon-Wiener indices suggest a decrease in water quality at the downstream site, although it is difficult to determine how much of the difference should be attributed to variations in substrate and how much to the effects of the residential area between the two sites.

10:30 RECOVERY OF BENTHIC MACROINVERTEBRATES AND FISHES IN A FLY ASH RECEIVING STREAM FOLLOWING PH CONTROL CHANGES. Rob J. Reash, American Electric Power, Environmental Engineering Division, 1 Riverside Plaza, Columbus, OH 43216.

Prior to 1975, Stingy Run was a third-order tributary of Kyger Creek, which empties into the Ohio River at Mile 260. In 1975, Stingy Run was impounded to form a fly ash pond which contains fly ash sluiced from Ohio Power Company's James M. Gavin coal-burning power plant. During 1975-1982, pH control of the alkaline discharge was maintained by addition of sulfuric acid, which caused precipitation of metal oxides and subsequent substrate coating. Instream biological sampling indicated low taxa richness ($\bar{x}$ = 2.1 taxa/sample) and total abundance of macroinvertebrates ($\bar{x}$ = 69 individuals/sample) during this period. Carbon dioxide injection replaced acid feed as pH control treatment in August, 1982. Following elimination of the substrate floc, taxa richness ($\bar{x}$ = 5.1 taxa/sample) and total abundance ($\bar{x}$ = 928 individuals/sample) of macroinvertebrates increased significantly ($P<0.01$) from pre-CO_2 treatment samples. Variability of instream pH was significantly lower ($P<0.01$) after CO_2 injection began. Fish species richness and total abundance appears to be increasing in recent stream samples. Estimated population densities of three macroinvertebrate taxa have increased since 1983. Some physicochemical variables were significantly correlated with macroinvertebrate sample data.

10:45 SUMMARY OF WATER QUALITY AND BIOLOGICAL CONDITION IN OHIO STREAMS SURVEYED BY THE OHIO ENVIRONMENTAL PROTECTION AGENCY UP TO 1985. Theresa Heitzman, Division of Water Quality Monitoring and Assessment, Ohio EPA, P.O. Box 1049, Columbus, Ohio 43266-1049.

Ohio EPA biannually evaluates the water quality and biological condition of its navigable waters in accordance with Section 305(b) of the Clean Water Act. Seventy percent of the 6,813 stream miles evaluated were based upon biological data. Of these stream miles evaluated, 60 percent (4,091 miles) are attaining their aquatic life use designations; 30 percent (2,043 miles) are partially attaining their use and 10 percent (679 miles) are not attaining their aquatic life use designations.

Of the 2,722 stream miles determined not to be fully achieving the fishable/swimmable goal, 36 percent were affected by municipal discharges, 16 percent were affected by industrial discharges, 11 percent were affected by combined sewer overflows, and 5 percent were altered due to effects of channelization. Various nonpoint source problems which often occur in combination with each other and point source degradation, contributed to approximately 25 percent of the non-attainment of aquatic life use designations. The remaining 7 percent were affected by natural or unknown conditions.

SECTION R. ECOLOGY

SECOND MORNING SESSION - TIMKEN SCIENCE HALL 160
SATURDAY, APRIL 25, 1987
LOWELL ORR, PRESIDING

9:00 DISTRIBUTION AND ABUNDANCE OF SUBTIDAL POPULATIONS OF THE SNAIL LITTORINA LITTOREA AT CAPE ANN, MASSACHUSETTS. Ralph W. Dexter, Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Following a controversy on whether Littorina littorea is an introduced European species or a native American species, many now accept the belief that it was both. Genetic vigor from both strains may explain the population explosion and its migration down the east coast from Halifax, Nova Scotia, to Maryland. Subtidal populations at Cape Ann during 1935-37 and 1956-61 were as follows: both Ipswich Bay and Gloucester Harbor had small populations at all times; South Branch of the Annisquam Tidal River had the largest population, especially during 1957-60; North Branch had the second largest population, especially in 1957 and 1959; Little River, at the junction of North and South Branches, fluctuated from moderate to none, but was largest in 1957. Best years were 1957-59; poorest years were 1937, 1956, and 1961. Shallow water with solid bottom materials were most favorable for subtidal populations. Intertidal populations have been reported previously.

