Schedule of Technical Section Meetings and Poster Sessions
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95th Annual Meeting
The Ohio Academy of Science

Hosted by
The University of Toledo

April 25-27, 1986

Theme: Ohio's Research Community:
LINKS WITH THE WORLD

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Schedule of Technical Section Meetings
and Poster Sessions

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GENERAL SCHEDULE

Except as otherwise indicated, all sessions and events are on the campus of the University of Toledo.

Friday, April 25, 1986

8:30 A.M. Registration for Section S. Library and Information Science and Symposium in the Card M. Canaday Center, William S. Carlson Library See page 57.

9:00 A.M. Registration for Section Q. Economics and the Symposium in the Driscoll Center for Continuing Education, See page 49.

10:00 A.M. OAS Executive Committee Meeting in the Driscoll Center for Continuing Education, Room 6.

12:00 noon Lunch in the Driscoll Center for Continuing Education, Dining Room A.

2:00 P.M. OAS Council meeting in the Driscoll Center for Continuing Education, Rooms 11 & 12.

3:00 P.M. Ohio Biological Survey Executive Committee meeting in the Driscoll Center for Continuing Education, Room 6.

5:30 P.M. Joint OAS Council and OAS Advisory Board Dinner in the Driscoll Center for Continuing Education Dining Room B. Reservations required and limited to members and guests of the OAS Council and OAS Board.

8:00 P.M. OAS Advisory Board Meeting in the Driscoll Center for Continuing Education, Rooms 11 & 12.

8:00 P.M. - 10:00 P.M. All Academy Welcoming Reception. Cash bar in the Driscoll Center for Continuing Education Dining Room A. Members and visitors welcome.

Saturday, April 26, 1986

8:00 A.M. - 3:00 P.M. Poster Session in Student Union Inman Room

9:00 A.M. Section Meetings. See Contents for specific section programs.

11:00 A.M. All Academy Lecture in the Law School Auditorium

Mel Hartmann, Director Research and Technology Assessment

NASA - Lewis Research Center, Cleveland

"Powered Flight - From the Bicycle Shop into the 21st Century"

12:00 noon Lunch (reservations required) Student Union Room 200

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 Driscoll Center for Continuing Education, Second Floor Lobby.

6:30 P.M. Annual Banquet and Awards Ceremony (reservations required)

Presidential Address by Dr. Paul M. Daniel

Miami University

"Biology and Biologists on and off the Buckeye Trail"

9:00 P.M. Annual Business Meeting for members only in the Driscoll Center for Continuing Education rooms 9 & 10.

MEALS

Advance reservations required. See registration form

Friday, April 25 Luncheon $7.00

Saturday, April 26 Luncheon $7.00

Banquet $10.00

Sunday, April 27 Geology Field Trip $4.00

Box lunch

On Saturday, April 26, 1986 the following on campus restaurants will be open:

Angelo's Attic - Pizza

Student Union - 4th floor

Please reserve registration

Open at 11:30 A.M.

Parks Tower Cafeteria (dorm)

Phone (419) 537-2031

REGISTRATION & PARKING

REGISTRATION is required for all meeting participants. See registration form inside back cover.

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

Pick up name tag at registration desk BEFORE attending sessions.

Meal reservations and payments must be postmarked by Monday, April 21, 1986.

Make checks payable to THE UNIVERSITY OF TOLEDO and mail to:

The University of Toledo

Division of Continuing Education

OAS Registration

Toledo, OH 43606

Parking available in lots #1-N and 1-S on the east side of the campus, off University Hills Blvd. If travelling east on Bancroft, turn right at the first light after Secor Road, turn right again when you see the lot and follow the road to entrance on the west side of lot. To reach the library, follow the walking path (across the street from Bowman Oddy Laboratories) between the ROTC Center and the physical plant. This path leads to a wide walkway between the Student Union and Carlson Library.

Registration will be on the 5th floor of the library from 8:30 - 10:00 A.M. If you arrive after 10:00 A.M. please register at the Driscoll Center for Continuing Education (above) before going to the Library.

Parking for Section Q. Economics and Symposium on the "Economics of Biotechnology" Park in Lot #17 behind (north) of the Driscoll Center for Continuing Education. If travelling east on Bancroft, turn left (north) at the third after Secor Road.

Registration in the Driscoll Center.

Parking available in lots #1-N and 1-S on the east side of the campus, off University Hills Blvd. If travelling east on Bancroft, turn right (south) at the third light after Secor Road. Use lot on right. Additional parking is available in the east ramp on your left. There is no charge for parking.

Registration, materials, poster sessions, and coffee will be available in the Inman Room on the second floor (2500 level) of the Student Union. Enter at the top of the steps on the north side (mall side) of the Student Union. The Inman Room is straight ahead through the lounge.

SATURDAY, APRIL 26, 1986

Make checks payable to THE UNIVERSITY OF TOLEDO and mail to:

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Toledo, OH 43606

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Please reserve registration

Open at 11:30 A.M.

Parks Tower Cafeteria (dorm)

Phone (419) 537-2031
FRIDAY, APRIL 25, 1986

9:35 A.M. Ohio-Based Information Organizations: Data Links With The World
This symposium will be held Friday, April 25, 1986 from 9:35 to 11:55 a.m. at the Ward M. Canaday Center in the William S. Carlson Library. The directors of the Bowling Green State University Libraries, the University of Toledo Libraries, the Raymon H. Mulford Library of the Medical College of Ohio at Toledo, and the Toledo-Lucas County Public Library system will participate in an examination of the role Ohio-based information organizations play in the advancement of scientific research communication throughout the world. Participants will discuss printed and computerized information services they offer to the academic, scientific and business research communities worldwide. (See Sections S, Information and Library Science abstracts.)

12:00 NOON - 5:00 P.M. Open House at the Department of Mechanical Engineer's Robotics Laboratory
The Department's Robotics Laboratory, located in Room 1204 on the first floor of the Engineering Science building, will be open to visitors. This opportunity to view industrial and laboratory teaching robots in action, as well as discuss the exciting course of robotics with faculty and students active in the field.

3:45 P.M. Panel Discussion of Library Directors
The panel discussion will be held on Friday, April 25, 1986 from 3:45 p.m. to 4:35 p.m. at Ward M. Canaday Center in the William S. Carlson Library. The directors of the Bowling Green State University Libraries, the University of Toledo Libraries, The Raymon H. Mulford Library of the Medical College of Ohio at Toledo, and Toledo-Lucas County Public Library system will participate in a discussion of how libraries in general and theirs in particular aid in research and promote excellence. (See Section S, Information and Library Science abstracts.)

6:00 P.M. Maumee Bay Boat Trip
Maumee Bay is a shallow embayment of Lake Erie located at the mouth of the largest of the Great Lakes tributaries. Lining the shores of the Lower Maumee River are commercial and industrial development of the City of Toledo. Further in the Bay the shoreline becomes residential and agricultural in character. In Maumee Bay, water from the Lower River mix with water from Lake Erie creating a productive estuaries. Limnological measurements and plankton sampling, taken on the field trip, will illustrate the ecotone nature of the Bay. The trip will leave the Law School Parking Lot, adjacent to the Department of Biology, at 6:00 p.m. and return at approximately 8:00 p.m. Transportation will be by private car, however, carpooling is desirable. The trip will be limited to twenty people. Those wanting to participate should contact Dr. Peter Fraleigh of the Biology Department, The University of Toledo, (419) 537-2125.

7:30 P.M. Ritter Planetarium
Ritter Planetarium will feature "Planets of Ice," a program based on the Voyager encounter of Uranus. The Voyager mission and the relation between the outer planets, their ice moons, and comets will be discussed.

8:30 P.M. Ritter Observatory
Open house viewing with the Ritter 1-m telescope will be conducted from 8:30 p.m. - 10:30 p.m., weather permitting.

SATURDAY, APRIL 26, 1986

9:00 A.M. Tour of Psychology Laboratories
Members of the Psi Chi, the National Honor Society in Psychology, will sponsor a tour of the psychology laboratories on Saturday, April 26. A tour of the clinical, cognitive, developmental, neuro-scientific, perception and animal laboratories is planned. The tour will include explanations, demonstrations, and discussions regarding the variety of research being conducted in the Psychology Department. The laboratories will be open from 9:00 a.m. to 5:00 p.m. on Saturday. Tours will begin on the hour at 10:00 a.m., 11:00 and 12:00 p.m. Enter University Hall from the south side using the second door from the southeast corner of the building. Further directions will be available at the Registration Area.

9:00 A.M. Tour and Open House of Geology Department and Geology Museum
The departmental museum, located in Room 5049, Bowman Oddy Laboratories (1901), offers educational and reference displays of minerals and fossils from both the local area and continent-wide and will be open from 9:00 A.M. - 5:00 P.M. Saturday, Sixty minute guided tours will leave BOL 5049 at 10:00 a.m. and 2:00 p.m. Visitors will have an opportunity to view teaching and research facilities, including the Organic Carbon Facility and Subsurface Data Center. The Organic Carbon Facility contains modern coal characterization equipment and reference samples of Ohio coals. The Subsurface Data Center houses a research collection of rock cores, cuttings, lake sediments, and Lake Erie soft sediment cores. The Department's Gamma Eta Chapter of Sigma Gamma Epsilon will be serving coffee, hot tea, soft drinks, and donuts in BOL 5049.

1:00 P.M. Stranahan Arboretum
The University of Toledo's 47-acre Stranahan Arboretum will be open to visitors; members of the Arboretum Board will be available to answer questions. The Arboretum has two small ponds, a ten-acre old-growth woodland, and the largest collection of ornamental woody plants in northwestern Ohio. Transportation will be by private car. The Arboretum is a ten minute drive northwest of the University. Proceed north on Sycamore Road to Central Avenue, west on Central to Talmadge, north on Talmadge to Sylvania Avenue and west on Sylvania 1.2 miles to Tantara Road on your right.

2:00 P.M. Ecology Keynote Lecture
A talk entitled, "Manned Submersible Research in Lake Superior," will be given by Dr. William Cooper of the Zoology Department of Michigan State University. The recent expedition in Lake Superior with a manned submersible will be discussed. Slides and color VCR movies of the deepwater fish, invertebrates and geology will be utilized. Future research dives will also be discussed. This lecture will be part of the Ecology Section's afternoon program and held in the same room. (Check program for Section R, location.)

2:00 P.M. Tour and Open House of Department of Physics and Astronomy Laboratories
The following laboratories will be open from 2:00 P.M. - 5:00 P.M. Saturday:
- Atomic Physics/Heavy-Ion Accelerator Laboratory - (ES 1000)
  Studies of atomic structure and atomic interactions through optical, uv and electron spectroscopic techniques are conducted.
- Laser Non-Linear Spectroscopy Laboratory - (ES 1005)
  Coherent excitation and emission in multi-level systems is studied.
- Low Temperature Physics Laboratory - (ES 222)
  Studies of the properties of materials from near the absolute zero (.07K) to room temperature are carried out. Recent work concentrates on thermophysical properties of disordered materials, such as glass and glass ceramics.
The facilities of Wildwood Preserve, Secor and Oak Openings metroparks will be featured. Additionally, the tour will pass through the Irish and Schwamberger Prairie natural areas. Specifically, the nature centers at Wildwood Preserve and Secor Park, the walking center at Oak Openings and a dunes area at Oak Openings will be visited. In the event that the spring season has progressed rapidly enough, a wildflower walk at Swan Creek metropark may be scheduled. The tour will proceed to Kelley’s Island for observation of glacial grooves, Indian petroglyphs and Devonian stratigraphy. We should return by 4:00 p.m. The fee for the field trip is $8.00 and a box lunch is available for $4.00. Further information may be obtained from Dr. Mark J. Camp, Bowman-Oddy Laboratories, (419) 537-2398.

9:00 A.M. Bus Tour of Selected Metropark and Other Natural Areas of Lucas County

This 10,000+ acre collection of wetlands along the Lake Erie shoreline is the site of high concentration of migrant water and land birds each spring. Thousands of ducks and geese, nesting bald eagles and great horned owls, hundreds of herons and egrets, and numerous other bird species should be present. If the sun shines, uncommon reptiles, such as the fox snake and Blending's turtle, can also be seen. Although no official trip is presently planned, meeting attendees should consider making a side-trip to this extraordinary refuge, which is located about 30 minutes drive east of the University; directions and further information will be available at the meeting registration desk.

SUMMARY OF SYMPOSIA

FRIDAY, APRIL 25, 1986

- Ohio-Based Information Organizations - Data Links with the World
  - See page 57.
- Economics of Biotechnology
  - See page 49.

SATURDAY, APRIL 26, 1986

- Neuroscience: Yesterday, Today and Tomorrow
  - See page 13.
- Biotechnology and its Implications for Education
  - See page 26.
- Northern Ohio Archaeology
  - See page 31.

LOCAL ARRANGEMENTS

Local Section Hosts

Dr. Harold L. Allen, Chairman
Dean of the Graduate School
University of Toledo

Dr. John S. Eck, Vice-Chairman
Associate Dean of the Graduate School
The University of Toledo

Section
A. Zoology
B. Plant Sciences
C. Geology
D. Medical Sciences
E. Physics & Astronomy
F. Geography
G. Chemistry
H. Science Education
I. Anthropology & Sociology
J. Conservation
K. Genetics & Cell Biology
L. Mathematics & Computer Science
M. Psychology
N. Junior Academy
O. Engineering
P. Administrative Science & Planning
Q. Economics
R. Ecology
S. Information & Library Sciences

Local Host
Dr. Clifford Smith
Dr. Lloyd Jones
Dr. Mark Camp
Dr. James McCorquodale
Dr. John Simon
Dr. Byron Emory
Dr. Julian Davies
Dr. Jerome DeBruin
Dr. Elias Nigam
Mr. John Kusnier
Dr. Louis Glatzer
Dr. Harvey Wolff
Dr. Robert Haef
Dr. John Schaff
Dr. Robert Bennett
Dr. Thomas Sharkey
Dr. Frederick Tank
Dr. Peter Freligh
Dr. Gloria Frelah

Department
Biology
Biology
Geology
Biochemistry, MCO
Physics & Astronomy
Geography
Chemistry
Elementary and Early Childhood Education
Sociology, Anthropology and Social Work
Biology
Biology
Mathematics
Psychology
Curriculum & Educational Technology
Engineering Physics
Management
Economics
Biology
Library

Other Resource Personnel

Mrs. Jody Moller
Conference Coordinator
Continuing Education

Mr. Fred Mollenkopf
Public Information
The University of Toledo, which observed its 100th anniversary in 1972, is one of the nation's outstanding urban universities. Its fall, 1965, headcount enrollment was 21,238. Of that total, 3,067 were enrolled in Graduate School and the College of Law. It had its origin in 1872 with the gift of 160 acres of farmland donated by Jesup W. Scott, a public spirited Toledo resident, who felt that the city should have a university to train young people for responsible positions in the growing community. The original land endowment is now the site of UT's University Community and Technical College. The Scott Park campus, in 1884, the University became a municipal institution with the City of Toledo beginning a program of financial support which continued for 83 years, terminating upon the University's conversion to state status in 1967.

In its early years the University held classes in various temporary locations. As reflected in its first name-Toledo University of Arts and Trades-courses were devoted to architecture, painting and manual training.

The first expansion came in 1904 when the University became affiliated with the Toledo Medical College and established a College of Pharmacy. Affiliation with the Toledo YMCA College of Law followed in 1909. Other colleges - education, commerce and industrial science - were established within the next decade.

The University's greatest period of growth dates from 1928. The citizens of Toledo then voted a bond issue for the development of a modern new campus on suburban West Bancroft Street and the construction of the first two buildings, University Hall and the Field House. Occupied in 1931, the original campus has been expanded to more than 200 acres with 35 major college and university structures. Located in one of Toledo's finest residential sections, it provides a suburban atmosphere, yet is an integral part of the cultural, social and commercial life of the community.

Coincident with its Centennial Observance, the University completed the major elements of an extensive main campus capital improvements program. Completed in the 1970s were a new College of Law Center and the William S. Carlson Library, second largest building on the main campus and named for the University's 10th president who served from 1958 until his retirement in October, 1972.

Among other recent campus additions are Centennial Hall, a multipurpose activities center seating nearly 9,000 for sports events, concerts and commencements; the Center for Performing Arts, which houses the music and theater departments; the Continuing Education Center; Centennial Hall, an attractive central campus commons; Rowan-Oddy Laboratories; the Parks Tower residence hall; a major addition to the Student Union; two parking ramps; Stranahan Hall, which houses the College of Business Administration, and an addition to the Engineering-Science Building. Scheduled for completion in 1987 is McMaster Hall, which will house the physics and astronomy department.

Opened in 1969, the Scott Park campus of the University Community and Technical College is located one and a half miles southeast of the main campus. It is comprised of six major classroom and laboratory structures on the site of the original Scott land endowment. A Student Center which provides extensive facilities for extracurricular and recreational activities was completed and opened in 1975.

Among other facilities, the University owns and maintains the R.A. Stranahan, Sr. Arboretum, a 47-acre site northwest of the main campus which was given to the University in 1964 in memory of the late Toledo industrialist and civic leader. The site includes two large ponds and serves as an outdoor laboratory for studies in botany, ecology, horticulture and pharmacology, as well as providing a haven for wildlife.

Dr. James D. McComas, who served as President of Mississippi State University for nine years, assumed the Presidency of The University of Toledo in July, 1955, and formally was inaugurated as UT's 12th president in ceremonies the following October.

The University is justifiably proud of its highly qualified faculty. Ninety-five percent have advanced degrees, with 73 percent holding an earned doctoral degree. Members of the faculty are active not only within the University setting, but also are involved with community programs, research projects and the publication of professional articles and textbooks. A most significant quality of the University faculty is its interest in students and its commitment to providing the best possible learning experience and environment.

A university is more than just a campus - it is people. Faculty members of The University of Toledo realize this and extend their efforts beyond the typical classroom setting to be available to students and respond to their individual needs. This is more than a philosophical objective, it tends to be a way of life at The University of Toledo.

The University of Toledo long has benefited from close ties with the urban community. Toledo, the nation's 40th largest city, is the trading center for 14 counties in northeastern Ohio and southeastern Michigan. The population of the industrial and agriculturally rich trading area is more than 1.2 million persons. Approximately 470,000 reside in Lucas County, of which Toledo (346,000) is the seat of government.

Located at the western tip of Lake Erie, the Port of Toledo (23rd largest in the U.S.) ships grain, coal, iron ore and general cargo. About 2,000 vessels, many of them from foreign ports, visit the harbor during the annual Great Lakes-St. Lawrence Seaway navigation season. The lake and nearby waterways provide excellent facilities for fishing, boating, water skiing, ice skating and other sports. An extensive renovation of the downtown has been underway several years and is continuing with construction of a convention-convocation center complex. The University will operate the $10 million state-funded convocation center portion. The Portside Festival Marketplace is another downtown attraction for visitors with its dozens of shops and restaurants.

Known as the "Glass Capital of the World" and the home of world-famous "Jeep" vehicles, Toledo has more than 1,200 manufacturing plants. Their products include automobile parts and accessories, stamping, die castings, chemicals, and spray equipment. The city is one of the nation's principal railroad centers and its two oil refineries make Toledo the largest refining center between Chicago and the eastern seaboard. Toledo is served by several major airlines through Toledo Express Airport, operated by the Toledo-Lucas County Port Authority.

The city has a $900 million expressway system which is linked to the east-west Ohio Turnpike and the north-south I-75 which extends from northern Michigan to Florida.

Toledo's public schools, hospitals, libraries and parks are among the nation's finest, and the community provides a variety of cultural resources which complement academic life. The Toledo Museum of Art is one of the world's leading museums and its unique Peristyle is the scene of performances of the Toledo Symphony Orchestra, Toledo Choral Society and Concerts by visiting performing artists. The Toledo Zoo has a Museum of Health and Natural History, amphitheater, botanical center and large freshwater aquarium.

The University has seven colleges which award undergraduate degrees; advanced degrees are offered through the Graduate School and The College of Law. The undergraduate colleges are Arts and Sciences, Business Administration, Education and Allied Professions, Engineering, Pharmacy, University College which primarily is for students pursuing Individualized programs, and the University Community and Technical College.
Toledo is proud of its many fine restaurants, which range from fast food to specialty cuisine. Many of these restaurants are located on Secor Road and Monroe Street (near The University) and on Reynolds Road (near Turnpike Exit 4). Listed here are but a few of the restaurants and motels which are convenient to our visitors. The Admissions staff will be pleased to help you select other accommodations, not included on this list, and provide directions.

### Restaurants

**A** Secor Road-Westgate Shopping Center
- Friendly’s Restaurant
  3301 W. Central 537-8623
- Bassett’s Health Foods
  3301 W. Central 531-2811
- Ponderosa Steakhouse
  3330 W. Central 536-6988
- The Original Pancake House
  3310 W. Central 535-5927
- Pizza Hut
  3425 Secor 536-3336
- McDonald’s
  3138 Secor 536-7661
- Wendy’s
  3405 Secor 537-9011
- Denny’s
  3302 Secor 531-1190
- China Gate
  3316 Secor 531-2847

**B** Southwyck Mall/Reynolds Rd. Area
- Bombay Bicycle Club Café and Bar
  1918 S. Reynolds 865-8048
- Dominici’s Italian Cuisine
  2121 S. Reynolds 381-0131
- Bob Evans Farm Restaurant
  2141 S. Reynolds 381-1422
- Chuck Muers
  1435 Baronial Plaza 866-8077
- Red Lobster Inn
  1422 Reynolds 893-9494
- Monroe Street/Franklin Park Mall
- Willows
  4844 Monroe 473-1276
- Red Lobster Inn
  4990 Monroe 473-3135
- Pizza Hut
  5590 Monroe 885-3565
- Bob Evans Farm Restaurant
  4805 Monroe 475-2070
- Sylvia/Douglas
- Friendly’s Restaurant
  2516 W. Sylvania 472-7402
- Timko’s Soup ‘N Such
  W. Sylvania at Douglas 475-4629

**C** Downtown
- Boody House Restaurant
  152 N. Summit 241-3322
- Old Spaghetti Warehouse
  42 S. Superior 255-5038
- Ricardo’s
  8001 Sylvania 893-0292
- The Oaken Bucket
  2841 N. Reynolds 531-5412
- North Toledo
- Manny’s
  953 Phillips 476-4154

**D** Sylvania/Douglas
- Friendly’s Restaurant
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- Timko’s Soup ‘N Such
  W. Sylvania at Douglas 475-4629

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- North Toledo
- Manny’s
  953 Phillips 476-4154

**H** Perrysburg/1-75
- Holiday Inn
  10600 Fremont Pike 874-3111
- Days Inn Motel
  10667 Fremont Pike 874-8771

### Motels/Hotels

**A** Secor Road-Westgate Shopping Center
- Sheraton Westgate
  3536 Secor 535-7070

**B** Reynolds Rd.-Southwyck Mall Area
- Ramada Inn
  2340 S. Reynolds 865-1361
- Holiday Inn
  2429 S. Reynolds 818-8765
- Red Roof Inn
  1570 Reynolds 893-0292

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- Ricardo’s
  8001 Sylvania 893-0292
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  2516 W. Sylvania 472-7402
- Timko’s Soup ‘N Such
  W. Sylvania at Douglas 475-4629
**SECTION A. ZOOLOGY**

**Morning Session - Bowman Oddy 2049**

**Saturday, April 26, 1986**

C. Lawrence Cooper, Presiding

OHIO CRAYFISHES (DECAPODA:CYPRINIDAE) THAT MAY BE THREATENED SPECIES. Raymond F. Jeserina, Department of Zoology, The Ohio State University, University Drive, Newark, Ohio 43055.