9:15 HABITAT SELECTION AND MOVEMENTS OF THE EASTERN BOX TURTLE, TERREPENE C. CAROLINA IN MIAMI WHITEWATER FOREST, HAMILTON COUNTY, OHIO. Nadine A. Martin, Dennis L. Claussen, and Paul M. Daniel, Department of Zoology, Miami University, Oxford, Ohio 45056.

A study site of approximately 10.6 hectares containing both grassland and woodland habitats was mapped. Five box turtles were captured within the study area in the spring of 1986 and taken to our laboratory. The turtles were immobilized and a radiotransmitter was attached with fiberglas to the posterior carapace of each animal. The turtles were returned within 24 hours to the exact point of capture. We visited the study area at approximately weekly intervals and attempted to locate each turtle via radio-tracking. When a turtle was found, we recorded its exact position, noted its behavior, and described its immediate habitat. The position data were used to map the

movements of each turtle. In a few instances we were able to localize the transmitter signal within a small area but were unable to find the turtle. These "finds", representing about 15% of the total, were mapped as approximations. Although we temporarily lost the signal from one or more turtles on occasion, we obtained good records of movements and habitat usage of these five animals. Other turtles captured within the study area provided additional data.

Our results indicate marked seasonal variation in the movements and in the habitat usage of the Eastern box turtle. This apparent pattern, however, is obscured by individual variation among these reptiles.

9:30 A NEW SALAMANDER SPECIES FOR WEST VIRGINIA: DESMOGNATHUS WELTERI. Eric C. McCleary and Lowell P. Orr, Dept. of Biological Sciences, Kent State University, Kent, OH 44242.

Earlier studies by investigators in our lab on a salamander community at Camp Creek State Park in southwestern West Virginia revealed a population of uniformly gray desmognathine salamanders that did not fit the description of other salamanders of the genus Desmognathus already described for West Virginia. In this study we determined the taxonomic status of this population to be D. welteri by making morphological and electrophoretic comparisons between it and its sympatric congeners, D. fuscus and D. monticola, and with a population of D. welteri from its holotype locality in Harlan County, Kentucky. Although the gray individuals in the West Virginia population differed in dorsal coloration from most of the highly variable D. welteri from Kentucky, the former exhibited no significant differences from the Kentucky D. welteri in morphological characters in larvae or adults. Electrophoretic comparisons also revealed no significant differences in allele frequencies between the two populations. A rapid survey of other areas in West Virginia indicated that D. welteri is found as far east as Pocahontas County and as far north as Gilmer County.

9:45 EVIDENCE OF THE TEN-YEAR CYCLE IN SCIURIDAE OF MINNESOTA AND THE PRAIRIE PROVINCES. John F. Wing, Department of Psychology and Nathan J. Bolls, Department of Biology, Wittenberg University, P.O. Box 720, Springfield, Ohio 45501.

Autocorrelation and spectral analyses by Finerty (1980) have identified 10-yr cycles in at least eleven mammals from five different families: the LEPORIDAE, MURIDAE, CANIDAE, MUSTELIDAE, and FELIDAE. Now the family SCIURIDAE can be added to this list. Using cosine and autocorrelation analyses Erlien and Tester (1984) found significant 8-11 year cycles in four of five sciurids from northwestern Minnesota trapped annually from 1954-1975: Spermophilus tridecemlineatus, S. franklinii, Eutamias minimus and Tamiasciurus hudsonicus. Their results for T. hudsonicus agree closely with our own re-analyses of Kemp and Keith's (1970) data on fur returns for this species in Alberta, Saskatchewan and Manitoba for 1931-1967. Using the recently developed contingency periodogram (Legendre et al, 1981) we found a significant ten-year cycle in the residual of fur returns for Alberta ($p<.01$) and Saskatchewan ($p<.05$) and a near significant cycle in Manitoba ($p<.10$). Also, these overlapping time-series for Minnesota and the Provinces showed coherency of peaks with significant ($p<.01$) intercorrelations ranging from $r = .43$ to $r = .81$. Thus, the cycles have been in near unison over an area of 650,000 square miles (a quarter of this species' range).

10:00 POSSIBLE CAUSES OF THE TEN-YEAR CYCLE IN TAMIASCIURUS HUDSONICUS. John F. Wing, Department of Psychology and Nathan J. Bolls, Department of Biology, Wittenberg University, P.O. Box 720, Springfield, Ohio 45501.

A 10-yr cycle in T. hudsonicus (Erlien & Tester, 1984; Wing and Bolls, 1987) has been shown to exist for several cycles over a significant portion of its range. What could cause this? Kemp and Keith (1970) eliminated chance and market price as causes. Here we give evidence against Keith's (1974) "buffered prey" hypothesis (as applied by Erlien and Tester) which says a predator (e.g., Lynx canadensis) might induce a 10-yr cycle in sciurids by shifting to them as prey during cyclic lows in Lepus americanus. By comparing time series for these species, we show predation probably influences but does not induce the cycle. Instead, the cycle may work up from the bottom of the trophic pyramid in a climate→plant→consumer sequence. Evidence for this comes from: Lester (1967) who reports that high temperatures and low rainfall in the summer of bud differentiation increases cone crops; Kemp & Keith (1970) who report that July temperature in Alberta correlates positively ($r=.807$, $p<.04$) with regional cone crops whereas rainfall correlates negatively ($r=-.649$, $p<.09$); and their report that the cone crops correlate positively ($r=.911$, $p<.01$) with Alberta fur returns. Here we report further significant correlations between regional climate and fur returns ($r=.273$ to $r=.577$, $p<.05$) and we speculate regarding the solar cycle as the ultimate source of the 10-yr cycle.

10:15 THE ROLE OF INSECTS IN THE OAK REGENERATION PROBLEM. S. L. Wright, J. R. Galford, and J. W. Peacock. Forestry Sciences Laboratory, 359 Main Road, Delaware, OH 43015.

As Ohio's oak forests are harvested, the species composition of many stands are changing to less desirable commercial tree species. This phenomenon is caused by inadequate amounts of oak regeneration present before a harvest. Entomologists are presently examining the role of insects in the oak regeneration problem.

Studies have shown that weevils of the genus Curculio cause significant losses to acorns each year. Recently, several additional insect species have been shown to damage germinating acorns. Other insects damage young seedlings, and insect defoliators cause loss of growth and vigor of young seedlings. Consequently, seedlings cannot compete with other tree species. While the harmful effect of any one insect species may be minimal, the cumulative effect is detrimental to potential oak regeneration.

Scientists have demonstrated that prescribed burning in forest plots in southeastern Ohio reduces populations of some oak insect pests. At least in the short term, burning reduces the numbers of Conotrachelus posticatus and Stelidota octomaculata, two insects that destroy germinating acorns.

10:30 GROUP FORAGING IN A COOPERATIVELY SOCIAL SPIDER. Ann L. Rypstra, Miami University, 1601 Peck Blvd., Hamilton, OH 45011

The spider species, Anelosimus eximius (Araneae; Theridiidae), builds large basket shaped webs in the undergrowth of tropical moist forest habitats of South America. Each web is occupied by a few to several hundred individuals who cooperate in most activities. Observations of webs of a population living in SE Peru indicate that cooperative foraging allows the spiders to subdue insect prey larger than they could otherwise handle. Experimental data indicate that there is an optimum group size that allows spiders to minimize the handling time of particular insect species. However, in most natural colonies, the optimum group size is exceeded and there is active competition for food which increases prey processing time.

10:45 THE EFFECTS OF VARIATION IN VEGETATION STRUCTURE ASSOCIATED WITH FERTILIZER AND SLUDGE APPLICATION ON THE WEB-BUILDING SPIDER COMMUNITY. Karen R. Cangialosi, Elizabeth A. Beach, and Marilyn Lutz. Dept. of Zoology, Miami University, Oxford, OH 45056.