Intensive field work during the past five years indicates that the Allegheny Crayfish [Orconectes obscurus (Hagen)] is not an endangered species. The introduction of the Rusty Crayfish [O. rusticus (Girard)] into Sunfish Creek, however, has almost eliminated the Allegheny Crayfish from its watershed. Additional information is needed to determine the status of the following taxa. The Fantail Crayfish [O. virilis (Hagen)] occurs only in the East Branch of the Chagria River. This stream should be re-investigated to determine if the Rusty Crayfish is eliminating the Fantail Crayfish. The Great Lakes Crayfish [O. propinquus (Girard)] apparently has been extirpated from the Muscongus, Portage, Sandusky, and Rocky rivers. The status of this species in the Grand and Ashtabula rivers and Conneaut Creek is unknown.

ORCONETES CAMBARIS, ERISSORPHOROUS HOBBS & FITPATRICK has been collected from one locality in the lower Scioto River basin. The Cincinnati Crayfish [O. ohianus Bundy] has disappeared from a number of localities wherein it was formerly collected. A taxonomic status and distribution of what has been called O. juvenilis (Hagen) in Ohio needs special attention. This taxon is either O. spinipes (Bundy) or a closely related undescribed species that has been collected, usually in small numbers, from the Little Miami, lower Scioto River, and Eagle and Pine Creeks in southern Ohio.

9:15 NEW DISTRIBUTION RECORDS OF CAMBARIS

(JUGICAMBARUS) MONONGALENSIS ORTMANN AND C. (J.) DERBIUS FAXON (DECAPODA:CYPRINIDAE) FROM WEST VIRGINIA, WITH COMMENTS ON THEIR TAXONOMIC STATUS. G. Whitney Stocker, 13773 Boyle Road, Newark, Ohio 43055 and Raymond F. Jeserina, Department of Zoology, The Ohio State University, University Drive, Newark, Ohio 43055.

A survey of the crayfishes of West Virginia belonging to the subgenus Jugicambarus was started in 1984. Thus far, 25 collections have been made. Cambarus (J.) monongalenesis, a primary burrower, was collected on the Allegheny Plateau north of the Little Kanawha River from Hancock (2 collections), Brooke (1), Marshall (3), Wetzel (1), Tyler (1), and Gilmer (1) counties. A closely related but undescribed species, which is a secondary burrower, inhabits the Allegheny Mountains and was captured from Randolph (1), Grant (1), and Putnam (1) counties. The two species have certain characters in common, but the third species is more similar to Cambarus (J.) dubius. The type of Cambarus (J.) monongalenesis is a primary burrower and more often orange in color, while the type of Cambarus (J.) dubius is a secondary burrower and more often brown in color. Additional collections of Cambarus (J.) monongalenesis include counties of West Virginia and Pennsylvania.

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

The interrelationships of North American cyprinids are so poorly known that a general classification has never been attempted. However, several genera can be linked by derived character states of the skeletal system. In one group of taxa including Carinocypris, Diobema, Notropis, Phenacobius, and Rhinichthys, the facial jugular foramen, inflated by a wall of bone, is oriented opposite the external bony bridge (absent in O. episcopus, O. diabolus, E. holosericeus; and half the specimens of Phenacobius). In addition, in most Cambaris, the maxilla has a single large condyle and the tubercles for the palatal ligament and for the mandible are not in contact but in contact; and the preoral canal medially leaves the parietal and rests on the supraoccipital (not in Cambaris or most Campostoma). In addition, the maxilla has a single large condyle and the tubercles for the palatal ligament and for the mandible are not in contact but in contact; and the preoral canal medially leaves the parietal and rests on the supraoccipital (not in Cambaris or most Campostoma).
SECTION A. ZOOLOGY

D. pallidus contains the cystacanth of *J. longirostris*, but its great abundance and wide distribution in this brook lamprey should be reconsidered. Populations were discovered in many areas where the species was previously unreported, including several Order II and III tributaries which drain directly into Lake Erie. Ammocoetes were anesthetized with MS-222, dye-marked by injection and released after recovery. Ammocoete abundance was determined by standard Petersen mark-recapture techniques. Population estimates ranged from fewer than 25 per mile to more than 11,000. Largest populations were found in the smaller streams, especially tributaries of the East Branch Chagrin River, of the Grand River in SW Ashtabula county, and Lake Erie tributaries such as Wheeler Creek. This brook lamprey is currently protected as an Ohio endangered species but its great abundance and wide distribution in NE Ohio, the Mad River drainage of SW Ohio and in the Killbuck drainage of Wayne and Holmes counties suggest that the endangered status of this brook lamprey should be reconsidered.

CONTRIBUTION OF NATURAL MORTALITIES OF FISH TO APRIL-OCTOBER IMPINGEMENT AT A LAKE ERIE ELECTRIC GENERATING STATION.

Andrew M. White, Biology Department, John Carroll University, Cleveland, Ohio, 44118.

Plant intake screens were washed twice per week, collecting fish for a period of five hours. Fishes were immediately placed in containers of water and categorized as active, stressed, dead, or more than 5 hours. They were then examined to determine the probable cause of debilitation or death. Of the 34,108 fishes collected, more than 63% had been dead for more than 5 hours. Impingement could be attributed to factors other than plant operation in more than 82% of the remaining individuals. Within the October (Dorosoma cepedianum) included, 12,160 fish were impinged. 67% of these were dead more than 5 hours and 85% of the remainder suffered from one or more factors which would result in death. More than 93% of the total impingement was related to death or impairment not associated with plant operation. Principal causes of impingement at this generating station were the natural fall die-off of YOY gizzard shad, hyperparasitism, starvation, sea lamprey attack, angler mortality, carcinomas, Gill rot, and/or infections of Aeromonas, Saprolegnia, or Columnaris.

SECTION B. PLANT SCIENCES

First Morning Session - Bowman Oddy 2045

SATURDAY, APRIL 26, 1986

EMANUEL D. RUDOLPH, PRESIDING
9:00 BRUCE FINK, MIDWESTERN BOTANIST AND EDUCATOR, 1861-1927. Emanuel D. Rudolph, Department of Botany, Ohio State University, 1735 Neil Ave., Columbus, OH 43210.

Bruce Fink, for 21 years professor of botany at Miami University until his death at age 65, is a major figure in American lichenology. He early championed the, at first unpopular, proposal of Schwendener that lichens were dual component. Not only did he study lichen systematics and floristics, he was also concerned with their ecology and physiology. He espoused the anti-tobacco cause and published papers on the "Tobacco Habit." Fink's floristic studies are the ones for which he is now remembered, particularly his studies of Minnesota lichens and his lichen flora of the United States which was posthumously completed by his student Joyce Hedrick (Jones). The lichen flora, although difficult to use, is the only modern one for the United States that considers all lichen groups.

9:15 FIRST BIOLOGICAL SURVEY OF LAKE ERIE (1898-1901). Ronald L. Stuckey, Botany, The Ohio State University, 43210.

The first organized Biological Survey of Lake Erie was conceived in the 1890s by Dr. Jacob K. Weiglard, Professor of Zoology, The University of Michigan. In 1898 he received liberal financial support from the U.S. Commission of Fish and Fisheries to conduct experimental investigations of the Lake's fish species. At the outset, studies were needed on the entire chain of biological relationships of the organisms living in the shoreline marshes, tributary streams, and the Lake itself. The Survey, under Weiglard's direction, was headquartered in the Federal Fish Hatchery at Put-in-Bay, now a research faculty of the Franz Theodore Sterne Laboratory. In addition to studies on selected species of fishes, a number of technical publications on vascular aquatic plants, algae, plankton, parasitic worms, and rotifers resulted. Some of the aquatic biological principles learned in the Survey were incorporated into an important textbook, Fresh-Water Biology (1918), compiled by H.B. Ward and G.C. Whipple, and widely used by North American students of fresh water biology and limnology. The main investigators were H.S. Jennings, A.J. Pieters, R.H. Pond, Julia W. Snow and H.B. Ward.

9:30 STATE ENDANGERED, THREATENED, AND PRESUMED EXTINCT PLANT RECORDS FROM A 3-TOWNSHIP AREA OF SOUTHERN OHIO: A LEGACY OF FLOYD BARTLEY. James F. Bars, ODNR, Division of Natural Areas and Preserves, Fountain Square, Columbus, OH 43224.

A great diversity of widely contrasting plant habitats exists within the 132 square mile area of Liberty and Jackson Townships, Jackson County and adjacent Sandusky Township, Pike County, Ohio. This results in an extremely rich flora. The major plant collector in this area was the late Floyd Bartley. He collected thousands of plant specimens here, often with the late Leslie Pontius. Over 1100 taxa were collected by Bartley between 1928 and 1973 from Liberty Twp. alone. The Division of Natural Areas & Preserves has records of 71 state Endangered (X), Threatened (T), and Presumed Extirpated (X) plants collected in this 3-township area. This gives it one of the highest concentrations of rare plants in Ohio. Bartley collected 63 of these plants from 300 different sites. Bartley also collected 46 taxa were last collected after 1960. 35 taxa have been updated since 1975 by Division staff, 26 in the past 2 field seasons. Four E and 3 X taxa, e.g. Gentiana saponaria, a herbaceous perennial, is widespread throughout the southeastern United States and northward to the southern Great Lakes. It is a gentian of moist thickets and wet open sites. In Ohio, the only extant records of this species are from the Whitehouse quadrangle in Lucas County. The largest known population, ca. 700 plants at Lou Campbell Preserve, is being monitored to learn more about its life history and implications for management. At Campbell Preserve, the gentians occur in a wet sedge meadow interspersed with Alnus rugosa. Baseline demographic data has been collected for 1984 and 1985. Information such as numbers of vegetative plants, flowers per plant, plants grazed, functional seed capsules, and insect-damaged seed capsules was recorded for all plants of the population. During the course of this study, it was discovered that only 8% of all seed capsules successfully disperse seed. Approximately 92% of all seed capsules are so severely damaged by the seed predation activity of the moth larva, Endothenia hebesana (Walker) that the seed dispersal mechanism is dysfunctional and most of the seed is destroyed.

10:15 MONITORING GENTIANA SAPONARIA L. (GENTIANACEAE), AN ENDANGERED SPECIES IN OHIO. Jennifer L. Windus, ODNR, Division of Natural Areas and Preserves, Fountain Square, Columbus, OH 43224.

Gentiana saponaria, a herbaceous perennial, is widespread throughout the southeastern United States and northward to the southern Great Lakes. It is a gentian of moist thickets and wet open sites. In Ohio, the only extant records of this species are from the Whitehouse quadrangle in Lucas County. The largest known population, ca. 700 plants at Lou Campbell Preserve, is being monitored to learn more about its life history and implications for management. At Campbell Preserve, the gentians occur in a wet sedge meadow interspersed with Alnus rugosa. Baseline demographic data has been collected for 1984 and 1985. Information such as numbers of vegetative plants, flowers per plant, plants grazed, functional seed capsules, and insect-damaged seed capsules was recorded for all plants of the population. During the course of this study, it was discovered that only 8% of all seed capsules successfully disperse seed. Approximately 92% of all seed capsules are so severely damaged by the seed predation activity of the moth larva, Endothenia hebesana (Walker) that the seed dispersal mechanism is dysfunctional and most of the seed is destroyed.

10:30 VARIATION AMONG FROELICHIAS FLORIDANA (Nutt.) MOQ. PLANTS GROWN FROM SEED COLLECTED FROM 2 SEPARATE SITES DURING 2 CONSECUTIVE YEARS. Marilyn Ort, 701 Colegate, Marietta, OH 45750

The Ohio populations of Froelichia floridana, listed as endangered by Ohio Div. of Natural Areas and Preserves, are disjunct by several hundred miles from other known populations. The species is known only from 5 small disturbed sites on sandy soils formed by glacial outwash within ca. 130 ha on a high Ohio River terrace in Washington Cty. The extant sites may be fragments of a larger continuous population no longer extant. Froelichia floridana is a dichotomously branched perennial characteristic of sandy and gravelly barrens and barrens-like areas with poor ground cover. It is a threatened species, a subspecies of the food species of fishes. Studies of selected species of fishes, a number of technical publications on vascular aquatic plants, algae, plankton, parasitic worms, and rotifers resulted. Some of the aquatic biological principles learned in the Survey were incorporated into an important textbook, Fresh-Water Biology (1918), compiled by H.B. Ward and G.C. Whipple, and widely used by North American students of fresh water biology and limnology. The main investigators were H.S. Jennings, A.J. Pieters, R.H. Pond, Julia W. Snow and H.B. Ward.

10:45 BREAK
beech will become more abundant while the oaks and other Goll Woods. In contrast to sugar maple and beech, which show typical reverse J-shaped size-frequency distributions, those "big tree" species are represented by only a few very large trees. A Markov Chain successional model suggests that perennial herbs resorb more N and P on more fertile soils. To clarify this, proportional and absolute N and P resorption were measured over three years in seven tree species, one shrub, and three perennial forest herbs along a gradient of soil nutrient availability in central Ohio. Woody plants consistently resorbed higher proportions of N and P than herbs. Within each growth form, some species exhibited strong nutrient availability/resorption correlations existed, they were negative for woody plants and positive for herbs. Alternative schemes for energy allocation, nutrient conservation, and resource availability for woody and herbaceous perennial growth forms are proposed.

9:15 STRUCTURE AND COMPOSITION OF THE GOLL WOODS STATE NATURE PRESERVE, FULTON COUNTY, OHIO.
Bo-Soo Oh and R.R. Boerner, Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Species composition, size-frequency distributions and successional relationships were studied in Goll Woods, the last uncut remnant of the Black Swamp forest of northwestern Ohio. 37 tree species were identified within the preserve. Relatively well drained former beach ridges were dominated by sugar maple (Acer saccharum) and beach (Fagus grandifolia), with sycamore (Platanus occidentalis) and white oak (Quercus alba) also common; poorly drained flats were occupied by silver maple (A. saccharinum), American elm (Ulmus americana), bur oak (Quercus macrocarpa), and ashes (Fraxinus spp.). Basswood (Tilia americana), ironwood (Ostrya virginiana), black walnut (Juglans nigra), and those "big tree" species are represented by only a few very large trees. A Markov Chain successional model suggests that perennial herbs resorb more N and P on more fertile soils. To clarify this, proportional and absolute N and P resorption were measured over three years in seven tree species, one shrub, and three perennial forest herbs along a gradient of soil nutrient availability in central Ohio. Woody plants consistently resorbed higher proportions of N and P than herbs. Within each growth form, some species exhibited strong nutrient availability/resorption correlations existed, they were negative for woody plants and positive for herbs. Alternative schemes for energy allocation, nutrient conservation, and resource availability for woody and herbaceous perennial growth forms are proposed.

9:30 CHEMICAL AND PHYSICAL CHARACTERISTICS OF SIX NORTHEASTERN OHIO PEATLANDS. Barbara K. Andreas and Gary R. Bryan, Department of Biology, Cuyahoga Community College, 2400 Richmond Rd., Cleveland, Ohio 44122.

Chemical and physical characteristics were examined in water samples taken from May - September in six north-eastern Ohio peatlands. Physical characteristics examined included pH, temperature and conductivity. Chemical characteristics examined included calcium, magnesium, sodium, potassium, total phosphorus, ammonium, nitrate and chloride. Samples were taken from areas of open water and from the Sphagnum substrate.

Peatlands included in this study were chosen on the basis of their floristic composition which at first may appear to be similar. Upon examining water chemistry parameters from the study area, six peatlands may be separated into three classes. Triangle Lake Bog (pH 3.5 - 4.2) and Flatiron Lake Bog (pH 3.5 - 4.7) are classified as semi-oxygentic peatlands; Fen Lake Bog (pH 3.8 - 6.5) and Browns Lake Bog (pH 4.7 - 6.0), as weakly minerogenic peatlands; and Harrick Fen (pH 7.0 - 7.6) and Jackson Bog (pH 7.3 - 7.7), as strongly minerogenic peatlands.

9:45 BREAK

10:00 EFFECTS OF MYCORRHIZAE AND BELOWGROUND COMPETITION ON GROWTH OF RAGWEED (AMBROSIA ARTEMISIIFOLIA) B. Crowell and R.J. Boerner, Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Previous studies indicate that plants vary in the degree of their dependence on vesicular-arbuscular mycorrhizae (VAM), and that species in the mycorrhizal family Cruciferae may allelopathically inhibit VAM in neighboring plants. We sought to determine for ragweed (Ambrosia artemisiifolia) 1) the extent and nature of its dependence on VAM, 2) the nature of belowground interspecific competition, and 3) the nature of belowground interspecific competition with Brassica napus (Cruciferae) nonmycorrhizal. Single ragweed 'targets' were grown in sand culture with and without VAM inoculum, and at high (H) and low phosphorus (L) supply rates. Pots with targets also contained 0, 2, 4, 8, 12, or 16 B. nigra 'neighbors', or 3-5 ragweed neighbors. Neighbors were tied back from targets to eliminate belowground competition. In the absence of any competition, mycorrhizal ragweed had greater shoot and root mass, greater total P in shoots and whole plants, greater plant P concentration, greater P uptake efficiency, and greater total root length than nonmycorrhizal ragweed. In the presence of belowground competition, target mass and target total P were generally significantly inversely correlated with neighbor root mass, regardless of the species of the competitor. These results suggest: 1) that annual ragweed is obligately mycorrhizal, 2) that belowground competition can strongly affect ragweed growth, and 3) that allelopathy is not an important competitive mechanism in this system.
we attempted to determine whether their presence could result in growth inhibition of selected crop species due to allelopathic interactions. Our greenhouse experiments with cold-water extracts of the two weed species on corn, representing different taxonomic groups (C. hirculus L.), soybean (Glycine max L.), and sunflower (Helianthus annuus L.) showed a selective inhibition of growth. The findings indicate that horse nettle significantly inhibited growth in corn and slightly inhibited growth in sunflower. Seedling emergence of dogweed was found to have no effect on the crops tested. Based upon these results, yield reductions from these weeds could be attributed to allelopathic behavior, as well as competition.

SECTION B. PLANT SCIENCES

AFTERNOON SESSION

SATURDAY, APRIL

L. WALTER MACIOR, PRESIDING

1:30 SECTION BUSINESS MEETING

2:00 Ultrastructure and Cinephotomicroscopic Analysis of the Motile, Colonial Green Alga, Stephanosphaera. L.A. Wawrzyniak and G.L. Floyd, Department of Botany, Ohio State University, Columbus, 43210.

Stephanosphaera (Chlorophyta) is a matrix-surrounded, coenobic colony with parallel, biflagellate cells in a ring-like arrangement. Extensions of cytoplasm connect cells to the matrix envelope. Immature cells have the Chlamydomonas-like flagellar apparatus organization; basal bodies are arranged in a V-shaped configuration, which, together with cruciate arranged microtubular rootlets, exhibit 180° rotational symmetry. During maturation of the flagellar apparatus, the basal bodies become laterally positioned, rotated, and separated. As a result, all four rootlets become ventrally oriented and nearly parallel, the distal fiber is lost, and the proximal fibers are partially detached. Stephanosphaera has been considered by some authors to be closely allied to the unicell Haematococcus on the basis of similar cytoplasmic extensions. Presence of the Chlamydomonas-type flagellar apparatus in Haematococcus and similarities in gene ontogeny would support the probable relationship of Stephanosphaera to an Haematococcus-like ancestor.

Cinephotomicrography was used to examine flagellar motion. Results will be compared with the motility of Chlamydomonas and other colonials. Flagellar beat patterns, and ultrastructural data will be used to show how flagellar apparatus configuration and colony organization contribute to colony motion.

2:15 POLLINATION ECOLOGY AND ENDEMISM OF PEDICULARIS HOWELLI. MACIOR, Lazarus Walter. Department of Biology, University of Akron, Akron, OH 44325.

Pedicularis howelli is a root hemiparasitic endemic to the Siskiyou Mountains of California-Oregon. Its flower is a pollinator vibration mechanism attracting a species of pollinating bumblebees by visible and ultraviolet light reflections. Analysis of corbicula pollen loads of pollinators indicated a low degree of foraging constancy but a high frequency of Bombus mixtures on the flowers. Pollinator behavior is similar to that of pollinators on other nectarless vibration mechanisms except that stigmatic stigmatic contact is coupled with upright foraging posture. No evidence was found to suggest that plant species blooming in the Pediculaceae community and using the same pollinator species reflect phenological divergence of anthesis favoring lesser competition for pollinators. Pollinators within a community, however, did appear to favor certain combinations of plant species for their pollen and nectar resources. Pediculaceae howelli's endemism appears to be defined by limited availability of natural and man-made breaks in the forest canopy along roads, trails, and meadows in a mixed conifer forest. This "edge effect" is also found in the endemic E. furcifera and E. dubia in Obligately insect pollinated. E. howelli produces abundant seed and seedlings where soil stability and open habitats are available.