The web-building spider community was monitored in plots in a mid-successional field subjected to various treatments. Treatments consisted of application of sludge and fertilizer and were compared to untreated controls. Although no significant differences were found in total spider abundance in the three areas, the relative proportions of spiders in different families differed significantly between treatments. This difference in spider family composition appears to be related to changes in vegetational structure associated with the application of sludge and fertilizer in the plots. Plant height, density, and species diversity all differ between the two treatments and the control and are correlated with the changes in the composition of the web-building spider community.

SECTION R. ECOLOGY
FIRST AFTERNOON SESSION - TIMKEN SCIENCE HALL 180
SATURDAY, APRIL 25, 1987
PETER FRALEIGH, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 ECOLOGY KEYNOTE SPEAKER
MICHAEL C. MILLER
THE BALANCE OF ECOLOGY AND DEVELOPMENT IN THE ALASKAN ARCTIC

3:00 FACTORS AFFECTING THE GROWTH AND NET PHOTOSYNTHESIS OF SCORPIDIUM SCORPIOIDES IN AN ARCTIC LAKE. Schneider, J.R., Dept. of Biol. Sciences. U. of Cinn., Ohio 45221.

In an arctic kettle lake on the N. Slope of Alaska, the growth and photosynthetic rates of submerged mosses are limited by such factors as light, temperature and nutrient availability. Normally, the pleurocarpous moss, Scorpidium scorpioides, is limited to the top 2m of a partitioned arctic lake. One side of this lake has received 5X the normal nutrient budget of N and P for two summers; the other has served as the control. The nutrient addition caused increased apical growth and branch length during the short arctic growing season. In addition, the net photosynthesis, measured as the production of oxygen and the incorporation of $^{14}CHCO_3^-$ in the branches, was restricted to the apical growing tips (ca. 1-3 cm). Within each lake section, the growth and primary productivity of this species was reduced by decreased light intensity much more than by decreased temperature or increased nutrient availability. With the ability of S. scorpioides to sequester nutrients from the water, its restricted depth distribution is best explained by the short growing season and reduced light penetration during the nine month winter.

3:15 NUTRIENT LIMITATION OF EPILITHIC ALGAL PRODUCTION IN A PHOSPHORUS AND NITROGEN ENRICHED ARCTIC RIVER, George G. Gibeau, Jr., Bernard J. Moller, and Michael C. Miller, Dept. of Biolgy, University of Cincinnati, Cincinnati, Ohio 45221

Algal species are known to respond to certain nutrients as noninteractive essential resources (Tilman), and their growth is thus limited by the nutrient in least supply relative to needs. All field studies were conducted on the Kuparuk River, a meandering 4th order tundra stream located on the north slope of the Brooks Range, Alaska (68° N), which received whole stream additions of PO^4 and PO^4 + NH^3 at stations 1 km apart. During the ice free season of 1986 plastic vials containing agar supplemented with one or more nutrients and sealed with a porous disk (2.6 cm dia) were anchored at 4 stations on the river bottom and sampled 3 times after 3 week incubation periods from July 1 to Aug 5. Treatments were: control, PO^4, trace metals, humics & PO^4, NO^3, PO^4 & NO^3, and vitamins. In the PO^4 enriched region of the river there was no increase in net productivity by PO^4 measured as chlorophyll biomass and ^{14}C production. However, there was an increase in the assay vials containing both N&P and N alone. The N&P enriched section of the river showed an overall increase in net productivity by 5-10 X over the control stations. There also appeared to be an effect with trace metals, in all experimental sections.

3:30 NITROGEN AND PHOSPHORUS DYNAMICS IN AN ARCTIC RIVER. Miller, M.C., Moller,B., Lock*, M. & Gibeau, G. Department of Biological Sciences, U. of Cincinnati, Ohio 45221 and *University of N. Wales Bangor, Wales, U.K.

The nutrient dynamics of the Kuparuk River(68N) on the N. Slope of the Brooks Range of Alaska has been part of a systematic study of the effects of PO_4^{-3} and NO_3^{-1} enrichment on the primary and secondary production since 1983. During the ice free season PO_4^{-3} limits attached algal production (N:P molar ratios >15); however in some years(1985) dissolved inorganic nitrogen has be rate limiting. Normally $[NO_3^{-1}]$ was inversely related to discharge, while $[PO_4^{-3}]$ was not related to discharge. Continuously added PO_4^{-3} and NH_4^{+1} is utilized by attached flora in 10-14 km, depending upon discharge. The response of the attached flora was a 10X increase in 1983 and 1984, but only a 2-3X increase in 1985 and 1986. Other nutrients were tested in bioassays, but no others could cause the observed difference. Apparently, the density of grazers has increased with a 2 year time lag, consuming algae and sloughing them into the passing water.

3:45 THE SPATIAL DISTRIBUTION OF DIATOMS (BACILLARIOPHYCEAE) IN LEAFPACKS IN A STREAM, Phyllis Balcerzak, Department of Biological Sciences, Kent State University, Kent, Ohio, 44242

Leafpacks are utilized by stream insects as a habitat and food resource. These leafpacks provide a source of food through microbially conditioned detritus and algal (diatom) growth on the leaf surfaces. It was determined in this study, carried out in Bixon Creek, Portage County, Ohio, that algal growth is not uniformally distributed throughout a leafpack. The number of diatoms in the downstream portion of the leafpack are significantly greater than the number in the upstream part of the leafpack. The effect of leafpack stability on the distribution and abundance of diatoms is being considered as a possible explanation.

4:00 THE PREDATORY EFFECT OF BACTERIA ON BLUE GREEN ALGAE. Earl C. Heath, Jeffery C. Burnham and Peter C. Fraleigh, Medical College of Ohio and University of Toledo, Ohio 43699.

Previously Burnham, et. al. (1981, 84), Mahoney, et. al., (1986) and Heath, et. al. (1986) found that some bacteria will prey upon certain blue green algal species (cyanobacteria). The purpose of two laboratory studies, involving cultures, was to find bacterial predators that are effective on certain blue green algae species but that will not harm green algae species. In unialgal or mixed algal cultures the bacterial predator Myxococcus fluvus strain BG02 lysed Nostoc muscorum, however, it did not lyse Aphanizomenon flos aquae or Scenedesmus obligatus. The Actinomycetes strain P30 lysed Aphanizomenon and had no effect on Scenedesmus in either unialgal or mixed algal cultures. The results of this study indicate that selective predation occurred with the BG02 lysing the Nostoc and not Scenedesmus, and with P30 lysing Aphanizomenon but not Scenedesmus. Thus it appears that the bacterial predators BG02 and P30 hold promise of being used for selective control of blue green algal growth.

SECTION R. ECOLOGY
SECOND AFTERNOON SESSION - TIMKEN SCIENCE HALL 160
SATURDAY, APRIL 25, 1987
STEPHEN DIAKOFF, PRESIDING

3:00 EVALUATION OF THE LEVEL OF RESISTANCE OF MICROBIAL POPULATIONS ISOLATED FROM BIOCIDE-TREATED COATING COMPONENTS
By Valerie R. Flechtner, Department of Biology, John Carroll University, Cleveland, Ohio 44118

The use of biocides by the coatings industry to prevent the growth and deleterious effects of microorganisms is common practice. To be cost effective, biocides are used at the minimum concentration capable of inhibiting microbial growth. Despite the use of biocides, microbial contamination can occur in both raw materials and in finished coating products. Contaminated samples of latex, clay slurries and latex paint were supplied by a local manufacturer. Although all samples contained commercial biocides, each was contaminated with a mixed population of microorganisms. The most heavily contaminated latex sample was discolored and had a sulfurous odor. This sample yielded four different types of bacteria and a filamentous fungus. Using this contaminated latex as inoculum, the biocidal activity of Proxel and Kathon, two commercially available biocides used by the coatings industry, was evaluated. While both compounds were biocidal at concentrations as low as 25ppm when assays were performed using nutrient broth as the cultivation medium, neither compound

was completely biocidal at concentrations as high as 1000ppm when latex solutions or latex paint were used as cultivation media. The organisms used for challenge were not those routinely used for biocide evaluation.