2:30 ORNITHOPHYLY AMONG THE HAWAIIAN LOBELIIDAE (CAMPAULACEAE): EVIDENCE FROM NECTAR-SUGAR COMPOSITIONS. Thomas D. Lamers and C. Edward Freeman. Department of Botany, The Ohio State University, Columbus, OH 43210-1293, and Department of Biological Sciences, University of Texas, El Paso, TX 79968-0519.

Data on the sugar compositions of floral nectars were used to test the hypothesis that the Hawaiian Lobelioidae (Campanulaceae) were pollinated by nectarivorous passerines (Oreopendellae and Meliphagidae) prior to the widespread extinctions of these endemic birds. If so, one would predict that the nectar would be hexose-dominant or hexose-rich. Nectars from 24 individuals, representing different taxa (3 genera, 10 species, and 3 interspecific hybrids), different conspecific populations, and different individuals within a population, were analyzed via high-performance liquid chromatography (HPLC). Mean fructose:sucrose ratios of 43.5% (range 37.6-60.0%), mean glucose was 54.5% (range 47.8-62.0%), and mean sucrose was 2.0% (range 0.4-7.5%). All samples were clearly hexose-dominant with sucrose:hexose ratios less than 0.050 (x=0.021), thus supporting the hypothesis of ornithophily among the Hawaiian lobelioids.
A total of ten flavones was detected in the four species analyzed from 30 populations. Inter and intraspecific differences existed. Also, there were some variations in numbers of flavones. Peperomia is characterized by a distinct array of flavonoids. Analysis of within sample genotypic frequencies indicates that each of the species of Peperomia has allowed time for mutations to occur and spread within a continuous habitat adjacent to the basin, allowing for unrestricted gene flow to occur. It is also surmised that the low variability has been maintained through isolation of Trillium sessile L. to assess the underlying genetic structure. Individuals sampled were recorded for position in the population and age class resulted in significant differences for the GOT1 locus. Significant differences for the other loci were dependent on the choice of samples. Position in the population, flower color (red, intermediate, yellow) and age class (juvenile, adult). Of the 21 loci assayed by starch gel electrophoresis, three (5-FGD1, GOT1, GOT2) were polymorphic and formed the basis of further analysis. The structure of the shoot apex of Jack-in-the-Pulpit (Arisaema atrorubens) is described in terms of a cytohistological zonation superimposed on a tunica-corpus configuration. The tunica tends to be a single layer, while the corpus is indistinct because of gradual differentiation of pith cells. The seasonal cycle resulted in no apparent changes in the structural aspects of the vegetative shoot apex. Axillary buds are described as being initiated from detached meristems which show cytohistological zonation consisting of stratified initials, overlaying a group of subtending cells, the basipetal initials. A zonal pattern characteristic of nature vegetative shoot apices becomes evident in the axillary buds during the initiation of the first leaf primordium.
A study of the groundwater chemistry in the vicinity of Cedar Bog in central Ohio was conducted to determine whether recharge areas and flow patterns could be defined chemically. From water samples collected at several sites in five different geologic units, graphic plots of molar ratios indicate water from bedrock has characteristics significantly different when compared to water samples from outwash deposits. Some plots show ratios from bedrock similar to those in the local end moraine. Ratio plots of groundwater from Cedar Bog also show consistent groupings and a similarity in plot locations to two outwash deposits. Several plots show a trend of increasing molar concentration which is consistent with two possible flow paths toward Cedar Bog. A single source and flow path cannot be recognized on the basis of molar ratios alone. Many factors control these ratios and in some cases, the ratio plots do not overlap, making distinctions impossible. Utilization of a mass transfer model (balance) in conjunction with a chemical equilibrium model indicates that the two possible flow paths can account for the resulting change in groundwater chemistry.

9:45
INTERNATIONAL CLASSIFICATION OF GLACIAL FEATURES. Richard P. Goldthwait.
P.O. Box 656, Anna Maria, FL 33501
During the last century, a morphological classification of glacial deposits has been nearly completely. Most of the compilation was completed here in 1975, has helped to enhance a major depth of influence. This has been done for the International Quaternary Association by (1) Correspondence from 82 glacial geologists in 24 nations, (2) criteria selection, and (3) by local small meetings in 12 countries discussing weak points and suggesting new ones. We added eroded features. A criteria objective is the common understanding of terms used in glacial geology. This has necessitated a table of near-equivalents in 8 languages, which is now underway.

9:15
INTERNATIONAL CLASSIFICATION OF TILLS IN THE CUYAHOGA VALLEY NATIONAL RECREATION AREA, NORTHEASTERN OHIO. Robert Katzmark and John P. Szabo.
Geology Department, University of Akron, Akron, OH 44325
Inductively coupled plasma (ICP) analyses performed on 25 selected till samples and distinct areas from the Cuyahoga Valley National Recreation Area in northeastern Ohio were analyzed statistically. Samples of the less than 75 micron fraction from the Lavery, Kent, Northampton and Mogadore Tills were analyzed for P, K, Ca, Mg, Na, Fe, Al, Si, Al, and Na. Bivariate regressions show most elemental concentrations correlate to grain size. Statistical tests show some significant differences in elemental means among individual till units which are the result of variations in source area and local materials. The tills that are most similar in this study are the Kent and Mogadore Tills and the Lavery and Northampton Tills. The Mogadore Tills have a similar northeastern source area which was low in overall carbonate content. The clay-rich Lavery and Northampton Tills have lower elemental contents suggesting a more northeasterly carbonate-rich source in the Erie Basin.

In addition Ca and Mg content determined by ICP analysis was compared to P and Mg content calculated from carbonate content derived from a Chittick apparatus. Ca has a strong correlation with carbonate content. Mg has a weaker correlation implying that some Mg originates in carbonates, but an additional source of Mg in chloride.

9:00
FOSSIL SOIL TOPOSEQUENCES AS INDICATORS OF HOLOCENE SLOPE PROCESSES IN WISCONSIN'S DRIFITLES AREA. T. A. Prokoll. Dept. of Geology & Geography, Denison Univ., Granville, OH 43023
Peoria loess distribution and forest soil properties on uplands, sideslopes, and footslopes indicate that hilltops and their surficial deposits are largely relic of the glacial environment of the late Wisconsinan. Loess thickness decreases with slope angle. Slope morphology, soil profile development, and forest cover change with slope angle. On long slope segments, loess cover thin significantly through the 10 to 20% slope range and is usually < 50 cm thick on slopes > 20% and < 30 cm on slopes > 35%. Foothill morphology and stratigraphy indicate minimal erosion during the Holocene at most sites. Forest soils developed in loess (Typic Haplo Adsols) are remarkably uniform on slopes ranging from 2 to 35%. On 102 slope transects, A and E horizons did not vary significantly with slope angle; Bt horizons showed slightly less development in terms of thickness, structure, and argillans on steep slopes. The Bt horizons of Peoria loess on steep slopes have higher pH values, slightly lower clay accumulations, and higher total phosphorus contents than on moderate slopes suggesting less profile leaching and greater enrichment from throughflow and throughwash. The Peoria loess has minimal erosion than present-day landscapes.

10:30
ON THE CAPTURABILITY OF PLANETOIDS BY EARTH-LIKE PLANETS. R. J. Malcuit, Dept. of Geology & Geography, Denison Univ., Granville, OH 43023
Although gravitational capture is one of the three classical hypotheses for the origin of the Earth's Moon, few calculations have been done to demonstrate its feasibility. The goal of this paper is to present constraints on the calculation of physical properties of bodies that could be captured by Earth by tidal friction processes. Some simplifying assumptions for this problem are: (1) body density of encountering planetoids is 1.34 g/cm^3 (lunar density); (2) the bodies are characterized by a Displacement Love Number (h) = 0.6 (the approximate value of h for present Earth); (3) h for ancient Earth = 0.9; (4) bodies are captured into an orbit characterized by period = 20 R_E (Earth radii) and major axis = 290 R_E (near mean semimajor axis of stable gravitational capture); (5) the encounters between the bodies are near-circular and non-collisional after tidal bulge geometry is considered, (6) the tidal deformation is along the line of centers of the bodies; and (7) the Energy Dissipation Factor (Q) for the calculations in 1 (i.e., all energy stored in the encounter is dissipated). Under the above conditions, planetoids smaller than about 1000 km radius (0.6 lunar radius) or 0.2 lunar mass,
can not be captured. The capture window widens consider-
ably as the mass of the planetoid increases. Encounters of
bodies of 2000 km radius (1.1 lunar radius; 1.5 lunar
mass) result in dissipation of 2 times the energy necessary
for capture, and larger bodies are even more capturable.

10:45 PHYSICAL GEOLOGY IN HIGH SCHOOL FOR COLLEGE
CREDIT: THE ORRVILLE HIGH SCHOOL-COLLEGE OF
WOOSTER CONNECTION. Bob Shank, Orrville High
School, Orrville, Ohio 44667 and F. W. Cropp, The College
of Wooster, Wooster, Ohio 44691.

Ten Orrville High School seniors during two semesters of
1985-86 are completing a Physical Geology course at
Orrville High School and will receive one course (four
semester hours) of credit at The College of Wooster.
Collaboration between the two authors enabled this unique
program to be approved by Orrville City Schools and The
College of Wooster. High school students chosen are honor
students who follow the same general syllabus and use the
same textbook (Strahler's Physical Geology) and laboratory
manual (Hamblin and Howard). High school students complete
more classroom hours and take more field trips than their
college counterparts, who write more journal entries and
are expected to spend more time studying outside of class.
The same final examination is administered to both groups.
Wooster High School will join the program next year.

SECTION C. GEOLOGY
Second Morning Session - Bowman Oddy 3045
Saturday, April 26, 1986

Michael C. Hansen, Presiding

STABILIZATION OF THE TIBBETS, SPAIT & SOL
PAULIN MINES, MAHONING COUNTY, OHIO. Ann G.
Harris, Youngstown State University, Department
of Geology, 410 Wick Avenue, Youngstown, Ohio 44555.

Three mines in Mahoning County were sealed off or
stabilized during the summer of 1985. They were the
Tibbets Mine in Austintown Township, the Sait & Sol
Paulin in Beaver Township.

The Tibbets is a drift/slope entry that has been
sealed off many years ago by pushing dirt into it and
normal erosion had exposed it again. Since children were
going into the mine and there was a shaft in the middle
of the floor, the entry was sealed off with concrete.

The Sait & Sol Paulin was located at the Fonderlac Country
Club, practice golf range. The entrance was in a ravine
that had been filled in, however, the dirt was still
below the mine and a large hole on the surface. The
original tunnel was exposed by excavation and sealed off
with concrete and then backfilled.

9:30 THE CONVERTABILITY OF OHIO COALS BASED UPON
THEIR OPTICAL ANISOTROPISM. McMahon, David A.
Geology Department, University of Toledo,
Toledo, Ohio 43606.

The vitrinites of the Lower and Middle Kittanning, Pitts-
burgh and Clarion coals were measured for the 3 mean maxi-
mum (R_{max}) and apparent 5 mean minimum reflectance values.
These values according to Ting (1981), were used to calcu-
late the birefringence (R_b) of the vitrinites of each coal. In
addition, the R_p was calculated as follows: R_b/3/2
(R_{max}-R_{min}).

Ting observed that optical anisotropy reflects the in-
ternal molecular structure and surface area of the coal and
therefore can be used to assess the methane content and the
convertibility of coal to a liquid or gaseous product. The
Anisotropic Ratio (R_p) was calculated as R_{max}/R_{min}.

In 1985 Ting demonstrated that coals of low anisotropic ratios
yielded more adsorbed/absorbed hydrocarbons upon heating
than those coal which exhibit a high R_p ratio.

Comparison of Ohio coals which exhibit high % conversion
yielded R_p ratios which are similar to values recorded by Ting
for good coking coals. It is suggested, there-

1:30 SECTION BUSINESS MEETING

2:00 BEDROCK GEOLOGIC MAP OF HAMILTON COUNTY, OHIO.
E. Mac Swinford, Ohio Department of Natural
Resources, Division of Geologic Survey, Fountain Square, Columbus, Ohio 43224

Amended Ohio House Bill 385 mandates the Ohio Department of
Natural Resources, Division of Geologic Survey to produce
geo logic maps for every county in the state. Field work for
the production of the 1:62,500 scale bedrock geologic map of
Hamilton County, Ohio has been completed as part of this
statewide mapping program. The county map will be accompa-
nied by columnar and cross sections and a brief explanatory
text describing the rock units and any significant geologic
findings.

The interbedded, fossiliferous limestones and calcare-
ous shales of the Falls Automation Group (Upper Ordovician)
have been divided into seven formations based on field map-
ning at a scale of 1:24,000, measured sections, and core des-
criminations. Lithologic criteria used in defining the for-
ations include the ratio of limestone to shale and bedding style of
the limestone and shale beds. In ascending order the units
mapped are: the Poin Pleasant tongue of the Clays Ferry
Formation, the Kope Formation, the Fairview Formation, the
Miamitown Shale (designated by a line because it is too thin
and difficult to see); the Miamitown Shale, the Arnhelm For-

9:45 CHEMICAL METHODS OF ELIMINATING MINERAL MATTER
AND ESPECIALLY SULFURES FROM COAL. R. Balti-
more, The Chemistry Department, The University
of Toledo, Toledo, Ohio 43606.

The chemical extraction of mineral matter, particularly
sulfides from coal is generally a costly business, both in
the use of chemicals and in the operation of complicated
techniques. It is generally recognized in the mining se-
industry to burn the coal and an alternative usage may have to
be sought to make a profit out of the resultant product. In considering
the chemicals, two factors may reduce the costs. The first is the recovery of the chemicals. The second is to use
chemicals which are themselves coal based.

Two possible systems are considered here - the first, a
simple solvent extraction process - demonstrated by a
series of laboratory experiments, utilizes a highly
cpolar solvent to dissolve out a large fraction of the coal.
This can be progressively reprecipitated by the use of less
cpolar solvents. Precipitated residues can be developed
into high capacity activated carbon adsorbents. Alter-
natively, the original solvent extract can be hydrogenated
and distilled to give a gasoline fraction.

A second system consists of reacting the carbonaceous
material with potassium hydroxide, leaching out and
recovering the KOH.

10:00 COMPUTER METHODS FOR THE PETROGRAPHIC PREDICT-
ION OF THE COKEING AND BLENDING POTENTIAL OF
SELECTED OHIO COALS. Blessing, D. R., and
Kneller, W. A., The University of Toledo, Toledo, Ohio 43606.

A series of computer programs were developed to evaluate
the potential use of Ohio coal coals reserves as components
of coke blends. The programs are designed as a tool for es-
ablishing a coke quality from data derived from channel
and core samples. Provisions are made to estimate
the float/sink wash reductions for raw unwashed coal.

The U.S. Steel methods were followed for predicting the
ASTM coke stability factor of individual coals and blends.
The computerized system includes 4 blending programs which calculate blend compositions for two to five component
blends, and assess each blend for optimum coke strength and
chemical quality. Fifty-two Ohio coals were selected from
the principal coal producing areas in Ohio. These coals
were blended with established coking coals. The data set
includes several of best bench and lithotopic samples. Var-
ious sample types were studied to determine the extent to
which mixing and preparation processes may be modified to
extract a metallurgical grade product.

Preliminary investigation indicates that some of the
Ohio coals which are poorly coking and high in sulfur and
ash can be upgraded to meet coking quality criteria. It
was observed that Ohio coals are acceptable as blend
components in formulating 5 to 10 percent of metallurgical
coke blends.

Second Afternoon Session - Bowman Oddy 3045
Saturday, April 26, 1986

Mark J. Camp, Presiding

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The Old Woman Creek estuary is a shallow body of freshwater that opens into Lake Erie, located 1 mile east of Huron, Ohio in Erie County. The mineralogy of the sediments in the estuary and of the rocks and sediments in the drainage basin were determined in order to determine which are the most significant sources of sediment to the estuary. There have been few attempts to determine the provenance of sediments in modern muddy environments. Estuarine sediments contain almost no carbonate materials, suggesting that these may be the least stable mineral group studied.

Possible source materials include: (1) glacial till, (2) glaciolacustrine sediment, (3) the Ohio Shale, (4) the Berea Sandstone, and (5) soils derived from the previously listed sources. Minerals found in these rocks and sediments are mica, feldspar, chlorite, kaolinite, plagioclase, calcite, dolomite, siderite, and pyrite. Preliminary results of X-ray diffraction analyses of bulk samples suggest a relative weight of 19/7/7 ratio as a characteristic of glacial till, which indicates that it is a significant contributor to the estuarine sediments.

Estuarine sediments contain almost no carbonate materials, suggesting that these may be the least stable mineral group studied. K-feldspar to plagioclase ratios appear to be unaffected by weathering and transport, in that they are comparable to the ratios of the source material.

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Stream or river anticlines have been described in the literature, most recently by Twinford (1985) in the Ohio Geology Newsletter. However, few geologists have seen river anticlines or are aware of their existence. Grand Canyon river trips traverse almost 100 km of Muav limestone and Bright Angel Shale outcrops which dip away from the Colorado River and which are most easily explained as a river anticline. Palaeozoic rocks above the Muav are not distorted or folded as are the Muav and Bright Angel near river level.

THE DETERMINATION OF REMNANT HIGHS IN THE KNOX UNCONFORMITY USING GRAVITY AND WELL LOG DATA, Dr. P. Wolfe, Dr. D. Kuklander, Dr. B. Richard, W. Armstrong, P. Kelly, C. Sweazy, Dept of Geological Sciences, Wright State University, Dayton, OH 45435.

Remnant highs within the Knox unconformity of Ohio are examined within Cardington Township, Morrow County, Ohio. The intention of the study is to compare known remnant highs to gravity data collected over them. A three square mile area in the northeastern portion of the township is focused upon here. It is chosen for its excellent well control and because it shows little major gravitational "noise" from other geologic features.

Two methods are used here to locate these remnant highs, and their usefulness is compared and contrasted. The first method is detailed well-log analysis of all the wells within the township. Structure contour maps of the Knox unconformity itself, the Trumon Limestone and several rock units in between are constructed, as well as isopach maps between those units.

In the second method, the results of a detailed gravity survey are used. Because of the size of gravity anomalies produced by these remnant highs and their associated drape features (less than one mgal.), a high precision survey has been carried out. Survey parameters include 220 foot station spacings and a 0.1 foot elevation control at each station.

4:15 COMPARATIVE STUDY OF SEISMIC EXPLOSIVE SOURCES IN A THICK GLACIAL TILL AREA. James R. Plomer, 260 Srehio, Wright State University, Dayton, OH 45435

In this study three different types of explosives are utilized to collect seismic reflection data over the same traverse. A reflection profile reveals that between 5 and 115 feet of till cover bedrock along the line. The data were processed utilizing the same processing parameters for each source. These data are also similar to those used to produce soil compactor (Wacker) energy source data generated along the same seismic line. Final sections were produced utilizing reflection stacking, gain recovery, frequency filtering, correlation stacking, deconvolution and velocity filtering. The final sections are compared on the basis of reflection strength, continuity and resolution. A computer generated synthetic seismogram compares the final section with a predicted section.

The data demonstrates that shaped charges produced the best quality record of the three explosive sources. All of the explosive generated data are superior to those generated by the Wacker. The Wacker has a weak input signal which fails to generate effectively through an appreciable amount of glacial till.


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4:00 SECOND AFTERNOON SESSION - BOWMAN ORGARDS 3051 SATURDAY, APRIL 26, 1986 R.J. Malcuit, PRESIDING
acid etch, that were comparable in quality to photomicrographs from thin sections of graphs of fifteen of these peels permitted determination of: sedimentary rock diagenetic effects from sandstones; strain values from several sedimentary and metamorphic tectonites; and chronology of development of igneous rock structures from four of the samples. Although optical characteristics of rock constituents cannot be determined from photographs of acetate peels, this method has the advantage of permitting a much larger surface to be examined than through study of standard thin sections.

2:45 MINIMUM COMPACTIONAL POROSITY: A NEW GRAIN SHAPE MEASURE. Harrell J. A., Department of Geology, The University of Toledo, Toledo, Ohio 43606

It has long been recognized that shape influences the extent to which loose grains can be compacted. Higher degrees of sphericity and roundness tend to result in lower compactional porosities because of reduced intergranular friction. These observations have suggested a new measure of grain shape: minimum compactional porosity. The methodology involves the following steps. (1) A uniformly sized sample (e.g., a sieve fraction) of sediment or disaggregated sedimentary rock is loaded into a cylinder along with isopropyl alcohol which acts as a lubricant. (2) The cylinder is placed in a water bath and vibrated ultrasonically until maximum compaction is achieved. (3) From the volume of compacted sample, and weight and average density of the grains, the minimum compactional porosity can be calculated. Experiments with a variety of sediment and rock samples have demonstrated that the minimum compactional porosity (MCP) decreases as sphericity and/or roundness increase. The MCP for single size fraction (e.g., mean grain size) or all size fractions (e.g., histogram of MCP vs. size) can be used to compare samples within a suite and thereby document shape sorting or changing provenance. The MCP shape measure has been successfully used to map the sediment dispersal pattern of the Marshall Sandstone (Mississippian) in the Michigan Basin.

3:00 HYDROTHERMAL SYNTHESIS OF SODIUM SILICATES. Croydon, Robert M. and Phillips, Michael W., Department of Geology, The University of Toledo, Toledo, Ohio 43606

Three sets of starting materials, each with a different Al to Si ratio, were prepared based on anhydrite formulas with Al to Si ratios of 1 to 2, 1 to 3, and 2 to 3, respectively. Several hydrothermal experiments for each of the different compositions were performed using single gold capsules and cold seal pressure vessels. The experiments were carried out at temperatures ranging from 300 to 500°C and at pressures ranging from 300 to 500 bars. The run durations ranged from 10 to 30 days. All of the run products, when analyzed by x-ray diffraction, were found to contain quartz and niterite (NaAlSiO3). Paragonite (NaAl2(AlSi3O10)(OH)) was found in all but one of the run products. In most of the run products analyzed, the presence of the niterite acted as a sink resulting in a marked decrease in the amount of sodium available for other reactions. In three of the run products with reduced levels of niterite, albite was found in one while analcime was found in the other two samples. The formation of the albite in run 4, assuming paragonite and analcime as intermediate phases, is in agreement with previous work. Both analcime run products were estimated to have an Al:Si ratio of 3.7.