3:15 THE OPTOMOTOR RESPONSE IN AQUATIC TOXICOLOGICAL STUDY Susan J. MacMillan and David W. Waller Department of Biological Sciences, Kent State University, Kent, Ohio 44242

The optomotor response allows a fish to hold its position in relation to nearby stationary objects, by moving to retain its initial position. Under laboratory conditions this tendency is translated into following behavior when a pattern of stripes is moved past the fish. By using a simple, portable apparatus the optomotor response can be used to measure how a chemical, in particular those contaminating natural waters, affect neural function in fish. In our studies, the fish was placed into a 1-gal glass jar suspended inside a patterned bucket. The bucket was rotated on a turntable device at 15 rpm. The following exhibited was recorded while looking into the jar from above. All "quarter-turns" made were recorded through 3-min trials. We subjected Fathead Minnows (Pimephales promelas, a common toxicological study species) to acute topical exposures to varying sublethal concentrations of pentylenetetrazole (ranging from 2 ppm to 60 ppm for 96 hr), of ethanol (ranging from 1 ppt to 10 ppt for 3 min), and of atrazine (10 ppm to 16.9 ppm for 96 hr). Several variables (number and sequence of episodes, number of quarter-turns in pursuit, pursuit less counter quarter-turns) were examined to characterize performance. Pentylenetetrazole increased following by exposed fish while ethanol decreased following. Atrazine, a common agricultural herbicide, decreased following but did not block it.

3:30 NEW CHAMBERS FOR MEASURING IN SITU SEDIMENT OXYGEN DEMAND IN SHALLOW STREAMS. Barbara Kooser and Eric Pineiro-Carrero. Ohio EPA, Water Quality Modeling P.O. Box 1049, Cols., O 43226

Benthic or sediment oxygen demand (SOD) is a variable in many models, such as QUAL2E, which simulates instream dissolved oxygen (D.O.) content. We have developed chambers to measure in situ SOD and benthic productivity. An opaque chamber is constructed with 9" diameter pvc pipe (1/4" thick). 1/4" pvc sheeting seals the top of the chamber, leaving a hole for a D.O. probe. A flange allows 1 1/2" of the cyinder to be inserted in the sediment, isolating a column of water 8" tall above the sediment surface. To prevent oxygen stratification in the chamber, a submersible bilge pump is attached to the side of the chamber with one intake and two outlet ports approximately 2" from the top. A rheostat is used to set in-chamber water velocity approximately equal to stream water velocity. Clear chambers have a similar design but are built from 1/8" thick lucite pipe and 1/4" thick lucite sheeting. In the field the D.O. level is monitored for 2 hours or until a drop or rise of 2 mg/l of D.O. is seen. Unlike commercial SOD chambers, our chambers are small, easily field portable, fairly simple to set up and monitor and can be used in water as shallow as one foot. Results from in situ measurements will be discussed, as well as the advantages and disadvantages to our chamber design.

3:45 POLLUTION--SOME RECENT ASPECTS OF POLLUTION. Bruce V. Weidner, Miami University, Department of Chemistry, Oxford, OH 45056.

A member of the National Oceanic and Atmospheric Administration has suggested that a blanket of soot may be raising temperatures around the North Pole. A member of the Hubbard station in New Hampshire has suggested that the effect on "vegetation" may be due to climatic conditions. A recent find about Camel's Hump in Vermont will be discussed. Some data collected in Nova Scotia and Newfoundland in summer of 1985 will be presented along with a summary of data collected in the United States and Canada since June of 1977 which is over 3000 samples of rivers, lakes, ponds, etc.

4:00 BIOLOGICAL AND PHYSICOCHEMICAL BASELINE DATA FOR SELECTED OHIO CAVES. Naomi Mitchell and H. H. Hobbs III. Department of Biology, P.O. Box 720, Wittenberg University, Springfield, Ohio 45501