3:15 THE USE OF THERMAL ANALYSIS IN THE CHARACTERIZATION OF FEAK DISTRICT LIMESTONES. B. Dulinuco, Wright State University, Department of Geology, The University of Toledo, Toledo, Ohio 43606, and A. Dyer and O.M. Wilson, Department of Chemistry and Applied Chemistry, University of Salford, Salford, M54 5WT, UK.

The Peak District is an area in the Southern Pennines of England containing extensive limestone beds of the lower carboniferous period. It is shown that differential thermal analysis (DTA) provides a method of distinguishing between the various limestone beds. The basis of this work was the fact that the main endothermic reaction of the DTA is the main mass loss in thermodgravimetric analysis (TGA) provided a measure of the carbonate content, but the overall "profile" of each DTA trace was significant in the process of identification. The samples were taken from two separate occurrences within each standard section and 8-10 samples from each location subjected to DTA. The main area of the DTA peak corresponding to carbonate decomposition was determined within 10% deviation. Similar data in terms of mass loss was recorded using the TGA equipment. There was a close reflectance of these recordings with the full wet chemical analysis quoted for adjacent, but closely geologically related strata.

3:30 THE ROLE PLAYED BY SULFATES AND ASSOCIATED SPECIES IN THE MANUFACTURE OF PORTLAND CEMENT: A CASE HISTORY IN INDUSTRIAL GEOLOGY. M.C. Clark, J. Bollimore, and A. Dyer, Department of Chemistry, The University of Toledo, Toledo, Ohio 43606, and Department of Chemistry and Applied Chemistry, The University of Salford, Salford, M54 5WT.

This project investigates the role played by sulfates and associated species in the manufacture of Portland cement and their influence on product quality. The sulfur compounds present in the clay and shale quarries in the cement works under consideration in Derbyshire, England are described. Various programs to assess the composition of the shale containing different modes of quarry operation are described. These programs allow the most suitable method of quarry operation to be selected in order to give a pre-selected shale sulfur content. Investigations into the reduction of the shale sulfur content by bacterial oxidation and subsequent leaching of the soluble sulfates are reported. A method of proportioning different shales to give a target sulfur content and the correct raw mix from local quarry materials is described.

The sulfur content has to be kept to a low target figure, because it affects the feed through of the limestone-clay mix, and because the sulfur has an effect on the refractory lining of the kiln operation.

3:45 ELECTRON PROBE ANALYSIS OF MINERALIZED JOINTS FROM THE UPPER REEKMANTOWN (LOWER ORISKANY) IN THE SOUTHERN SHENANDOAH VALLEY. Watkins, Michael L., Dean, Stuart L., and Phillips, Michael W., Department of Geology, The University of Toledo, Toledo, Ohio 43606.

Fifty-five oriented samples of limestone and dolostone were collected from the upper Rockdale Run Formation (Upper Beekmantown, lower Oriskany) in the eastern and western belts of the Massanutten Synclinorium in the northern Shenandoah Valley. Forty-nine samples had mineralized joint fillings sufficiently well developed to study the relationship of the filling material to the adjacent rocks. All rock and vein fillings were analyzed by electron probe. Traverses were made on all samples across the veins into the adjacent rock, as well as longitudinally along the veins.

Dolomite vein fillings were found only in six samples, all of which had dolostone country rock. Calcite veins were abundant in both limestone and dolostone samples. Eight specimens with dolostone country rock had quartz vein material, mostly authigenic, associated with calcite and dolomite mineralization. The presence of detrital quartz grains in a few veins suggests hydraulic injection during joint opening. Probe analyses and thin-section studies indicate that the source of the vein filling material was local, that is within a few centimeters stratigraphically, of the surrounding rock. Structural criteria indicate that the veins apparently opened primarily during folding.

4:00 PETROGRAPHY OF THE ORISKANY SANDSTONE FROM FIVE WELLS IN OHIO AND PENNSYLVANIA. Joseph B. Dunicmaco, Wright State University, Department of Geological Sciences, Dayton, Ohio 45435.

The Lower Devonian Oriskany (Ridgley) Sandstone of the Deeparkian Stage is a major producer of gas and oil in the Appalachian Basin. The diagenetic and post-diagenetic history of the cement-porosity relationships has been studied in well cores from two wells in Ohio and three wells in Pennsylvania, representing all three 300 drilled feet of Oriskany. Effective porosity is intergranular, intragranular and in fractures. The paragenetic events observed include: pressure solution of detrital quartz grains; subrounded quartz overgrowths or rounded detrital grains; silification of fossil fragments; pressure solution of calcitic brachiopods and crinoids; deposition of calcite from intergranular solution of quartz and dolomite by calcite; dissolution of feldspars; introduction of calcareous matter as grain coatings and pore fillings; growth of authigenic clays and pyrite; stylolitization and fracturing.
were moving in opposition with a velocity of 29.78 km/sec. to overflowing with catastrophically produced meltwater.

The first phase suggests opposing forces between our orbit-
other evidence, reveal the necessity for an alternative

The second phase of action — acting simultaneously with the
Cross-sectional distortions of the Great Lakes basins and
in making the Great Lakes was the melting of the hurled ice
and covered the warped basins with sand, gravel, clay and

The crystal structure of a pollucite crystal (Na$_{12}$Si$_{3}$O$_{24}$F$_{6}$H$_2$O) from Hebron, Oxford Co., Meine (Harvard Museum #0052) has been refined in space group Ia3d (a = 13.689(1) using a CAD4/WAXS diffractometer employing a monochromator and MoK$_\alpha$ radiation. The refinement is based on 324 non-zero, non-equivalent averaged reflections using

A REFINEMENT OF THE STRUCTURE OF POLLUCITE. Beaverstock, David M. and Phillips, M. W., Department of Geology, The University of Toledo, Toledo, Ohio 43606.

The final refinement with isotropic temperature factors and occupancies based on Beger's model and chemical analyses yielded an agreement factor: $R = 0.050$. A difference Fourier synthesis at these areas had two small but significant positive peaks disposed about the Cs site at a distance of about 0.8 A. These peaks disappeared when Cs was allowed to refine anisotropically ($R = 0.050$). It remains unclear whether these peaks represent slight positional disorder of H$_2$O in the cavity or are merely artifacts arising from the isotropic constraint on Cs.

SECTION C, GEOLOGY
Poster Session - Student Union, Ingram Room Saturday, April 26, 1986

Board C SEDIMENTOLOGY OF TRACE FOSSILS IN
@ 9:00 AM CARBONIFEROUS ROCKS FROM SOUTH-CENTRAL KENTUCKY. CLOSE, Jay C., Dept. Geology, Southern Illinois University, Carbondale, IL 62901.

Sedimentological interpretations of Carboniferous ichnofossils from south-central Kentucky have been combined with other data in order to form a rate refined paleoenvironmental reconstruction. Ichnofossils from the Chesterian shallow marine and Morrowan fluval-deltaic lithofacies generally occur as hypichnia displaying positive semi-relief, and are generally confined to fine-grained sandstones that directly overlie shales. The ichnofossils are relatively rare, indicating that environmental conditions present during Chesterian-Morrowan sedimentation were mostly harsh. Preservational bias has destroyed any evidence of body fossils that may have been present. Crawling, grazing, and feeding ichnofossils are the most common types. The vaga, deposit feeding faunal ingested nutrients that had settled out of suspension onto relatively firm clay substrates. The fauna probably would not have searched for food on mobile clay surfaces because of burial risks. Therefore, these areas had to have experienced appreciable dewaterting prior to invasion.

Board D COLLISION TECTONICS, FORMING THE BASINS FOR THE GREAT LAKES — WITHOUT GLACIERS. Chester A. Davis, Technician, Department of Physics Marietta College, Marietta, OH 45750

Cross-sectional distortions of the Great Lakes basins and other evidence, reveal the necessity for an alternative theory for the origin of the Great Lakes. Three phases of collision forces are proposed as having made these lakes. The first phase suggests opposing forces between our orbiting planet and a colliding comet. This could provide a source of kinetic energy over a short time to deform strata of the Great Lakes Region. A mechanical device shows how some strata can be distorted by a simulated collision. The device moves a simulated quantity of strata, while a simulated colliding comet produces a retarding force. The comet is proposed as having had a diameter of 30 kilometers; striking Earth with a velocity of 1000 m/sec. The strata were moving in opposition with a velocity of 29.78 km/sec.

The second phase of action — acting simultaneously with the first — was the hurling of crustal materials, which fell and covered the warped basins with a thick layer of other fallout — including ice. The third phase of action in making the Great Lakes was the melting of the hurled ice from the Arctic ice cap, which soon filled the new basins to overflowing with catastrophically produced meltwater.

A mid-continent flood occurred at that time, at the beginning of the Ice Age, rather that at its end. These findings are a much-needed breakthrough. They show why glaciers were possibly not involved in creating the Great Lakes.

SECTION D, MEDICAL SCIENCES
First Morning Session - STRANAHAN 114 Saturday, April 26, 1986

SAM ROSEN, PRESIDING

THE EFFECT OF VASOPRESSIN REPLACEMENT ON HEART RATE IN FOOD-DEPRIVED, NASOPRESSIN-DEFICIENT RATS. J. J. Senevola, R. Widmark, and Helen M. Murphy. John Carroll University, Cleveland, OH 44118.

Research indicates that food-deprived, vasopressin-deficient (Brattleboro) rats exhibit bradycardia when compared to controls. This study was an attempt to investigate the effects of vasopressin replacement on heart rate in food-deprived Brattleboro rats. Four groups of Brattleboro rats were utilized: 1) food deprived for 23 hrs/day and given daily injections of vasopressin, 2) food deprived for 23 hrs/day and given daily injections of peanut oil, 3) food deprived for 23 hrs/day and given no injections, and 4) not food deprived and given no injections (control). Following a 7 day habituation period, rats were maintained on this protocol for 9 days. Each day an EKG was recorded. Heart rates for each day of the experimental period were compared with the rates on the last day of habituation. Statistical analysis of heart rates revealed a significant decrease in heart rate on day 2 of the experimental period. Vasopressin injected animals had a significantly greater increase than the other groups. On day 4, all groups except the control group had a significant decrease in heart rate, with the vasopressin injected group showing attenuated effects compared with the other two experimental groups. The results of this experiment indicate that vasopressin replacement is effective in delaying the onset of bradycardia in food-deprived Brattleboro rats.


All have tumor mice die eight days post implant. This tumor has a 100% efficacy in DBA/1J mice. Oxygen consumption of bone marrow cells from normal and tumor implanted mice was done on a VSI-model during the first five days. The oxygen consumption of bone marrow cells from tumor implanted mice was lower than normal. In previous work we have shown that the sixth day is the transition day for the implanted animal. The normal mouse bone marrow consumed 2.6±1/IXO7 cells/60 min. Five-day post implant bone marrow cells consumed 1.4±1/IXO7 cells/60 min. Eight-day post implant bone marrow cells consumed 2.8±1/IXO7 cells/60 min. Eight-day post implant bone marrow cells consumed 3.2±1/IXO7 cells/60min. The BRL/lui mouse demonstrates severe hepatocarcinosis and progressive cachexia during and after the transformation phase. We postulate that progressive hypoxia in bone marrow induces increased mitochondrial activity in bone marrow cells of cachexic mice.

9:30 DEVELOPMENT OF A TWO-STAGE MODEL FOR TRANSPLANTABLE CARCINOGENESIS IN THE MOUSE. Christopher M. Weghorst, James E. Klausing and Gary D. Stoner, Department of Pathology, Medical College of Ohio, 3000 Arlington Ave., Toledo, Ohio 43699.

Our laboratory is currently investigating the mechanisms of two-stage carcinogenesis (tumor initiation and tumor promotion) in newborn and fetal animals. Previous studies have shown the mouse fetus to be highly susceptible to the development of neoplasms when exposed in utero to chemical carcinogens. In the present study, male and female C57 X A/J strain mice received a single dose (5-50 mg/kg body weight) of ethylnitrosourea (ENU) via maternal intraperitoneal injection at day 15 of gestation. At parturition, one half of the newborns received drinking water containing 500 ppm phenobarbital (a known tumor promoter) while the other half were given normal water. All mice were sacrificed and examined for hepatic and pulmonary tumors at various time intervals up to 6 months after weaning. Appropriate controls were also performed for comparison. The development of a two-staged carcinogenesis model in embryonic exposed...
mice may be beneficial for a) the study of the mechanisms involved in the tumor initiation and promotion of embryonic and fetal organs and b) the reduction of time and cost involved in the detection of tumor initiators and/or tumor promoters. The latter being a result of a short latency period of tumor development exhibited by transplanted treated animals compared to animals exposed as adults.

**EFFECTS OF BREAST SELF-EXAMINATION ON STAGE OF BREAST CANCER**

by: Joshua Muecat, Ohio Dept. of Health, P.O. Box 133, Columbus, OH 43210

The frequency of breast self-examination(BSE), breast examination by physician & mammography was studied in relation to pathologic stage of breast disease. Data was examined using the population based case-control study Center's for Disease Control's Cancer & Steroid Hormone Study (CASH). Stage of disease for 918 newly diagnosed breast cancer patients aged 20-55 yrs was validated using the Connecticut Tumour Registry. A nondiseased control group of 887 age-matched women randomly selected from the population of Connecticut was also studied.

After adjusting for the effects of mammography & physician examination, no association was found between stage of disease & frequency of BSE. The use of an early stage comparison group to late stage cancerous women allows the comparison of these results to prior studies on the efficacy of BSE. However, an early stage comparison group might provide a biased result. It is likely that among those women who had cancer detected at an early stage, there was a higher frequency of breast screening techniques than the general population of women. Lead-time bias among early stage would make lead stage bias less appropriate for comparison. Using the nondiseased control group & adjusting for known & suspected risk factors for breast cancer, frequency of BSE still was not found to be associated with stage of disease. Prospective studies need to show the value of BSE before it's use is widely advocated.

**SECTION D. MEDICAL SCIENCES**

**SECOND MORNING SESSION - STRANAHAN 118**

**SATURDAY, APRIL 26, 1986**

**MARSHA KREIMER-BIRNBAUM, PRESIDING**

**COMPARATIVE HEPATOTOXICITY OF HALOGENATED HYDROCARBONS IN RAT, MOUSE, DOG, AND PRIMATE PRIMARY HEPATOCYTES.**

Norman E. Schultz and James F. Klaunig. Department of Pathology, Medical College of Ohio, Toledo, Ohio, 43699.

Our laboratory is investigating the cellular mechanisms of hepatocellular toxicity and carcinogenicity. Previous in vivo studies have shown a species variability in response to the toxic and carcinogenic effects of toxic compounds on hepatic tissue. Rodent hepatocytes in primary cell culture have been shown to closely duplicate in vivo response to toxic compounds. In the present study we developed methods for the isolation and culture of canine and primate (monkey) liver, 2) investigated the comparative toxicity of carbon tetrachloride (CCl4), chloroform (CHCl3), trichloroethylene (TCE), and trichloroethanol (TCEth) on cultured hepatocytes from the 4 species. Relative toxicity of the 4 compounds in the 4 species is shown below with the species most sensitive to the toxic effects of the compound listed first. Toxicity for: CCl4 showed mouse > rat > dog; CHCl3 showed mouse > rat > dog; TCE showed mouse > monkey > rat > dog; and TCEth showed mouse > dog > monkey > rat.

**CELL-FREE TOXINS OF KILLER YEASTS.**

Y-H CHI and P F LEHMANN. Microbiology Department, Medical College of Ohio, C. F. #10008, Toledo, Ohio 43699.

Cell-free toxins from Debaromyces vanriji (ATCC 36689), Kloekomyces marxianus var. marxianus (ATCC 36907), K. marxianus var. lactis (ATCC 8565) and Saccharomyces cerevisiae ("superkiller"; strain T158C X S1a) were prepared in culture supernatants after killing yeast cells in growth medium without broth. The toxins were assayed on plates seeded with a sensitive yeast strain (either Candida albicans or S. cerevisiae). Toxins were concentrated via filtration through membranes having pore sizes allowing passage of molecules with MW 10,000 or MW 25,000. In some cases, the toxins were concentrated using a hollow fiber membrane filter which allowed for a rapid production and large volume of product. The cell-free toxins could be applied to filter paper discs and these discs used for testing the sensitivity of different yeast strains. Discs could be stored at -20°C.

The toxins were inactivated by heat or alkali conditions. Characterization of the toxins' behaviour on a column containing Sepharype 200 (Pharmacia), showed that the preparation could be further purified by this procedure. Other toxins were lost or inactivated on the column, even when using buffer of high ionic strength.

**EFFECTS OF NIOITCINE ON RAT ORAL MUcosa.**

Kathleen L. Schroeder and Jeffrey A. Babushkin, College of Dentistry, Ohio State University, Columbus, Ohio 43210

This research studied the early changes associated with topical nicotine administration at concentrations relative to popular smokeless tobaccos(ST), and measure the relative absorption of nicotine using cotinine as an indicator. Twenty-seven Sprague-Dawley rats (mean 460-650 gms) were divided into 7 groups as follows: Control groups 1) swallowing only; 2) nicotine in orabase; Treatment groups - III-1.6mg/gm nicotine in orabase, IV-2Mg/gm nicotine in orabase, V-ST(4.1 mg/gm nicotine), VI-ST(0.6mg/gm nicotine), VII-ST(1.6 mg/gm nicotine). These groups received administrations 3 hours/day for up to 90 days in the lower lip pouch. After oral examination, the rats were sacrificed and levels of 3, 7, 40, and 95 days. Gingival and labial mucosal specimens were divided for SEM and light microscopic examination. Blood samples were taken at sacrifice for determination of cotinine levels. The findings reveal a hyperkeratosis, an increase in mitotic activity, an acanthosis and dyskeratosis using light microscopy. SEM observation revealed ulceration epithelial denudation, leukocyte infiltration, and hemorrhage. Cotinine levels were highest in group V followed by groups III and IV. Differences in cotinine concentration used as an indicator of absorption of nicotine, appears to be reflected in the morphological changes observed in groups III, IV, and V.

**ERYTHROCYTE PROTOPLASM (E.P.): IMPROVED METHODOLOGY FOR DETECTION OF LEAD POISONING.**

Michael R. Lust and Martha Kreimer-Birnbaum, St. Vincent Medical Center, 2213 Cherry St., Toledo, OH 43608.

Lead poisoning is still a problem of significant magnitude among low socioeconomic pediatric populations as well as in industrial settings. Determination of E.P. is the screening method of choice, presenting several advantages over direct blood lead testing. Ten ul of whole blood is added to a suspension of diatomaceous earth and extracted with ethyl acetate-stearic acid (1:1) mixture. Porphyrins are later extracted into dilute HCI and quantitated by fluorometry, using coproporphyrin as a standard. Evaluation of the method's performance over four years of participation in the Centers for Disease Control E.P. proficiency testing program has shown excellent agreement with the target values (mean 97.3%, standard error of the mean = 0.92). In addition to its excellent performance record, this method offers advantages over similar solvent extraction procedures: it requires fewer technical steps, utilizes a more stable standard for fluorometry, and very important, its overall cost is lower. (Supported in part by a grant from the F. M. Douglass Foundation.)

**SECTION D. MEDICAL SCIENCES**

**FIRST AFTERNOON SESSION - STRANAHAN 114**

**SATURDAY, APRIL 26, 1986**

**SAM ROSEN, PRESIDING**

1:30 **SECTION BUSINESS MEETING**

2:00 **SYMPOSIUM ON NEUROSCIENCE**

**NEUROSCIENCE: YESTERDAY, TODAY AND TOMORROW**

**KEITH ALLEY, CONVENER**

3:00 **VANADIUM-INDUCED LIPID PEROXIDATION IN THE RAT BRAIN.**

Parinandi, N. and W. Jyung, Department of Biology, University of Toledo, Toledo, OH 43606.

Effect of three oxidation states of vanadium viz. III, IV, and V on lipid peroxidation (spontaneous autooxidation) in rat brain cerebral cortex homogenate and its partially purified membranes was investigated. Phospholipid
lipsomes were also used as a model system. Formation of the thio Barbic acid reactie mateiials (TBAH) 90 minutes after incubation with the element in the lipid model system was used as an index of lipid peroxidation measured spectrophotometrically. Of all the three oxidation states screened, vanadium (III) appeared to be the highest, vanadium (IV) appeared to be intermediate, and vanadium (V) appeared to be at least in their lipid peroxidation inducing capacities. The dose-response relationships of all the three oxidation states of vanadium and the mechanisms of lipid peroxidation will be presented.

3:15 RECIPIENT RECORDING OF VALSALVA'S MANEUVER: A POWERFUL TOOL IN THE CLINICAL EVALUATION OF THE AUTONOMIC NERVOUS SYSTEM. Walter L. Olson, MD. Toledo Neurological Institute 3949 SunForest Court Toledo, Ohio 43623

Since the description of the valsalva ratio by Levin in 1966 the valsalva maneuver has been used to assess the parasympathetic reflex and/or overall autonomic function of the cardiovascular autonomic innervation. The valsalva ratio utilizes functional changes in heart rate which depend on the integrity of both adrenergic efferent and parasympathetic function. The rectilinear recording of the valsalva maneuver allows extraction of a and b adrenergic responses and of parasympathetic response separately. An a ratio (hypertensive overshoot response), a b ratio (tachycardic response) and a parasympathetic ratio (bradycardic response) are proposed. Patients with sympathetic, parasympathetic and autonomic failure studied with valsala's maneuver are presented.

3:30 DEVELOPMENT OF HYPOTHALAMUS-PITUITARY-ADRENAL (HPA) AXIS IN YOUNG RODENTS: INFUENCE OF TsHOURACIL OR CONGENITAL HYPOThYROIDISM. Lee A. Reserve, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

For appropriate output of adrenal steroids after stress, proper development of hypothalamic-pituitary-adenal (HPA) axis in mammals is required. Response of the axis in young rodents i.e. pre- and post-natal, with maturation to adult levels around 1 mo of age. Functional capabilities of HPA components of rat and mouse pups from dams fed thiouracil (0.25%) and from congenitally hypothyroid mice young rodents is grossly sub-adult, with maturation to adult levels around 1 mo of age. Thiouracil (0.25%) and from congenitally hypothyroid mice young rodents was measured with in vivo and in vitro techniques. Normal pups evidenced a rise in serum corticosterone 15 min after ether stress or ACTH injection, which increased from 15-25 days of age. Response of the axis after thiouracil intake in 15-30 days, but ACTH caused corticosterone release at 15-35 days. Delayed maturation of the hypothalamic HPA component was suggested by absence of thioaracil-modified basal corticosterone. This suggestion was supported by vitro perfusion studies of 15 day old rats, as thioaracil did not change adrenocortical response to ACTH or pituitary ACTH content, but improved hypothalamic bioactive CRF by 95% and immunoreactive CRF by 61%. Hypothalamic extracts from 15-30 day old congenitally hypothyroid mice contained less immunoreactive CRF than from euthyroid littermates, but differences were less than with thioracil. Congenital hypothyroidism seems to influence HPA development more profoundly than thioracil.

3:45 STRAIN-TYPING YEASTS. LE Cowan, RN Jones, WJ Ferencak III, PF Lehmann. Microbiology Dept., Medical College of Ohio, CS 10008, Toledo, OH 43608

Different susceptibility to killer yeasts and the presence or absence of agglutination by lecithin and antibodies were used as a basis for classifying yeasts. Using killer yeasts alone, 60 isolates of Candida albicans were placed into 34 biotypes. Those biotypes containing 5% of the isolates could be further subdivided with monoclonal antibodies. Other yeast species could be typed in the same manner and showed differences in their susceptibility to certain killer yeasts and to agglutination by lecithin and antibody. E.g., while C. albicans and C. tropicalis were killed by Debaryomyces vanillii (ATCC 36955) and Saccharomyces cerevisiae and Cryptococcus neofor mans were not. The use of many killer yeasts and antibodies greatly improved the typing procedure initially reported by Polonelli et al., who subdivided C. albicans into 10 biotypes. However, while our largest biotype group held 7% isolates, 52% of their isolates fell in a single biotype group. The procedure will be useful for monitoring yeast spread in hospitals and in other environments. (LEC and SMJ were participants in the Research Apprenticeship in Science Program).

4:00 HEALTH ATTITUDES AND NICOTINE CONSUMPTION IN SMOKELESS TOBACCO USERS. Kathleen L. Schroeder and G.B. Iaderosa, College of Dentistry, Ohio State University, Columbus, Ohio 43210

150 randomly chosen male subjects 50 smokeless tobaccos(S.T.) users, 50 smokers, and 50 non-smokers were divided into 3 groups and surveyed for tobacco habits and health attitudes. The nicotine yield% of(S.T.) and the S.T. user's 1 brand of choice were determined for a "potential" usage profile. Light(0-9mg nicotine/week or 0-4mgkg), Moderate (90-388mg nicotine/week or 40-192mg/kg), and Heavy (388+mg nicotine/week or 24+mg/kg). A frequency determination of the age of onset for specific tobacco habits showed a bimodal curve for ST users and a uni-modal curve for smokers. The 2 peaks for ST users were at age 16(n=45) and age 18(n=15) compared to one peak at age 16(n=9) for smokers. This suggests two different populations among ST users. Analysis of education level, years of use, and weekly nicotine consumption were done. Those initiating ST usage at a young age(<15 years) exhibited a lower level of education(11.6 years completed) than those with an older age of onset(14.1 years completed). This data proved highly significant(P<0.05). 60% of the young initiators lived in a rural setting as compared to 40% of the older initiators. Young initiators used killer twice as often as ST users. Of all ST users who quit smoking began their habit as an alternative to smoking. This study distinguished ST users and smokers and established a definition of the ST user.

4:15 SURVEY OF STERILIZATION AND ASEPSIS PROCEDURES IN DENTAL OFFICES. Lynn Miklar and Sam Rosen. The Ohio State University College of Dentistry, 305 West 12th Avenue, Columbus, Ohio 43210.

Although recent publications have recommended procedures for sterilization and disinfection in the dental office, virtually no information is available regarding current practices. The purpose of this study was to obtain information from dental practitioners about their aseptic procedures, and to compare the findings with the guidelines for infection control established by the ADA's Council on Dental Therapeutics.

A questionnaire was sent to 4000 randomly selected dentists in California, North Carolina, and Ohio. Of the 513 responding offices, "effective and preferred" methods of sterilization were used by 96% of offices for the sterilization of surgical instruments; decreasing to 52% of offices for the sterilization of general hand instruments. For their handpieces, "ineffective" methods of sterilization methods were reported by 85% of offices. The only acceptable practice in the use of injection needles is to dispose after each patient. However, 2.3% of offices reported "sterilizing" needles between patients. This study identified a variety of aseptic techniques being employed in today's dental offices. The survey showed that reusable instruments and materials are not being sterilized by acceptable procedures, and may be a pathway for the transmission of disease. The need to convey information from the scientific community to the dental practitioner is obvious.

4:30 FATAL OCCUPATIONAL INJURIES IN OHIO, 1984. John Paulson, Div. of Epidemiology, Ohio Dept. of Health, P.O. Box 118, Columbus, OH 43210

A review of Ohio 1984 death certificates identified 178 deaths which were the result of occupational injuries received in Ohio. Information on circumstances of injury, usual occupation and industry of decedent; county of residence and occurrence; age, race, and sex of decedent; month, day of week, and time of day of injury; and time elapsed between injury and death were abstracted from the death certificates. A descriptive epidemiology of this series is presented.

Mechanical energy represented the etiologic agent in 75% of the fatalities, with road vehicle accidents responsible for 48% of all deaths. An additional 23% of fatalities were due to falls. Electrical energy was the etiologic agent in 17% of the fatalities.

Mortality rates are determined for occupational groupings utilizing Census labor force estimates as the denominator. Rates are shown to be high among construction workers and truck drivers. The accuracy and completeness of this death certificate series is evaluated through comparison with Industrial Commission of Ohio accident claim statistics.
The present study was undertaken to compare the relative enzyme activities in murine liver. Strain and sex differences have been shown in the hepatic tumor response in the mouse. Recent-
concentrations of these detoxification enzymes in male and female C3H, BALB/c, B6C3F1, and C57/Bl mice. Male mice in each strain displayed higher levels of SOD, CAT, and GP than their male counterparts. For SOD; C57 > B6C3F1 = BALB/c > C3H. For CAT; B6C3F1 > C3H > BALB/c > C57/Bl. For GP; C57 > BALB/c > B6C3F1 > C3H.


Photodynamic therapy (PDT) of tumors with Hpd, a mixture of dicarboxylic porphyrins in various states of aggregation, is based on the selective retention of porphyrins by neoplastic tissue concomitant with their rapid clearance from normal surrounding tissue. Previous studies of PDT of normal intestine have shown that a) sustained decreases of blood flow, (Selman et al., Cancer Res., in press) and b) extensive mucosal and submucosal damage. In order to correlate these changes with intestinal levels of porphyrins, jejunal segments of Fischer 344 rats were perfused with NaCl (0.9%) and homogenized in HEPES buffer, pH 7.0. Porphyrins were extracted with a mixture of acyl acetate:acetic acid and centrifuged (2000 x g) for 20 min. These experiments do not differentiate if the porphyrins were in the mesenteric circulation or taken up by intestinal cells. These increased porphyrin levels may be responsible for the decreased blood flow and for the damage observed in the normal intestine after PDT. (Supported by P.M. Douglass Foundation and N.I.H. R23 CA38754-01.)

4:45 MODIFIED PORPHYRINS AS TUMOR PHOTOSENSITIZERS. G.M. Garbo, K. Chaudhuri, B.W. Keck, S.H. Selman, M. Kreiner-Birnbaum. St. Vincent Medical Center, 2213 Cherry St., Toledo, OH 43608; and Medical College of Ohio, Toledo, OH.

Photodynamic therapy (PDT) is an evolving modality of cancer treatment. Photosensitizers such as hematoporphyrin derivative (Hematoporphyrin Derivative = Hpd) are systemically administered and accumulate preferentially in the tumors. Subsequent tumor destruction occurs as a result of the activation of the photosensitizer with light.

As enhanced tissue penetration (and destruction) is achieved by using red light (A > 590 nm), the activation of the HpD components is low in this region. A group of modified tetraazatetrabenzoporphyrins (and their corresponding carboxylic acid components). The modified porphyrins gave phototoxic effects comparable to those observed with Hpd. In vivo PDT studies (360 joules/cm²) were performed in transplantable intestinal segments from non-Hpd injected rats showed levels of porphyrins of 0.14-0.16 ug/g wet weight. Twenty-four hr after injections of 10 or 20 mg Hpd/kg body weight, the intestinal porphyrins increased from 0.0003 to 0.00014 mg/ml, respectively. These experiments do not differentiate if the porphyrins were in the mesenteric circulation or taken up by intestinal cells. These increased porphyrin levels may be responsible for the decreased blood flow and for the damage observed in the normal intestine after PDT.

Board K

10:00 AM EFFECT OF NAf IN DRINKING WATER ON RAT DENTAL CARIOPATHIES. R. Spuller*, S. Beiraghi, R.W. Keck, S.H. Selman, F. Beck. Ohio State University College of Dentistry, 305 W. 12th Avenue, Columbus, Ohio 43210.

Several studies have documented the anticaries effects of fluoride when added to drinking water in rats. The majority of these investigations have utilized concentrations far in excess of current water fluoridation practices. The objective of this study was to record the caries experience of rats exposed to drinking water containing 1 to 10 ppm fluoride.

One hundred CrI: CD (SD) COBS albino rats 22 days of age were randomly divided into 5 groups and subjected to a 56 day caries test period during which they were fed diet 200C and distilled drinking water with sodium fluoride added to provide 0.1, 0.5, 1.3, and 10 ppm Fluoride. Diet consumption, water consumption and weight gain were measured throughout the caries test period. Significant caries reductions (p<0.05) were recorded in all fluoride groups compared to the 0.0 ppm control group. Fluoride concentrations at 10 ppm had significantly (p<0.05) greater effects on caries reductions than concentrations below 5 ppm. There was no statistically significant difference in the anticaries effect of 1 ppm when compared to the caries reduction in the 5 ppm group. These results demonstrate that fluoride administered in drinking water will significantly reduce caries reductions from 10 down to 1 ppm and that 1 ppm is just as effective as 5 ppm in its anticaries effect.

Board L

10:00 AM CARIOGENICITY OF THREE FOODS IN RATS RECEIVING THEIR ESSENTIAL NUTRIENTS. S. Beiraghi*, S.L. Ashley, T.D. Ashley, J.L. McDonald, D.R. Avery, and B.L. Olson. Indiana University, School of Dentistry, Indianapolis, Ind.

Early animal studies evaluating the cariogenic potential of different foods invariably provided the test foods as only one component of the overall diet. Thus, the interpretation of the caries data obtained from these foods was confounded by the presence of other nutrients and food components.

In the present study, the cariogenicity of three different foods was evaluated in 22 day old Wistar rats. One hundred Crl: CD (SD) COBS albino rats 22 days of age were randomly divided into 5 groups and subjected to a 56 day study period during which they were fed diet 200C and distilled drinking water. Diet consumption, water consumption and weight gain were measured throughout the caries test period. Significant caries reductions (p<0.05) were recorded in all fluoride groups compared to the 0.0 ppm control group. Fluoride concentrations at 10 ppm had significantly (p<0.05) greater effects on caries reductions than concentrations below 5 ppm. There was no statistically significant difference in the anticaries effect of 1 ppm when compared to the caries reduction in the 5 ppm group. These results demonstrate that fluoride administered in drinking water will significantly reduce caries reductions from 10 down to 1 ppm and that 1 ppm is just as effective as 5 ppm in its anticaries effect.

Board N

10:00 AM HYPERTACTIVITY AND PROCESSED SUGAR. Ashley, Monica L. R.R. #2 Box 29 Wallston, Ohio 45692

Purpose: To determine if a relationship between the intake of processed sugar and hyperactive behavior exists.

Experimental Design: I used my brother, who had been previously diagnosed by our physician, in the following manner: (1) I observed his behavior for two weeks during which time his diet was uncontrolled. (2) I observed him for two weeks during which time all processed sugar was eliminated from his diet. (3) I observed his behavior for one additional week during which time processed sugar had been re-introduced into his diet.

Expected Experimental Results: I expected a direct relation ship between my brother's intake of processed sugar and his hyperactive behavior.
Norepinephrine (NE) infused into the paraventricular nucleus (PVN) of rats on a standard 12:12 light cycle and trained to bar-press for food, was shown by this method to be glia. The same cells were shown by this method to be in the cytoplasm of each cell. The in situ DNA-RNA hybridization technique was used to show the presence of insulin-like immunoreactivity in the cytoplasm of each cell and in the glial cells of the mouse embryo. The teratogenic effect of Phenytoin (PH) in the mouse model may be mediated through depression of the cardio-respiratory function of the dam resulting in a decreased amount of oxygen reaching the fetus. The objective of this experiment was to determine the effect of maternal valproate administration on the teratogenic outcome of the PH exposed mouse fetus. Thirty Cd-1 dams were randomly assigned to three experimental groups, and were intubated at 8AM and at 10:00 AM on the 17th day; fetuses were removed by laparotomy, weighed and examined for external malformations and fixed in formalin for examination by Wilson's method. Fetal weights and the incidence of malformations were statistically analyzed using ANOVA and Chi-square analysis. The T + PH group showed decreased fetal weights (< .01) and a decrease in the incidence of malformations and homozygotes (< .02) compared to the T or PH treatment groups alone. The results remain inconclusive regarding the possible ameliorating effect on the teratogenic outcome of the PH exposed mouse fetus. Maternal administration of the anticonvulsant sodium valproate has been implicated in neural tube defects in both humans and laboratory animals. The objective of this study was to determine the effect of maternal valproate administration on the morphology of neural tube closure in the mouse embryo, utilizing the scanning electron microscope (SEM). One hundred virgin CD-1 mice were bred with male CD-1 mice for a period of two hours. Fetal females were placed in experimental and control groups of ten mice each. The experimental group received 560 mg/kg doses of sodium valproate by gastric intubation at gestational ages 7.5, 8.5, 9.5, 10.5, and 11.5 days. The control group received the vehicle only. Mice were sacrificed at gestational age 8 5/4 days; concep tuses were removed by laparotomy and fixed in 0.1 M phosphate buffered 4% glutaraldehyde. Embryos were dissected and specimens were prepared for SEM study. Measurements were taken from SEM photomicrographs. Among 78 embryos in the treatment group, the mean neural tube opening was 67.5+7.64 microns (+S.E.), compared to 27.0+2.94 microns in the control group (84 embryos). The amount of correlation coefficients (for the 12 sites).
of neural tube opening was statistically evaluated using the Mann-Whitney-U test, and the results proved significant (p < .001). These results indicate that sodium valproate significantly delays closure of the neural tube in the CD-I mouse embryo.

SECTION E. PHYSICS AND ASTRONOMY

MORNING SESSION - ENGINEERING SCIENCE 2046

Saturday, April 26, 1986

W. Williamson, Jr., Presiding

9:00 Attenuated Total Reflectance (ATR) of Silver/Dielectric/Silver Layers. Laura A. Vankorner, Department of Physics and Astronomy, The University of Toledo, Toledo, Ohio 43606.

ATR with prism coupling to alternate layers consisting of a thin silver metal layer, a thin dielectric layer, and a thick silver substrate is discussed. Computer models of ATR are developed using standard electromagnetic theory. For dielectric films greater than 10,000 Å thick, surface plasmon (SP) resonances at the metal/dielectric interfaces are found. As the thickness of the dielectric is decreased, the SP normal mode splits into two resonances: the angle of excitation of one approaching and the other receding from the critical angle. This behavior resembles that found in dielectric/metal/dielectric layers which generate Long Range Surface Plasmons. In contrast, the exceptionally sharp resonance near the vertical angle associated with the Long Range Surface Plasmons is not observed. Comparisons between the results of the two geometries will be made.


9:15 Optical Spectroscopy of Four Strange F+Be Binary Star Systems. Robert Dempsey, and Bernard W. Bopp, Department of Physics and Astronomy, The University of Toledo, Toledo, Ohio 43606.

We report the results of extensive optical spectroscopic observations of four unusual interacting binary star systems. The binaries consist of a main-sequence B-Type star with emission lines (Be), along with an evolved F-type star. In two systems the F-component is apparently a white dwarf, with radial velocity amplitudes of >100 km/s. First radial velocity and Na I absorption lines in the spectra of these two objects indicate that a tenuous circumstellar shell exists around the stars. Unusual mass ratios (M2/M1) of 1.0 and 0.7 have been obtained.

9:30 Radial Velocity Measurements and the Existence of Astrometric Binaries in Late-Type Main Sequence Stars. Richard Meredith, Bernard W. Bopp, Department of Physics and Astronomy, Univ. of Toledo, Toledo, OH 43606.

Radial velocities with errors < 1 km/s have been obtained for 48 dM stars. A comparison of these velocities with published values in Gliese's (1969) Catalog of Nearby Stars shows only two stars to be possible spectroscopic binaries with small velocity amplitudes. No short-period (P < 10 days) systems are found. This null result confirms and extends the work of Young, Sadjadi, and Harlan (1983, Astrophysical J., in press) who conjecture that short-period or "astrophysical" binaries cannot exist among chromospherically inactive dM stars.


Electron backscattering from thin surface films on bulk substrates has been calculated using the single scattering Monte Carlo method. Variation of the backscattering coefficient as a function of film thickness and substrate composition will be discussed.

10:00 Electron Backscattering Coefficients from Thin Metal Films. W. Williamson, Jr., Physics and Astronomy Dept., The Univ. of Toledo, Toledo, OH 43606. *Theoretical Division, Sandia National Laboratories, Livermore, CA 94550. **Physics and Astronomy Dept., Bowling Green State Univ., Bowling Green, OH 43403.

Electron backscattering and transmission coefficients have been calculated using the condensed history Monte Carlo method. A study of the variation in the coefficients for various sub-step sizes for different film thicknesses will be presented for intermediate energy electrons.


The attenuation of electrons in thick materials using Monte Carlo techniques has been studied using the single particle scattering and condensed history methods. Comparisons of backscattering coefficients calculated with the two methods for intermediate electrons will be presented.

10:30 Contour Characterisation of Aggregated Particles. D. Dollimore, The Chemistry Department, The University of Toledo, Toledo, OH 43606.

A method of characterising aggregated particles in terms of their contour profiles is outlined. For Euclidean and non-Euclidean shapes, a logarithmic relationship can be developed, which extrapolates to finite values for Euclidean contours, but to infinity for non-Euclidean shapes. The slope of the relationship provides a method suitable for characterisation. It is not believed that this method is based on Fractals as certain investigators report, for some of the basic concepts of Fractal analysis are absent. The method can be applied to any particular system that can be represented by a contour representation, i.e. carbon black particles, glass beads, sandstone grains, etc. It can, however, be extended to other fields, such as the pore sizes in adsorbents, characterisation of the roughness factor in surfaces, in dealing with the shapes of molecules, and in problems concerning the nucleation of phase changes.

10:45 Neutrino Mass Oscillation. Dr. Yadollah Aliakbar, The University of Toledo, Department of Physics and Astronomy, Toledo, OH 43606.

Based on the general calculation of the tetrad formalism in a 4-dimensional space-time, we have shown that the deviation from the Riemannian geometry to the non-Riemannian geometry depends on the torsion case. In the absence of torsion, one is naturally confined to the Riemannian geometry, while for the non-zero torsion case, our formalism uses the Einstein-Cartan geometry which is a basis in the spinor space and is incorporated with the gauge transformation for the zero rest mass Dirac field.

After constructing the Lagrangian density of the Dirac particle in this spinor space, defining the corresponding Heisenberg-Pauli type field equations, using V-A weak interaction model for the coupling term, and solving the Klein-Gordon equation, we obtain a nonzero oscillatory mass due to the torsion-contortion term of the field equation. This agrees, both in magnitude and range, approximately with that reported by F. Reines. We then suggest this mass to be a fairly good candidate for the solution to the "missing mass" problem of the closed universe model in the cosmology.

1:30 SECTION BUSINESS MEETING

ENGINEERING SCIENCE 2046
FORTY YEARS OF SNOWFALL IN OHIO’S SNOWBELT AT CHARDON. Thomas W. Schmidlin, Geography Department, Kent State University, Kent, OH 44424.

Daily measurements of snowfall began at Chardon in 1945. This Geauga County station gave the first documentation of very heavy snowfalls in northeast Ohio and now has the longest record of snowfall within Ohio’s snowbelt. Seasonal snowfall averages 105.8 inches and has ranged from 44.9 inches to 361.2 inches. The greatest monthly total was 69.5 inches in December 1962. Annual totals fit a Gaussian frequency distribution, monthly totals generally do not. Snowfall was heavy from 1955 to 1971 but has been below the 40-year average in 10 of the past 13 winters. January snowfall has been increasing but February, March, and April totals show a downward trend. Year-to-year correlation of seasonal snowfall is 0.32. The average date of the first and last daily snowfalls of 1 inch are November 10 and April 4. An average of 35 days per year have 1 inch or more of snowfall, eight days have 4 inches or more. The greatest 3-day snowfall of the season averages 15 inches. The average number of days with snow cover of 1 inch or more is 85, with four inches or more is 52 days, and twelve inches or more is 11 days. A 4-inch snowcover persisted for 100 days in 1977-78. Snowdepth reached 30 inches on March 5, 1960. Additional parameters and statistical tests are provided.

THE IMPACT OF CULTURAL FACTORS ON LABOR AVAILABILITY. Stephen S. Chang, Department of Geography, Bowling Green State University, Bowling Green, OH 43403-0217.

Hong Kong is facing a labor shortage. The ability to get enough workers is a most important factor for a manufacturer as it plays a significant role in the success or failure of the business. Proper site location can help recruitment efforts. In selecting sites, it is not only the population concentration that matters. Cultural aspects of housing and family organization can affect the regional availability of various kinds of labor. In areas of government-subsidized housing, there is a shortage of assembly-line workers while “home-assembly” workers are more readily available. This is a result of government housing policy which does not allow married children to reside with their parents. This in effect creates a nuclear family situation and hinders the role of the extended family. In areas with mostly private housing, the extended family can function and a manufacturer has a better opportunity of recruiting more of their needed assembly-line workers.