Monthly samples were obtained from Freeland's Cave, Meigs Township, Adams County, Ohio beginning November 1985. This is one of the state's most significant caves based on its size (708m total horizontal length) and the diversity of its aquatic and terrestrial faunas. Biota and physicochemical parameters were sampled along the front 300m of stream passage. Most of these factors exhibited a definite gradient, with minimal variations in the interior (entrance and deep cave relative humidity values exhibit a range of 73-88% and 95-100%; air temperatures -2-22.8°C, 7.9-12.6°C; and water temperatures, 7.6-15.0°C, 7.9-12.6°C). The composition of the fauna was seasonal, the invertebrates being most active and abundant during the warmer months. The salamander, Eurycea longicauda Green, also was a conspicuous component of the community at this time. During the cooler months fewer invertebrates and salamanders were seen, but bat populations increased. Additional smaller (less than 100m) caves in Adams, Brown, Erie, Highland, Pike, and Seneca counties were also investigated. All supported a lower number of cavernicoles, but demonstrated a similarly stable and predictable environment. Research for this study was supported in part by grants from the Ohio Department of Natural Resources and Wittenberg University.

SECTION S. INFORMATION AND LIBRARY SCIENCES

MORNING SESSION - CATTELL LIBRARY 26
SATURDAY, APRIL 25, 1987
MARIAN D. WINNER, PRESIDING

9:00 **ELECTRONIC TECHNOLOGY AND ACADEMIC LIBRARIES. Margaret B. Guss, Bierce Library, University of Akron, Akron, OH 44325.**

This paper describes the stresses and coping attempts of academic libraries to satisfy users' ever growing demands for information on a universe of subjects. The academic library's dilemma results from the university's traditional compartmental organization and its planning process, the explosion in the quantity and cost of information, and the actions of private information providers. The relationships among these elements in determining the impacts of computing upon the library as an institution and upon its services are explored; the framework for the relationships among the actors and impacts is taken from the article by James N. Danziger, "Social Science and the Social Impacts of Computer Technology," Social Science Quarterly 66 (1985):3-21. This paper summarizes previous studies and suggests implications.

9:15 THE GROWTH OF SCHOLARLY PUBLICATIONS AND THE UNIVERSITY LIBRARY

Donald E. Oehlerts, 271 King Library, Miami University, Oxford, Ohio 45056

An estimated 100,000,000 books, scholarly papers and research reports, and government publications have been indexed by the major bibliographic services in the twentieth century. Between two and three million new publications are indexed each year.

Only the largest American libraries are able to handle such huge collections of information and publications. The largest university libraries now have collections which include at least 50,000,000 books, articles, dissertations, and research reports. Each year these libraries add 200,000 new volumes, receive between 50,000 and 100,000 serial titles, and employ staffs of more than 500 persons.

Modern computer systems are able to handle subject databases which index hundreds of thousands of publications, but few libraries could afford the cost of computer systems including millions of current and retrospective publications. Computer technology may never be able to replace the traditional systems of bibliographies, catalogs, indexes, and abstracts which have provided control of the world's scholarly literature for the decades of the twentieth century.

9:30 THE IMPACT OF NATIONAL INFORMATION POLICIES ON INTERNATIONAL COMMUNICATION. Loren D. Mendelsohn. Carlson Library, University of Toledo, 2801 W. Bancroft Street, Toledo, Ohio 43606.

The recent enactment of laws affecting national information policy by a number of developing and developed nations has had a profound impact on international communication, frequently inhibiting the free exchange of information. These laws have taken a variety of forms. Legislation in Western European countries has taken the form of privacy protection laws, while domestic legislation has dealt

primarily with national security concerns. The impact of a given information policy is dependent on its purpose, both explicit and implicit. This paper will discuss the purpose and impact of several national information policies.

9:45 TRENDS IN GEOLOGIC INFORMATION: RESPONSES OF PROFESSIONAL ORGANIZATIONS TO A SCIENCE IN TRANSITION. Philip Stoffer and Dale Hague
Science Library, Miami University, Oxford, Ohio 45056

The proliferation and growth of earth science organizations during the past 100 years reflects the developments and specializations within the realms of earth sciences. However, the current decline of U.S. minerals and petroleum industries has affected the stability and roles of earth science professional organizations. A survey of selected earth science professional organizations shows the effects of this stress and the responses of these organizations. National trends in economics, information exchange, and education affects the status and role of earth science societies and the materials they publish.

10:15 SECTION BUSINESS MEETING

THE EDITOR THANKS JANE TRUMBULL FOR HER INVALUABLE ASSISTANCE IN THE PREPARATION OF THIS ISSUE.