Cultural factors can subtly play a crucial role in labor availability, and its recognition can give business a competitive advantage.

THE ANATOMY OF COMMERCIAL ACTIVITIES OF A MEDIUM-SIZE CITY IN BANGLADESH. Aseek K. Dutt, Allen G. Noble and Zemzet Hasan, Department of Geography, University of Akron, Akron, Ohio 44325.

Rajshahi, the fourth ranking urban center of Bangladesh, is the administrative headquarters as well as the leading urban center of the Rajshahi Division. It is also the site of a university and numerous other public institutions. It is situated on the left bank of the Ganges (Padma) river. Rajshahi originated as a commercial center, particularly for the silk and Indigo trade, and became prominent after the arrival of the Europeans. The city extends in an east-west direction between the river in the south and the railway line in the north. The main business street runs in an east-west direction. The primary retail center, Shahel Bazaar, has a traditional Asian bazaar townscape and may be regarded as the counterpart of the Central Business District of the Western cities. Ribbon commercial development extends in all directions from this central bazaar. The main retail center thus takes the shape of a T extending northward and then east and west. The retail center of Rajshahi city, surveyed in the summer of 1985, comprises over 125 kinds of retail functions having over 2500 establishments of various sizes. Effort has been made to classify them and find centroids of the individual retail activities. Some retail activities are clustered while the others are scattered.

THE FUNCTIONAL CHANGE OF SMALL BUSINESS CENTERS: TESTING THE SPATIAL AND ECONOMIC ELEMENTS OF CENTRAL PLACE THEORY IN SALINE COUNTY, MISSOURI. Paul O. Umbach, Department of Geography, The University of Akron, Akron, Ohio 44325.

For more than fifty years Christaller’s central place theory has been tested at various scales throughout the world. Although the theory has never been without criticism, it has stimulated much additional economic and geographic research. In this paper Saline County, Missouri is found to conform with the requirements of central place theory. Temporal changes in the function of small business centers are discovered when the county is compared with previous study areas. The smallest centers have lost many or all of their central place functions since the early 1940’s. A two-level urban hierarchy appears to have evolved from the former three-level system suggested by Christaller. The hamlet, formerly the smallest central place, no longer exists in Saline County, Missouri as a functional business center.

REGIONAL VARIATION IN AMISH QUILTS: LANCASTER COUNTY, PENNSYLVANIA AND HOLMES COUNTY, OHIO. Karen M. Connolly and Allen G. Noble, Department of Geography, University of Akron, Akron, Ohio 44325.

The Amish are a plain people living in isolated communities with distinctive farming practices, house types, modes of transportation, and types of clothing. Amish quilts are another unique facet of their lifestyle. They can be distinguished from the body of American patchwork quilts of the same time period. This paper examines the characteristics of Amish quilts, and the pattern differences that appear in two geographic regions: Holmes County, Ohio, and Lancaster County, Pennsylvania. These differences enable these quilts to be categorized as folk material, and as such, an important part of the material culture of the United States.

COMPARISON OVER FOURTEEN SOLAR CYCLES OF ENGLISH AND JAPANESE CYCLES IN THE PRICE OF CONSUMABLES, 1699-1857. John F. Wing, Sean E. Gleason, and Amy H. Garver, Wittenberg University, P.O. Box 720, Springfield, Ohio 45501.

Wing (1983a, 1983b) found numbers/biomass of blue in English ecosystems fluctuated in unison with the sunspots, and that blue during very strong cycles (moving sunspot average > 40) but not during weak cycles. The implication for pre-industrial, human society was also tested by Wing (1982b) using Thomas' (1941) detrended Swedish harvest Index for 1736-1913: it gave significant positive correlations (r = .29 to r = .60) during periods of active solar cycles but negative correlations (r = -.29 to -.33) during periods of weak cycles. Analysis of the detrended English price of consumables (Brown & Hopkins, 1956)
Further confirms this: correlations during periods of active cycles were $r = .18$ to $.59$ but during weak cycles they were $r = -.30$ to $-.32$. The detrended Japanese series (Yamamura, 1971) yielded $r = .15$ to $.54$ and $r =-.01$ to $.28$, respectively, for active and inactive periods. Correlations for most periods were significant ($p<.05$), but the pattern is the most important finding.

10:45

ECONOMIC TELECONNECTIONS: CLIMATE-INDUCED CORRELATION BETWEEN THE PRICE OF CONSUMABLES IN ENGLAND AND JAPAN, 1698-1857. John F. Wing, Amy H. Geaver and Sean E. Gleason, Wittenberg University, P.O. Box 720, Springfield, OH 45501.

A comparison is made of the detrended English (Brown & Hopkins, 1956) and Japanese (Yamamura, 1971) price of consumables. The (incomplete) series of Japanese price residuals anticipated England's (complete) series by two years ($r = .190$, $n = 86$, $p < .05$) or three years ($r = .246$, $n = 85$, $p < .025$) as would be expected since Tokyo temperature anticipated England's by two years ($r = .243$, $n = 75$, $p < .025$) or three years ($r = .352$, $n = 75$, $p < .01$) and Tokyo precipitation anticipated England's by two years ($r = .177$, $n = 99$, $p < .05$). Such climatic (and economic) teleconnections are to be expected since both England's and Japan's climates are dominated by the zonal westerlies (Bjorn, 1977) and, In fact, Tokyo precipitation is significantly correlated with the zonal circulation index (Trenkle, 1956) even when measured over Europe. Solar control over the westerlies is suggested as the main mechanism behind the teleconnections.

SECTION F, GEOGRAPHY
Afternoon Session - Snyder Memorial 217
Saturday, April 26, 1986
Mohan Shrestha, Presiding

1:30 SECTION BUSINESS MEETING

2:00


The completion of the St. Lawrence Seaway in 1959 signaled a major change in inter-basin commerce from the Great Lakes ports. However, the design dimensions of the Seaway have, in the 1980's, begun to influence the amount of saltwater shipping from the Great Lakes. Ship sizes have increased, and the Seaway's current 26 foot draft has presented limits to navigation. The fluctuating dollar, and European Community agricultural policies, have also affected Great Lakes/St. Lawrence shipping. Using Toledo's four main trade commodities as a case study, changes in commodity shipping from 1973 to 1983 will be examined. These changes are assumed to partially reflect the overall change in shipping on the Great Lakes/St. Lawrence Seaway route.

2:15


The intent of this paper is to discuss the origins, formation and present demographic conditions of those peoples known as Kartvelians or inhabitants of Sakartvelo the present day Georgian S.S.R. Kartvelian languages comprise a subgroup of the Caucasian or Japhetic language family. These languages are distinctively individual and unrelated in structure to any other language with the possible exception of the Basque language of Spain. Two subgroups compose the Kartvelian Group of languages, the Western Kartvelian Peoples including the Mingrelians, Chams and Swans; the Southern or Georgian subgroup includes 15 peoples among the large Kartvelian tribe from which the common name is derived. Known since the time of Jargon and the Argonots, these people have maintained their identity against incursions by Romans, Arabs, Turks, Persians, and Russians. While most Kartvelians live with their own people, the Kartvelian republic, some are scattered throughout Russia, others live in tribal lands in Turkey or are found in Iran. Since the census of 1926, the Kartvelian Peoples have increased in number by 50.9 percent or from 1.8 million to 3.6 million. Strong supporters of the Communist government, their republic has the highest party membership of any of the 15 Soviet Republics.

2:30

SPATIAL INTEGRATION OF SOUTH SLAVS IN THE CLEVELAND SMSA. Vera K. Pavlikovic and Richard W. Janson, Kent State University, Kent, Ohio 44242.

Spatial integration of an immigrant group with the mainstream of the host population is best expressed through the quantification of a fundamental human need - housing. This paper suggests a modification of the Lieberson index of residential segregation and its application as a crude measure of immigrants' spatial integration. Using the data of the South Slavs in the Cleveland SMSA, several hypotheses pertaining to the inter-ethnic and intergenerational differences will be tested.

3:00

ELEVATED CORN CRIBS AND RELATED SCALE HOUSES OF THE SCIOTO RIVER VALLEY, OHIO. R. Brett Johnsom, University of Akron, Akron, Ohio 44325.

Several curious drive-in, double corn crib structures are located on the floodplain of the Scioto River in south-central Ohio. These structures are unusual in that they are elevated, either wholly or partially, up to six and one-half feet from the ground. In appreciation of their obsolescence and gradual disappearance from the cultural landscape, these large capacity cribs are described in detail, taking into account their functions within the flourishing agricultural community of the late 19th and early 20th centuries. Scale houses also were encountered in functional juxtaposition with these corn cribs. These are also described.

3:15

ENVIRONMENTAL AND ECONOMIC FACTORS IN THE GROWTH AND DEVELOPMENT OF THE LOWER SCIOTO RIVER VALLEY. Jane Maran, Department of Geography, The University of Akron, Akron, Ohio 44325.

A descriptive study was made of selected floodplain features of the Scioto River Basin of Ohio in Pickaway, Ross and Pike Counties. These features include topography, precipitation, drainage, flow characteristics, flood frequency, and floodplain management. Uses of the river and related transportation systems are discussed. The data were collected from federal, state and municipal published reports dating to 1913, local historical society publications and records, and personal interchange. This study is part of a larger work which posited a correlation between the environment of the floodplain and the presence of elevated corn cribs. Several curious drive-in, double corn crib structures are described. These are also described.

3:30

THE RISE AND DEMISE OF ELEVATED CORNBEDS IN PIKE COUNTY, OHIO. Jane L. Craig, University of Akron, Akron, Ohio 44325.

The collection of unique farm structures on the Scioto River floodplain is a reflection of the commercial corn growing economy of the late 19th and early 20th centuries. The buildings, used for the processing, drying and storage of unshelled corn prior to shipment, came about as a result of the large corn yield of the valley. Even as these structures were being built to store this bounty, they were part of their own obsolescence. This paper addresses the effect of technology on these structures and how improvements in harvesting methods sounded the death knell for a rural architectural structure unlike those found in other parts of the country.

3:45

THE DISAPPEARANCE OF AGRICULTURAL STRUCTURES IN PIKE COUNTY, OHIO. Deborah Phillips King, University of Akron, Akron, Ohio 44325.

Taking advantage of advancing technology, today's farmers function by maximizing mechanization and subsequently increasing production. Farm structures which have fallen into disrepair or which cannot be adapted for reuse are often destroyed. As a result, relic features on the agricultural landscape are disappearing at both the hand of time and modernization. This paper examines the rate and pattern of disappearance of agricultural structures such as barns, corn cribs, and scale houses in Pike County, Ohio. Utilizing maps dating from the early 1900s, and later maps and aerial photographs, historic structures have been located, and a relative rate of disappearance determined.
A Geographic View of Adolescent Stress Within a Midwestern City
Bernd Wenclawak

Adolescent stress is of increasing concern as the teenage suicide rate rises, and drug and alcohol abuse increase, resulting in injury and premature death. Adolescent stressors were examined to determine if there was variation in the occurrence and importance of stressors among population subgroups reflecting different cultural and environmental locations throughout the city. This information is needed to develop effective intervention programs which may need to be tailored geographic areas. Schools, therefore, were selected in zones ranging from inner city out to suburban and rural locations. This study was undertaken to determine which stressors were common to most adolescents and which were important to subpopulations. A cross-section of ten schools in a midwestern city was utilized based on location, socio-economic background and race. The total sample included 1234 students in grades 7-12. A life events instrument, the Youth Adaptation Rating Scale, was administered to assess which stressful events had occurred to students and student perception of the impact of those events.

4:00 Periodic Flea Markets in the Northern-Eastern U.S.: An Examination of Vendor Rent Structure. Jeffrey J. Gordon, Bowling Green State University, Bowling Green, OH 43403

Periodic markets of any kind in advanced exchange economies, such as the U.S., have been little studied by scholars. The current project examined the structure of periodic flea markets in the U.S. Several aspects of the project were investigated using this variable heating rate method, including: 1. The range and nature of the rent structure operating in these markets. 3. The degree of variability within a single set of periodic flea markets yielding both indoor and outdoor rent data.

4:15 Ohio: A Geographical Perspective. Rajkumar Navaratnam, Bowling Green State University, Bowling Green, OH 43403

Little scholarly research has been devoted to alleys per se. Studies of city morphology and structure often appear to take for granted the existence of alleys for granted. The few published studies related to alleys dwell mainly on problems of alley-housing rather than on their structures, patterns, or uses. Public attention appears to focus on alleys only at times of petition for their vacation. This research project examined the current functions of all the alleys of Bowling Green and systematically recorded each alley according to its location, structure, and status. A complete mapping and classification of alleys was performed to enable the interpretation of their different forms and present uses. In essence, this study represents a historically-cultural Geographic study of a specific component of a city’s structure that was felt to deserve greater attention.

4:30 Kinetic Parameters from Thermogravimetric Data. A.S. Bhatti, Mahra Al-Marzooqi and D. Dollimore Department of Chemistry, The University of Toledo, Toledo, Ohio 43606.

Kinetic parameters can be calculated from any system subjected to a rising temperature regime with a saving in time over the more orthodox methods. The use of differential thermal analysis (DTA) and thermogravimetric analysis (TGA) for this purpose can be suitably illustrated by reference to polymer systems. Basically, the method involves the use of the rate equation, the Arrhenius equation and a mathematical expression giving the temperature regime to which the system is subjected. The analysis can be performed using the rate equation, the Arrhenius equation and the Arrhenius equation. The preferred form is usually differential thermal analysis (DTA) and thermogravimetric analysis (TGA) for this purpose can be suitably illustrated by reference to polymer systems. Basically, the method involves the use of the rate equation, the Arrhenius equation and a mathematical expression giving the temperature regime to which the system is subjected. The analysis can be performed using the rate equation, the Arrhenius equation and the Arrhenius equation.

9:00 Crystal Structure of Dimethylthiophosphinato Chromium(III). Tineke Burandt and A. Alan Pinkerton, Department of Chemistry, The University of Toledo, Toledo, Ohio 43606.

Spectroscopic studies of diithiophosphinate (RPS) complexes of Cr(III) suggest that the octahedral CrS₆ chromophore is trigonally distorted (1). This is in agreement with predictions from valence bond theory (2). However, no structural data exist in the literature to confirm this hypothesis and prediction. We have, thus, undertaken the determination of the crystal structures of this type of molecule and report the results here. Crystals of Cr(S₂PMe₂)₆ were obtained by sublimation and the structure solved by conventional Patterson and Fourier techniques. Currently, the structure has been refined to R = 0.032 without inclusion of hydrogen atoms. The molecule has twofold crystallographic symmetry. The crystallographic results will be compared to the hypothesis and prediction above.


9:15 Pollution - Before and After Earth Day. Bruce V. Weitzel, Chemistry Department, Miami University, Oxford, Ohio 45045.

Occasionally, looking back over a period of time we observe the changes that have taken place in our World. Just the changes of population, manufacturing, construction and travel indicate the trends of pollution in the air, land, and water. One way to measure some of these changes is by measuring the pH of natural waters as well as the pH of the precipitation via rain, snow, etc. An update of this measurement will be presented mainly from data collected in the United States and Canada. The data of foreign countries will also be given. To date about 2800 water samples have been collected and tested and over 400 samples of precipitation mainly in Oxford, but also some during our travels. The contribution of nature itself via volcanoes and forest fires will be reviewed. A short review of before and after Earth Day - 1970 will be
presented and some methods used to try to reduce pollution and what some states are contemplating regarding pollution.

10:00 BOND LENGTHS AND ANGLES IN GLASS-FORMING SYSTEMS AS FUNCTIONS OF AB INITIO ATOMIC ORBITAL WAVE FUNCTIONS
Stephen W. Barber, Owen-Illinois, (Retired)
3606 Glendale Avenue, Toledo, OH 43614

A comprehensive theory of glass formation is required to account for the anomalous property-structure relations characteristic of glass-forming systems in general. An essential part of any such theory is a formal account of chemical bonding relating such anomalies to ab initio atomic orbitals. This presentation shows that bond lengths and angles in glass-forming systems are implicit in the relativistic atomic orbitals calculated by Waber and Cromer as these are modified by promotion energies and related potentials recently evaluated by Hinze and Jaffe.

10:15 POTENTIOMETRIC MEASUREMENT OF METAL-LIGAND FORMATION CONSTANTS WITH A THIOCYANATE ION-SELECTIVE ELECTRODE. Pamela J. Hackl and Gordon A. Parker, Department of Chemistry, University of Toledo, Toledo, OH, 43606

The vaporization chemistry of In_{2}Te_3(s) was studied by the computer-automated simultaneous Kudsen-effusion and torsion-effusion method, by high-temperature mass spectrometry, and by ancillary methods. The first absolute measurements of the vapor pressure of In_{2}Te_3 are reported. In_{2}Te_3(s) vaporized incongruently in the temperature range 701-889 K and produced Te_2(g) and a solid solution, (In_{2}Te_3-x)(Te_2-x)Te_3. The standard enthalpy of the reaction at 298 K, \Delta H_{f}^{\circ}(298 K) by the third-law method was 136.0 \pm 0.3 \text{kJ/mol of vapor}. The above solid solution vaporized incongruently and produced InTe(s) and a vapor which consisted of Te_2(g) and In_{2}Te_3. InTe(s) vaporized congruently in the range 701-889 K and produced Te_2(g) and In_{2}Te_3; the third-law \Delta H_{v}^{\circ}(298 K) was 201.5 \pm 1.0 \text{kJ/mol}. These results were at variance with the literature on vaporization of In_{2}Te_3 where both congruent vaporization and incongruent vaporization to give InTe(s) are separately reported. Further, InTe(s) was reported to vaporize incongruently. These differences are discussed.

This paper is dedicated to Professor Dr. Kurt L. Komarek on the occasion of his 65th birthday.

10:45 ELECTROSYNTHESIS OF BIS(PHOSPHINE)PLATINUM(0) COMPLEXES AND REACTIVITY WITH ORGANIC SUBSTRATES. C. Eagle, J.A. Davies, D.E. Otis and V. Uma, Department of Chemistry, University of Toledo, Toledo, OH 43606

The two-electron reduction of \([\text{PtCl}_2(\text{PR}_3)_2]\) at a mercury pool electrode leads to the generation of bis(phosphine)platinum(0) equivalents. Trapping with acetylenes (e.g. PhC=CH, Na[HC=CHC(CN)=CH]N, where B(Ph) allows the synthesis of \([\text{Pt}(\text{RC}==\text{CR})_{2}(\text{PR}_3)_2]\) complexes on a preparative scale, where R=Et, the low-valent complex reacts with Ni(0-Bu)3 via a C-H activation process analogous to a Hofmann elimination and with CH,CN via a C-C oxidative addition. Mechanistic studies point to new pathways for C-H and C-C bond activation in less reactive substrates such as arynes and alkynes.

The sedimentation behavior of particulate materials in various liquids is reported. These included powdered alumina, limestone particles and bentonite. The average settling rate was determined using a calculation based on various equations appearing in the literature. Relationships between the rate of settling and the viscosities of the liquids, and between the rate of settling and the dielectric constant are discussed. Both the relationships were logarithmic in form, i.e., plots of the log of Q, against log η and of log Q against log ε were linear (where Q is the settling rate, η is the coefficient of viscosity of the liquid and ε is the dielectric constant of the liquid).

Suitable graphs to test the various equations put forward to describe the hindered settling behavior are shown. The incorporation of the dielectric constant effect into these hindered settling relationships is considered and shown to account for the observed effects.

LIQUID CHROMATOGRAPHIC INVESTIGATION OF PARAMETER, WHICH INFLUENCE THE RETENTION OF CR-BETA-DIIONATES. P. Schultz and B. Nowclawak, University of Toledo, Dept. of Chemistry, 2801 W Bancroft St., Toledo, OH, 43606.

Chromium(III) forms complexes with bidentate ligands such as beta-diketones and with an octahedral coordination sphere. In case of unsymmetrical ligands two geometrical isomers (mer and fac) can be separated by liquid chromatography. We have investigated the retention behavior of 2,2'-dimeethylhexane-1,5-dione (Hmhd), 4,6-dimethylheptane-2,4-dione, 2,4-dione (Hmd), 2-methyl-naphthalene-1,5-dione (Hnmn), 2,6,7-tetramethylheptane-4,5-dione (Hthd), pentane-2,4-dione (Flacac) coordinated to Chromium(III) by liquid chromatography. Polar silicagel and unpolar octadecyl (C18) bonded phases have been used for the separations. The retention behavior of the chelates on both phases showed some interesting differences, which can be explained by differences in the separation processes.

POLAROGRAPHIC BEHAVIOR OF SULFIDE AND POLYSULFIDE. Z. UDDIN, Baldwin-Wallace College, Department of Chemistry, Berea, Ohio 44017.

Sulfide is determined at a dropping mercury electrode (DME) in alkaline media on the basis of the anodic current from the reaction:

\[ \text{Hg} + S^2- \rightarrow HgS(s) + 2e^- \]

Poly-sulfide yields an anodic wave corresponding to the reaction:

\[ S_{n^-}^{2-} \rightarrow 2(x-1) + xS^2- \]

The quality of the cathodic behavior is improved by the presence of a mixture of sodium acetate and sodium salicylate which also functions to remove traces of dissolved O2. The sampled DC and pulsed polarographic responses are described for use of the DME in a stationary solution of rather large volume (25-50 mL). Results are also given for the application of pulsed polarographic amperometry at the DME in a flow-through cell for automatic detection of S2- and Sx- by the technique of flow injection analysis.

THERMAL ANALYSIS STUDIES ON OXALATE PREPARED CONTAINING TUNGSTEN. A.S. Bhatti, M.I. Diaz-Quines and D. Dollimore.

The thermal decomposition of tungsten oxalate leads to the formation of a lemon-yellow oxide of tungsten. The study involved the use of thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), fourier transform infrared spectroscopy (FTIR) and X-ray powder diffraction. The lemon-yellow product from thermal decomposition of all samples was WO3. This can be compared with the oxide formed from similar studies on molybdenum oxalates. Here, the oxide formed was blue. The MoO3 is described and identified as a white powder. The blue oxide is variously described as a slightly reduced form of MoO3, resulting in non-stoichiometry or due to the existence of mixed valency states for molybdenum in the oxide. (i.e., Mo(V) and Mo(VI)) without a change of structure. In some citations, it is given a formula MoO3 (i.e., $\text{MoO}_3 \rightarrow 0$). In the case of the tungsten oxides, a blue oxide is also reported, but it is given a formula WO3 (i.e., $\text{WO}_3 \rightarrow 0$).
As an extension of our earlier work on the flash vacuum pyrolysis of benzenoid aryldienes, we have investigated the pyrolysis of a series of heterocyclic aryldienes, exemplified in the following reactions. We have employed both 2- and 3-diene substituted furans, thiophenes, and pyrroles as well as 4-diene substituted pyridines. The products have been characterized by nmr and mass spectral methods. The resulting dihydrobenzo- aromatics are extremely difficult to produce by alternative procedures.

**FUNCTIONAL GROUP TRANSFORMATIONS ON SUBSTITUTED CYCLOBUTENES. J.W. Jetter and T.H. Kistie. Department of Chemistry, Bowling Green State University, Bowling Green, Ohio 43403.**

We have recently studied Diels-Alder reactions of several fluorinated cyclobutene esters, such as 1 and 2, as well as several other types of cyclobutene esters such as 3. These compounds are relatively easily available and are realtively easy to modify synthetically. We have evaluated several synthetic approaches to 4 which will be discussed in the oral presentation. The effect of fluorine substituents on the reactivity and stereochemistry of the cycloaddition reactions of cyclobutenes will be discussed.
The cyanide and acetylide anions, CN and HC≡C−, are iso-
try, commonly acts as a 0,0-bridging ligand, [M-CN-M] dianion and related synthons. Two systems designed to pro-
clude the use of the adducts for the synthesis of substituted
ethylene glycol acetal of furfuraldehyde to determine the
effect of electronic effects on the regiochemistry of the
tetrahydrofurans will be discussed. The 7-oxabicyclo[2.2.1]
the Diels-Alder reaction between various 2-substituted furans and unsymmetrical
tetrahydrofurans will be discussed.

The content of this presentation will include a descrip-
tion of the project as by which the author established a
Science Research course curriculum at the High School
level. The author will discuss many aspects of the process
including getting cooperation from administrators, estab-
lishing an interest among students and other staff members,
grant writing for equipment and services, rationale for
establishing such a course, and a brief course outline.
A discussion of the course outline will include areas of
research for both group and individual experimentation,
the role of accessing computerized data bases and other
information resources, the role of working with computer
programming in BASIC and Logo, as well as the use of
a wide variety of community scientific resources and
resource persons.

This is a presentation to describe the implementa-
tion of a grant funded by the National Science
Foundation to facilitate a science enrichment
program for elementary and middle school teachers of Northwest Ohio. The first phase of the pro-
gram included a summer workshop to upgrade teach-
er's knowledge of science content in the area of
earth science, chemistry, physics, and astronomy. This phase also involved developing science
resources, teaching kits, demonstrations using inquiry, and
information on computer programs in science
education. A second phase involved a field-based
setting to eat hands-on materials in the class-
rooms. The last phase included spin-off work-
shops to involve other classroom teachers in
the philosophy of hands-on methods for teaching
science to children. The goals, rationale, and
outcomes of the program will be given during
this presentation.

Simulation games are role-playing group activi-
ties which resemble real life. Students choose
one of six different roles and do group fact find-
ing and problem-solving. Topics are controversial
issues to which there are several possible sol-
lutions and a variety of opinions. With the grow-
ing concern to include technology topics in the
curriculum, simulation games offer a viable way
to study technology issues.

Simulation games are an excellent way to teach
higher level thinking skills such as synthesis,
analysis, evaluation as well as verbal expres-
sion, group cooperation and value formation. It
is an interdisciplinary approach to a complex
problem; emulating reality. The experience teach-
est students skills which will enable them to
effectively function in an increasingly more

technological society.

Toni Miller, Presiding

SCIENCE EDUCATION
First Morning Session - Snyder Memorial 103
Saturday, April 25, 1986

Science Education: Some Suggestions for Improvement.
Marian A. Hoecink, Bishopwood High School
State Route 73
Trenton, Ohio 45676

With support from the National Science Foundation,

 toni miller, presiding

Science Education: Some Suggestions for Improvement.
Marian A. Hoecink, Bishopwood High School
State Route 73
Trenton, Ohio 45676
With support from the National Science Foundation,
"Strategic Defense Initiative. Using the resources of the media center, students do research and have "conferences" or "town meetings" to express opinions, knowledge & priorities on set of tasks.

10:00 AN INTERDISCIPLINARY APPROACH TO TEACHING TECHNOLOGY. Toni L. Miller and Bob Bauer, Spring Hill JHS, 660 Lessig Ave. Akron, Ohio 44312

Industrial (Arts) Technology teachers are actively incorporating technology education to help fulfill a need for technological literacy and to improve enrollment. Science has also begun to focus on Science, Technology and Society, but not as actively.

The study of technology lends itself to an interdisciplinary approach (i.e., a blend of Math, Science, traditional Industrial Arts, Language Arts, Social Studies and Computer Literacy) to present a history of man's use of tools for the solution to problems of society.

The resources of an Industrial (Arts) Technology teacher and a science teacher have been combined to develop a philosophy and curriculum materials in order to "team teach" technology topics. Hands-on activities, simulation games and a variety of traditional methods are used to develop an appreciation for, an historical perspective of and values on issues related to technology. This multi-faceted approach is designed to maximize learning, thinking and decision-making skills, and to enable students to better cope with their technological society now and in the future.

10:15 A SCIENCE CENTRED CURRICULUM AND LEARNING AGENDA FOR A GLOBAL LEARNING SOCIETY
Stephen W. Barber, Owens-Illinois, (Retired) 3806 Glendale Avenue, Toledo, OH 43614

The National Commission on Excellence in Education, in A NATION AT RISK, proposes reform to "focus on the goal of creating a Learning Society." -- A noble sentiment favored by Jefferson and Franklin and scientists in general; but unrelated to the real although misconceived need. A learning society better than any yet conceived by a national commission already exists and has had dominant influence in world history for more than a century. The need in public education is not to create a learning society but to teach participation in one supremely qualified already exist. A curriculum and student learning agenda to meet this need is here proposed.

This proposal is to shift science, our optimum learning discipline, to the center of our curriculum where, by its methods, it can optimize all less general categories of learning; i.e., the other humanities. SCIENCE is a global community whose schools should be immune to global literature. Literacy in it can enrich the lives of global as well as national populations. How tragic that even commissions on excellence in education remain unaware or unappreciative of its while prescience confusion and disadvantage threaten to destroy all excellence and all meaning!

10:30 INDIVIDUALIZING INSTRUCTION IN SCIENCE
Hinton, Nadine K., Graduate Student, Dept. of Psychology, The Ohio State University, 1885 Neil Ave. Mail, Columbus, Ohio 43210

Two methods for designing individualized science units will be presented. First is an organizational tool for the teacher to use in considering all aspects of an original unit (different reading levels; use of media; resource persons; i.e.,). Second, by teaching students to generate and to answer their own questions at each level of Bloom's Taxonomy, each student can complete a unique project at his/hers own level and area of interest. While the examples given in this presentation will be from middle school science units, these programs can be modified easily for use in interdisciplinary units, in other content areas, or at other grade levels. These methods have been used successfully for several years at West Muskingum Middle School.

10:45 INTERACTIONS OF COMPUTER ATTITUDES, TEST ANXIETY, AND PERSONAL CHARACTERISTICS IN A COURSE REQUIRING COMPUTER TESTING. Loretta F. Reel, Computer Based Education and John F. Gwinn, Biology Department, University of Akron, Akron, Ohio 44325

As the use of computer testing becomes more extensive, it is important to determine how computers affect student performance and attitudes. Audio-tutorial anatomy and physiology (ATAP) is a two-semester, self-paced laboratory course that administers weekly on-line computer tests to over 500 students. Scores from these tests comprise a significant portion of the course grade. Questionnaires were given at the beginning, middle, and end of the year which included: personal data, previous computer experience, attitudes toward computers, and general test anxiety. It was found that after a semester's experience with computer testing, general test anxiety increased slightly, but computer attitudes became more realistic. Regarding debilitating facilitating anxiety, students reported that computers administered tests produced more debilitating anxiety and less facilitating anxiety while paper and pencil tests engendered more facilitating and less debilitating anxiety. In spite of this, the students strongly preferred computer testing. Given these findings, it would appear that careful attention should be given to the specific details of the computer testing format and the manner in which it is integrated into the course.

SECTION II. SCIENCE EDUCATION
Second Morning Session - SNYDER MEMORIAL 132 Saturday, April 26, 1986
MARIAN A. MOECKEL, PRESIDING

9:00 CONCLUSIONS FOR COMPARATIVE AQUARIUM SCIENCE FAIR -- STRICKLIN, Woobecy Lilen
Oak Hill High School, 3000 Thomeer Road Cincinnati, Ohio 45224

Science Projects can be excellent tools for students to learn by discovery about a concept, law, or process but only if the students do work themselves and under guidelines to maximize the learning process. Help is available through the Computer Learning Center to assist your students with their projects and to help you if you want to put on a science fair.

9:30 INLAND MARINE SCIENCE FOR SCIENCE TEACHER ENHANCEMENT. Cynthia S. Groat, Dept. of Biological Sciences, Bowling Green State Univ., Bowling Green, OH 43403, and Suzanne B. Rock, Bowling Green Senior High School, Bowling Green, OH 43402

The Year of the Ocean focused public awareness about our largest resource. Inland residents are affected by the ocean's impact on weather, economy, food, politics, etc., and disadvantaged by lack of direct access and few school curricula. Marine science study is very important to inland students and can also integrate numerous science disciplines. Furthermore, the current nationwide attention on the critical shortage of qualified science teachers and C. Groat's own enhancement during sabbatical leave (spring 1984) both emphasized the need for increased training opportunities to update knowledge and skills of science teachers to improve the quality of science teaching. A pilot project was conducted summer 1985 on Marine Closed-System Study and Tropical Field Trip for Science Teacher Enhancement utilizing facilities in the Inland Marine Laboratory at Bowling Green State University. The teachers learned to set up and maintain salt water aquariums for the classroom. They participated in a 10-day field trip to the Florida Keys to observe marine habitats first-hand and to collect live specimens for their classroom aquariums. They incorporated new knowledge and experiences into new curriculum units. Both the teachers and their students gained increased understanding about science by "bringing the ocean into the classroom."
drug effects if multiple drugs are given. An interaction can, in general, give two types of results which are essentially opposite each other in effect: 1. A synergistic one - this is actually an additive effect - the result is greater than if the two drugs had simply had their individual effects added together. Example of SYNERGY: \( 1+2 > 2 \). 2. An antagonistic one - in this case the drugs counteract each other. The individual drug effects are reduced. The interaction of the drugs can actually be detrimental to the system and demise can occur. Example of ANTAGONISM: \( 1+2 < 2 \). ANTAGONY: Scientists and science educators know about synergism and antononism. Yet their interactions - the interactions between scientists and science educators in the System of Science Education - are syneristic. This paper suggests that if a more regular synergistic interaction rather than the opposite, could occur between these two groups in the Science Community, then the crisis that exists in Science Education could be possibly abated.

10:30 OATLAND GUNNING A NASA MISSION FOR INNER SPACE CONQUESTS. Morris L. Martin, 157 Griswold St., P.O. Box 591, Delaware, Ohio 43015.

International, space education doors were opened for the author when he accepted the challenge of nonmission assignment to a NASA launch conference. His personal quest recorded the Challenger/Spacelab blast-off, gleaned unique resources, and advanced to informal meetings with the scientific delegations of Holland and Germany.

A mounted cluster of cameras, emulsions, and accessories has convinced students that unusual photographic selections produced superior, analytic images of that launch. Investigative intrigue looms from dual, sonic overlap on the author's audio tape. Source, scientific memos ensue classroom interest.

The author will show his array for rapid photography, offer technical and economic advice, and share highlights of invited participation in a press conference for Prof. Hermann Oberth: "The Father of Modern Rocketry and Space Flight". Other treasured tangibles will play roles in this presentation.

SECTION H. SCIENCE EDUCATION
FIRST AFTERNOON SESSION - SNYDER MEMORIAL 103
SATURDAY, APRIL 26, 1986
J. DAVID WHITTINGTON, PRESIDING

1:30 SECTION BUSINESS MEETING

USE OF MICROCOMPUTER SIMULATIONS OF SCIENCE ACTIVITIES TO STUDY CONCEPT DEVELOPMENT
Robert E. McManus, Ph.D., Director of Academics
Columbus Public Schools, Columbus, Ohio 43207

Educational research favors the use of mixed sequences over sequences of all positive instances in a conjunctive feature identification task. Psychological research favors sequences of all positive instances over sequences of mixed positive and negative instances. Middle school science students were given instructions on using negative instances in a conjunctive logical string task. Students were able to use negative instances and to identify the two critical features of the microcomputer simulation of science activities.

The two sequence conditions (+ and -) were crossed with the frequency conditions (1:1 and 9:1) to form four treatment groups. The sequences consisted of either all positive instances (+) or all alternative positive and negative instances (+). The features in the irrelevant dimensions were either balanced so that each occurred about 50% of the time (1:1) or they were weighted so that one feature occurred about 90% of the time (9:1). There was significant interaction between the sequence conditions and the frequency conditions. This interaction suggests feature frequency in a potential variable in explaining the differing results between the psychological research supporting the use of all positive instances and the educational research supporting the use of mixed positive and negative instances.
The purpose of this study was to determine the attitude of science educators toward the merit of holding science fairs. Twenty science teachers in a rural Southeastern Ohio school district participated in the study. The school district has participated in science fairs at the local, district or state levels for five years previous to the study.

The data was collected by using a Likert-type opinionnaire with a scale of seven positions on each of fifteen statements. The data from the opinionnaire was analyzed by computing the mean, median, mode and and standard deviation.

The study revealed a moderately positive attitude toward the merit of science fairs. In general the science teachers felt that science fairs do have something to offer the school curriculum.

A STUDY OF SCIENCE EDUCATORS' ATTITUDES TOWARD THE MERIT OF SCIENCE FAIRS
William R. Bahr, Southwestern High School, Patriot, Ohio, 45656.

WHAT BIOTECHNOLOGY HAS IN STORE FOR US — AN EDUCATION IMPACT PROGRAM
Communications Director, Monsanto Company, 800 North Lindbergh Blvd., St. Louis, Mo. 63167

The purpose of the Kangaroo Expedition was to study: (1) the movement of individual kangaroos within and between local populations (home range); (2) short and long term social relationships between individuals; (3) energy requirements and temperature regulation in free-ranging kangaroos. These questions were studied by first capturing individual kangaroos and then following the movements and behavior of those bearing lightweight radio transmitters that would broadcast not only their position, but also their physiological state.

Volunteers are in all aspects of field data collection, including assisting in radio tracking, animal capture and surgery, and data logging of physiological telemetry.

AN EARTHWATCH RESEARCH EXPEDITION TO STUDY THE PHYSIOLOGY AND BEHAVIOR OF AUSTRALIA'S ARID ZONE KANGAROOS. Robert E. Rohrbaugh, Jackson Middle School, 7355 Mudbrook St. SW, Massillon, OH 44646

Earthwatch is a non-profit organization which acts as a clearinghouse to match people's interests with worldwide research projects that need interested people. Expeditions involve mission oriented activities with problems to solve of the most fascinating kind. On an expedition one has the unique opportunity of working side by side with professional scientists "on the front lines of inquiry", seeking solutions to unanswered questions, and cooperating to get the job done. Earthwatch participants share the work, costs, adventure and excitement of field research.

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A SYMPOSIUM: BIOTECHNOLOGY AND ITS IMPLICATIONATION FOR EDUCATION
Arranged by Spencer E. Reames, Benjamin Logan High School, Box 98 (Logan Co. Rd. #5), Xenia, Ohio. 45386

WHAT BIOTECHNOLOGY HAS IN STORE FOR US — AN INDUSTRY PERSPECTIVE. Gary P. Barton, Science Communications Director, Monsanto Company, 800 North Lindbergh Blvd., St. Louis, No. 63167

The products of genetic engineering research can be divided into three general categories: agriculture, human health care and nutrition.

Agriculture: Scientists have made major discoveries in plant genetic engineering that may enable them to produce crop plants in the 1990s that can tolerate drought, herbicides, insects or disease.

Human Health Care: Research in this area focuses on the discovery of proteins that will provide innovative new ways to treat major diseases. Other research is aimed at discovering the processes that control cell growth and function.

Animal Health and Nutrition: A protein is expected to be commercialized in the late 1980s to increase the efficiency of milk production in dairy cows and improve feed utilization.
The aim of this research project is to better understand the molecular mechanisms of how the chicken pituitary gonadotropic hormones affect growth, reproduction, and metabolism. To this end, we are isolating and cloning the gene for the chicken growth hormone as well as the genes for the α and β subunits of LH (luteinizing hormone), FSH (follicle stimulating hormone), and TSH (thyroid stimulating hormone). We are using heterologous rat and bovine specific cDNA probes in order to isolate these sequences from a chicken genomic library and a chicken pituitary cDNA expression library.

We are characterizing the mRNA transcripts of these isolated genes to determine their size, half-lives, and levels of expression upon induction during various growth stages. The genomic clones will be analyzed to determine the regulatory regions specifically responsible for gene expression.

Once we have isolated and cloned the specific gonadotropic pituitary genes, we will attempt to produce large enough amounts of these expressed and correctly post-translationally modified proteins using an avian retroviral expression library.

The genomic clones will be analyzed to determine the regulatory regions specifically responsible for gene expression.

Recent developments in molecular biology, immunology, tissue culture, and embryo manipulation have significantly enhanced man's ability to change living organisms. The potential benefits to mankind have led to multibillion dollar per year investments involving over 200 new companies and many existing enterprises. Although various scientific problems involved in genetic engineering are insurmountable until relatively recently, many of these problems have now been at least partially solved. Concerns have shifted somewhat toward issues involving: 1) the legalities of patenting new life forms; 2) the question of the need for regulation; 3) safety; and 4) the public perception of science. The development of a high tech industry around basic science has left some researchers with divided interests, and has at the same time led to useful collaboration between industry and academia. Universities will soon face new tests of the need for regulation; 3) safety; and 4) the public perception of science. As a multi-dimensional, long range project of the American Association for the Advancement of Science (AAAS), SRS aims to accomplish this in a project to disseminate activity-based materials, ideas, and resources from the scientific community to teachers through networks of administrators, teacher trainers, peers, and other professionals concerned about the quality of science education.

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Once we have isolated and cloned the specific gonadotropic pituitary genes, we will attempt to produce large enough amounts of these expressed and correctly post-translationally modified proteins using an avian retroviral expression library.

3:15 Social and Legal Implications of Genetic Engineering. Clague P. Hodgson, Laboratories of Molecular and Developmental Biology, Department of Dairy Science, Ohio Agricultural Research and Development Center, Ohio State University, Wooster, Ohio 44691.

Recent developments in molecular biology, immunology, tissue culture, and embryo manipulation have significantly enhanced man's ability to change living organisms. The potential benefits to mankind have led to multibillion dollar per year investments involving over 200 new companies and many existing enterprises. Although various scientific problems involved in genetic engineering are insurmountable until relatively recently, many of these problems have now been at least partially solved. Concerns have shifted somewhat toward issues involving: 1) the legalities of patenting new life forms; 2) the question of the need for regulation; 3) safety; and 4) the public perception of science. The development of a high tech industry around basic science has left some researchers with divided interests, and has at the same time led to useful collaboration between industry and academia. Universities will soon face new tests of the need for regulation; 3) safety; and 4) the public perception of science. As a multi-dimensional, long range project of the American Association for the Advancement of Science (AAAS), SRS aims to accomplish this in a project to disseminate activity-based materials, ideas, and resources from the scientific community to teachers through networks of administrators, teacher trainers, peers, and other professionals concerned about the quality of science education.

3:45 Where Does Biotechnology Fit in Teaching Biology? John N. Reeve, Chairman, Department of Microbiology, 484 W. 12th Avenue, Columbus OH 43210.

Biotechnology, as its name implies, is the use of technology to exploit biological activities. The technologies involved range from thoroughly established, industrial processes such as fermentation (brewing, antibiotic production, waste treatment) to commercial applications of recently-developed research techniques (gene cloning, monoclonal antibodies, tissue culture). Biotechnology is therefore clearly not a scientific discipline nor even a defined group of technologies. Teaching Biotechnology as an academic subject would be very difficult and probably of limited value to students. Nevertheless the word Biotechnology is used so frequently by the press and the concept has been lauded so highly in commercial and political arenas that students are rightly demanding an education in 'Biotechnology'. I propose that educators should respond by explaining where the basic scientific facts, taught in biology courses, are relevant to biotechnology and that this approach be used to identify and discuss real-world examples of biotechnology products and processes. This proposal will necessitate teaching molecular biology at a very early stage in a student's education; choices may have to be made between whole organism biology and subcellular topics in biology curricula.

4:15 Panel Discussion

Gary Barton, Douglas Foster, Clague Hodgson, and John Reeve will respond to questions and comments from the audience. Spencer Reames will serve as moderator.

Section II. Science Education
Poster Session - Student Union, Inman Room Saturday, April 26, 1986

Board E

@ 9:00 AM

Science Resources for Schools

Walter J. Bogan, Jr.
Director, Science Resources for Schools Office of Science and Technology Education
American Association for the Advancement of Science
1333 H Street, N.W.
Washington D.C. 20005

Report on a three-year SRS pilot effort in Ohio and other states of a program to improve science teaching in the middle grades, sponsored by the American Association for the Advancement of Science, and sponsored by DOE.

Science Resources for Schools (SRS) is a program of continuing professional development for teachers of science in the middle grades. The central purpose of SRS is to encourage these teachers to provide their students with experiences with natural phenomena that will foster confidence and enthusiasm in students' own ability to learn science. As a multi-dimensional, long range project of the American Association for the Advancement of Science (AAAS), SRS aims to accomplish this through dissemination of activity-based materials, ideas, and resources from the scientific community to teachers through networks of administrators, teacher trainers, peers, and other professionals concerned about the quality of science education.

Section I. Anthropology and Sociology
Morning Session - Snyder Memorial 3rd Saturday, April 26, 1986

Janet Michello (Wolfe), Presiding

8:45 Opportunity for Participation in Sports: From the Elementary to the High School Years.

M. Jane McCandless, Social Science Division, The University of Pittsburgh at Bradford, Bradford, PA 16701.

Detailed information about athletic programs across educational gradients is limited. The purpose of this study therefore was to obtain information about athletic programs offered to both males and females from the elementary through the high school years. From a questionnaire mailed to superintendents of all county and city public schools in a northwestern county of a midwestern state, the results revealed comprehensive athletic programs at the high school level. Athletic programs at the junior high school level however are limited to those most popular sports found at the high school level. And organized athletic programs at the elementary level are virtually nonexistent. Discussion then focuses upon the consequences of such divergent programs during the first twelve years of school.

9:00 Distinct as a Status Passage. Bohdan Chopko, Richard K. Holzer, and John M. Nowicki.

880 Simich Dr., Seven Hills, Ohio 44131

A status passage can be viewed as a marketplace: a passage pays a price in exchange for a commodity and its associated benefits. In the case of weight-reducing diets, the commodity of reduction in body mass has a variety of associated benefits. Sixty seven diets, the majority of which represented in the mass media and designed for use by the general public, were coded with respect to the associated benefits of health, personal appearance, and social metamorphoses. Costs were coded...
implant life, surgeons routinely consider patients under 50 years old. The specific reasons for discounting implants in younger patients were not described in the paper.

Dependent Children program, social security number, date of birth, and other factors are needed to determine if a client is eligible or not. In many programs, obtaining information for as many as 20 categories is required. The number of factors for a program may be small such as one or as large as 24 factors. Some are common to many programs; others are particular to some programs. The variety is large and its impact is significant.

We determined the number of factors for 97 Federal benefit programs. The number of eligibility factors that a program has determines the amount of information that is needed to determine if a client is eligible or not. In turn, the amount of information determines the amount and accuracy of verification that a case worker has to perform. The number of factors for a program may be small such as one or as large as 24 factors. Some are common to many programs; others are particular to some programs. The variety is large and its impact is significant.

The techniques of Multiple Regression, Factor Analysis, and Path Analysis were used in determining the factors predicting female juvenile delinquency. Overall, the sociodemographic factors were more useful in explaining why females commit crimes. In contrast, the primary groups for males were not significant predictors.
This paper examines selected socioeconomic and demographic differentials of the "New Immigrants" to the U.S. from Middle South and Western Asia: India, Pakistan, Iran, Turkey and Arab countries. Data for this study comes from the 1980 U.S. Census of population microdata public use tapes and from the 1983 current population survey matching files of April, March, and June. In general, these immigrants tend to fare well in the market. They are above the national average in terms of professional occupation, income, and higher education. Demographically, they have a higher average income in terms of professional occupation, income, and higher education. Overall, the strengths and weaknesses of stable carbon isotope analysis as a technique for the reconstruction of ancient diets have been examined and evaluated.


In November 1833 an intense meteor shower was visible in eastern North America. Local history records that many individuals in the Wyandot County area were very frightened, believing that the end of the world was at hand. By 1834 grazing herds of horses and cattle were left behind, and the remnants were routinely using falling stars as a motif. For the next fifteen years this spectacular astronomical event was commemorated on gravestones which are found at the Dunn, McCugheenville Catholic, Macedon, Little Sandusky, and Fehl cemeteries in Wyandot County.

1:30 SECTION BUSINESS MEETING

2:00 LATE ARCHAIC AND EARLY WOODLAND SETTLEMENT AND TRADE-EXCHANGE SYSTEMS IN THE SOUTHWESTERN LAKE ERIE DRAINAGE BASIN (CA. 2500 B.C.-1 A.D.).

David M. Stothers, Ph.D., Director, Laboratories of Ethnoarchaeology, The University of Toledo, Toledo, Ohio 43606

Based upon 15 years of archaeological excavation research in the southwestern Lake Erie region, models have been constructed to interpret and explain the existence of 1) Trade and Exchange, and 2) Settlement-Subsistence systems which operated in the Late Archaic (Tohoebach phase: ca. 2500-600 B.C.) and the subsequent Early Woodland (Leimbach phase: ca. 600 B.C.-1 A.D.) societies of that region.

Information is presented suggesting the following interpretive models: 1) a local trade and exchange network existed in the western Lake Erie region which distributed "cache bladex" preforms fashioned from locally derived Pipe Creek chert; 2) trade and exchange beyond the local Feheley-Leimbach cultural network is suggested by exotic chert cache deposits containing lithic materials derived from southcentral Ohio, and the Niagara River region at the eastern end of Lake Erie; 3) Feheley-Leimbach societies were characterized by an annual settlement-subistence cycle which featured a spring-summer coalescence and a fall-winter dispersal pattern for local nuclear family units; 4) local catchment configurations suggest a political structure in which several Local Bands were affiliated to form larger Regional Bands. Each Regional Band is believed to have had an associated cemetery in which each affiliated Local Band periodically deposited their dead.

2:15 STABLE CARBON ISOTOPE ANALYSIS: CULTURAL AND BIOCULTURAL IMPLICATIONS FOR THE PREHISTORIC POPULATIONS OF WESTERN LAKE ERIE, Susan K. Rechel, Laboratories of Ethnoarchaeology, University of Toledo, Toledo, Ohio 43606.

Stable carbon isotope analysis, coupled with corroborating archaeological evidence, has recently been applied to trace the introduction and subsequent rise of maize consumption at several prehistoric sites in the western Lake Erie region. 13C fractionation values obtained from this analysis also have generated new data regarding the intensity of maize consumption from ca. 1000 B.C. through protohistoric times. It is additionally been possible to make dietary comparisons between Western Basin and Sandusky Tradition populations from northwestern and north-central Ohio. 13C fractionation values from prehistoric sites in New York, West Virginia, Illinois, southern Ohio, southern Ontario, and the Upper Mississippi Valley have made it possible to estimate regional components of maize consumption and agricultural intensification as well. Overall, the strengths and weaknesses of stable carbon isotope analysis as a technique for the reconstruction of ancient diets have been examined and evaluated.
gas demand resulting from replacement of older, less efficient gas furnaces with newer high efficiency models in Dayton Power & Light's (DP&L) service area. Econometric methods proved inadequate for forecasting specific furnace replacement effects due to lack of sufficient historical data for a useful time series. Methodology developed could be best described as an "engineering" approach. Information from DP&L residential surveys, customer account statistics, local weather data and heat loss algorithms from National Electrical Manufacturers Association served as primary resources for the analysis. Data regarding thermal performance characteristics of service area homes and local weather statistics were used to calculate average heat loss per home. Average use per customer was computed for each major existing furnace type grouping: forced air, gravity and hot water/steam. Information was used with earlier heat loss estimates to produce furnace efficiency estimates of 67.2%, 55.7% and 53.6% for respective types, proving consistent with Federal statistics. Economic and demographic customer profiles were developed by type and used with furnace life expectancy estimates, replacement cost assumptions and historical data to develop an anticipated replacement schedule. Methods show replacements reduce residential demand by more than 11% by 1995.

9:30 ACID MINE DRAINAGE HISTORY OF LAKE HOPE. SMART, Russell A., and HUNTHMAN, Brent E., Kentucky Geological Survey, 311 Breckinridge Hall, University of Kentucky, Lexington, Kentucky 40506, and Brehm Laboratory, Wright State University, Dayton, Ohio 45435.

Lake Hope is located in northeastern Vinton County about 18 miles west of Athens, Ohio. The lake and its mine drainage problems serve as a microcosm and paradigm of acid mine drainage in the northern Appalachian coal field. Small quantities of coal were mined in the Lake Hope watershed prior to construction of the impoundment in 1939. But increased quantities were mined during World War II and through the early 1960's. The consequent acid water problem was recognized early, and efforts to reduce the acidity in the lake have included limestone cubs in Sandy Run, direct liming of the lake, removal of gob piles, and sealing a selected area with a blanket of clay. Cubs of limestone failed because of plating effects, direct liming of the lake was costly and produced limited success. The clay blanket and plug demonstration has failed for specific reasons yet to be determined. Current work on these acid source waters includes studying the feasibility of using artificially developed sphagnum bogs for treatment of the water.

10:00 ANIMAL RIGHTS, WILDLIFE CONSERVATION, AND RESEARCH. Roberta M. Burns, The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, Ohio 43210.

Since publication of Singer's "Animal Liberation" in 1975, the animal rights movement has become large, active, and politically effective. This movement challenges many of the practices of scientists and conservationists and potentially could have a severe impact on research and conservation. Because of this, it should receive more attention from the scientific and conservation communities than it has so far. The basic difference between animal rights advocates and wildlife conservationists is that the former are concerned about the well-being of individual animals while the latter are concerned about the survival of populations and species. The most extreme animal rights advocates would stop all meat eating, hunting and trapping, and animal experimentation. Others only want to regulate these activities to minimize animal suffering. We should carefully consider their arguments, adopt any of their ideas that may be appropriate, and work to educate the public and legislators on the need for animal experimentation, scientific collecting, and population management.

10:15 EVALUATION OF THE SCHOOL PROGRAM AT OLD WOMAN CREEK NATIONAL ESTUARINE SANCTUARY. April G. Lahm and Rosanne W. Fortner, The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, Ohio 43210.

Old Woman Creek is the only National Estuarine Sanctuary on the Great Lakes. Consisting of a barrier beach, creek and uplands, the sanctuary offers interpretive and educational opportunities through a trail system and visitor center, well equipped to handle both school groups and the visiting public. Since the primary management objective of the sanctuary is to increase public understanding through education, a scrutiny of the program has been taken. The Old Woman Creek educational program is one of the most developed among estuarine programs in the United States. It is being evaluated through the use of tests to measure both student attitudes and knowledge about estuaries. The tests cover concepts about estuaries in general and Old Woman Creek in particular. The data were collected by the exhibits at the visitor center and by Old Woman Creek personnel. Exposure to the Old Woman Creek educational program also changes attitudes and understanding about the importance of estuaries. Thus, while this evaluation focuses only on the Old Woman Creek School program, the series of questions developed about estuaries and the evaluation of the program are of interest to all National Estuarine Sanctuaries.

10:30 STUDENT AWARENESS OF RESOURCE IMPORTANCE AS EVIDENCED BY ART. Marjorie Pless and Rosanne W. Fortner. The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, OH 43210.

Revisiting the potential of art and literature as a vehicle for expressing knowledge and attitudes about the Great Lakes, the Ohio Sea Grant Education Program sponsored a state-wide art competition exhibition for 5th-9th graders. In Ohio 1986 is the Year of the Lake. Each art entry therefore focused on one of several aspects of Lake Erie, including its aesthetic value, recreational and economic development opportunities, and cultural and historical importance. A content analysis of the entries indicates that students see a variety of forms of the lake's importance. Comparisons of content between the work of students whose teachers used Sea Grant visual aids and those who did not use the aids indicates the extent to which ideas for art subjects can be influenced by advance stimuli.

SECTION J. CONSERVATION

WATERFRONT LIVING - BOWMAN ODDY 2022
SATURDAY, APRIL 26, 1986
JUDITH M. SCHULTZ, PRESIDENT

1:30 SECTION BUSINESS MEETING

2:00 A PLANETARIUM TRAINING PROGRAM FOR VOLUNTEERS. Roberta M. Burns, The Ohio State University, School of Natural Resources, 2021 Coffey Rd., Columbus, Ohio 43210.

The purpose of this study was to develop and pilot a planetarium training program for high school volunteers at a science museum located in Columbus, Ohio. The study was divided into two components: (1) a workshop dealing with the basic astronomy, and (2) a workshop dealing with the public planetarium shows. A non-randomized control group/pretest-posttest design was used to measure the effectiveness of the program. Workshop effectiveness was assessed using a semantic differential. Data analysis utilized a t-test and mean scores. The study results suggest a place for a more rigorous approach to the development and evaluation of planetarium training than is currently available.

2:15 ASSESSING ELEMENTARY SCHOOL CHILDREN'S ATTITUDES TOWARD AQUATIC RESOURCES. BRENNDA E. MADISON. The Ohio State University, School of Natural Resources, 2021 Coffey Road, Columbus, Ohio 43210.

Many environmental education researchers agree that attitudes are already established by the time a student enters high school. This investigation attempted to assess attitude change toward aquatic resources in sixth grade students upon completion of a specified aquatic education program. A Solomon Four-group design was implemented for two experimental schools and one control school. Seventeen multiple choice questions measured student's cognitive understanding of the subject. Attitudes were measured using seventeen, Likert-type questions. Test scores demonstrated an overall increase in knowledge. Scores also indicated that the curriculum used cultivated significantly more positive attitudes, and the test instrument was a reliable means of measuring these attitudes. Continued research comparing existing aquatic curricula and their effects on attitudes will help to improve efforts in the field of environmental education.
The specific objectives of the Consortium are: 1) establish an effective mechanism for coordinated, inter-institutional research on environmental and resource problems in the Ohio River Basin, 2) stimulate new research directions and areas of research funding for Consortium members, 3) identify areas that merit new research and support in the Ohio River Basin, 4) encourage cooperation and research among Consortium members, 5) establish and maintain an information base on environment-related research and researchers in the Ohio River Basin, and 6) foster opportunities and respond to needs for multi-institutional education on various aspects of water quality, the environment, and environmental health in the Ohio River Basin. This session will discuss the history and current programs in the Consortium.

SECTION K: GENETICS AND CELL BIOLOGY

MORNING SESSION - BONNIE ODDY 1059

SATURDAY, APRIL 26, 1986

BONNIE LAMVERMEYER, PRESIDING


Kristi Ann Skeel, and Bonnie Lee Lamvermeyer, Department of Biology, Denison University, Granville, Ohio 43023

This investigation is a re-analysis of an isolated population of Odorocileus virginianus, white-tailed deer, originally examined in the mid-1970's. Blood samples for the current study were obtained during a series of five regulated public hunts at the National Aeronautics and Space Administration's Plum Brook Station during the fall of 1984. Serum and red blood cell specimens were analyzed through polyacrylamide gel electrophoresis. In this investigation we observed an apparent globin and transferrin phenotypes that had not been observed in the previous study. Possible sources of bias were covered conditions at the time of the hunt, a nonrandom sample of deer, and uneven tracking dye migration during electrophoresis. The results of this research could influence management decisions about optimal herd number in areas where the range of animals is restricted, such as in zoos and parks.

9:45 PHOSPHORYLATION OF PROTEINS IN THE MALE AND FEMALE RAT BRAIN. V. Donn, M. Roadruck, and E.F. DuBrul, Department of Biology, The University of Toledo, Toledo, OH 43606.

We are studying in vivo incorporation of intracranially injected [32P]P into proteins from three different cellular fractions of the hypothalamus and cortex. The highest specific phosphorylation of proteins is in the nuclear fraction, followed by the post-mitochondrial supernatant and the mitochondrial fraction. Specific phosphorylation is usually highest in hypothalamic extracts as compared to cortical extracts. Translatable differences are observed between sexes. SDS/PAGE analysis does not demonstrate any qualitative differences in phosphorylated proteins between sexes or brain regions at 2 hours post-injection. Protein phosphorylation is also being studied in vitro. Subcellular fractions of male and female hypothalami and cortex are assayed for cAMP-sensitive and cAMP-insensitive protein kinase activity and endogenous phosphorylated proteins are compared using SDS/PAGE. There do not seem to be any large differences in kinase activity between the sexes, but it does appear that kinase activity in all the cell fractions is greater in the cortex than in the hypothalamus. No qualitative differences are observed in SDS/PAGE.

10:00 TESTICULAR LH RECEPTORS AND STEROIDGENESIS IN TWO STOCKS OF OUTBRED SWISS MICE. A.G. Amador, T.A. Parkening*, T.J. Collins*, and A. Bartke.

Department of Physiology, Southern Illinois University School of Medicine, Carbondale IL 62901; *Department of Anatomy, University of Texas Medical Branch, Galveston TX, 77550.

Testicular LH receptor and plasma testosterone concentrations were analyzed in two stocks of outbred Swiss (CD-1 and ICR) mice under basal conditions and after a single injection of hCG (0.1 U/g BW). Basal LH receptor (40 ± 2 vs 25 ± 2 fmol/mg prot) and plasma testosterone (0.4 ± 0.2 vs 0.6 ± 0.05 nmol/ml) were significantly higher in CD-1 than in ICR mice. Twenty-four hours after hCG administration, plasma testosterone (20.3 ± 7.6 nmol/ml) were greatly elevated in mice of both stocks, whereas the concentration of testicular LH receptors was decreased only in ICR mice (37 ± 8.3 ± 1 fmol/mg prot). Plasma FSH, LH, and PRL levels were similar in both stocks of mice. The present results show that two populations of genetically related "normal" outbred animals are very surprisingly different in several aspects of testicular endocrine function in spite of similar plasma pituitary hormone levels, and suggest that important differences may exist also between other stocks of "normal" laboratory animals.
Drosophila are characterized by their tendency to forage on yeasts, fungi, and bacteria, associated with fermenting vegetable matter. In this report we present surprising examples of D. hydei reproducing on a dead cicada (Rhabdophaga), a dead spider (Nuctenea cornuta), the carcasses of other adult hydei, and even ground beef (Bos taurus). In the case of the cicada we show, by comparing the biomass of the D. hydei produced (0.19 g) to the consumable biomass of the cicada (0.9 g), that the larvae must have consumed the cicada tissues directly rather than through microorganisms that had fed on the cicada. Also, larvae completely solubilized the bodies, including the exoskeleton, when growing on adult carcasses. We conclude that these larvae are producing their own insect-digesting enzymes, and that they are secreting them extra- or intracellularly into the substrates consumed. These conclusions are based on, 1) our calculation that there was no cicada biomass to spare on microorganisms, 2) our observation that carcasses and exoskeletons were not solubilized in the absence of larval activity and, 3) the fact that the larvae turned the viscera of the cicada, the spider, and the adult flies into juicy emulsions. 

SECTION K. GENETICS AND CELL BIOLOGY
POSTER SESSION - STUDENT UNION, INGMAN ROOM
Saturday, April 26, 1986

Board F

Dominant lethal mutations in sprague Dawley rats
By Patrick T. Panicke, R. W. L. Scudder, and C. W. Wilson, and Willy J. Wastening, Department of Biology, Central State University, Wilberforce, Ohio 45894.

This study was designed to investigate the mutagenic potential of toluene using the dominant lethal mutation assay. Male Sprague Dawley rats were given intraperitoneal injections (ip) of toluene in corn oil or corn oil alone for five consecutive days. The amount injected was 0.4 of the LD_{50} to 75 days for the Moscow strain of D. americana, Chinook strain to 75 days for D. virilis, 17 days and the longest was 25 days for D. littoralis. These results contribute to our understanding of the basic biology of these species for which data were not previously available. Each male and female adult longevity on standard cornmeal medium were examined for each of the species of this group. Adult longevity of females was longer than that of males except for three species, however none of these differences was statistically significant. The mean longevity of females ranged from 26 days for ‘smokers’ to nearly 90 days for the Temeculian strain of D. virilis. For males the mean longevity ranged from 24 days for D. americana, Chinook strain to 75 days for the Moscow strain of D. virilis. There were significant species differences for both males and females. The time spent in each stage of development, egg to larva, larva to pupa and pupa to adult was studied for each species as well. There were significant species differences for each of the stages. The shortest total egg to adult development period was for D. virilis, 17 days and the longest was 25 days for D. littoralis. These results contribute to our understanding of the basic biology of these species.
Abstract

A software system usually consists of systematic and well-defined interactive processes possessing some relationship like hierarchy, inclusion, etc. These relationships are different than the structuralism in the sense that later are concerned with static behavior, execution of sequence and the flow of control. This does not give any idea about what the software is going to do and how it works.

In order to represent and analyze the software system structure using the available techniques in one way or the other require two diagrams/models, and further, don't represent the relationships very precisely. The present paper discusses the use of Petri nets for the representation and analysis of software system structure. It has considerable interest from the researchers in the past few years for modeling concurrent and asynchronous systems. The dynamic behavior of the system can be studied through static marking and their changes at various levels of abstractions.

This paper makes an endeavour to use Petri nets for modeling software design structure using the notion of events and conditions. The reachability concepts of Petri nets are used to study the dynamic behavior of the modeled systems in terms of the movement of tokens and the changes in the conditions of the system. The presented model offers a great potential in the analysis of software system structure as the simulation of the processes can be obtained which in turn yields the various sequences of events and decision capability for the modeling tool to consider accordingly.


Recently computer applications have become large and complex enough to require alternative solutions to the von Neumann architecture. The new architectures require multiple processors with either shared or distributed control, and memory that can be private, common, or some combination of the two. However, new hardware solutions involving concurrency and parallel processing have not solved to problems not encountered in sequential programming. The additional problems include time-varying errors, contention for resources, deadlocking, communication control, and dependencies on varying processor speeds.

Languages such as Concurrent Pascal, Modula-2, and ADA have concurrent capabilities, and other languages are being enhanced to include such facilities. In this presentation I will discuss some difficulties of concurrent programming and introduce some methods (e.g., semaphore, monitor, and rendezvous) that have been developed to overcome these problems.


Real time applications of computer vision, image, speech, and signal processing, etc. require high speed computations. Recently research efforts are directed towards the exploitation of parallelism in the algorithms and parallel computation of these algorithms. An architecture of a real time general purpose processor (DFSP) based on the binary tree structure has been developed for real time signal processing application. A control software is required to partition and allocate the application algorithms for the DFSP. This software will shield the programmer with the internal details of the DFSP.

We propose a knowledge base system (KBS) which will partition and allocate tasks for the DFSP. KBS will formulate a target equation representing the DFSP, then it will start to fit the given task to DFSP. Once the KBS defines the operation of each processor in the DFSP, it will partition and allocate given tasks to the DFSP. KBS tries different allocation schemes to get a scheme which will avoid communication bottlenecks maximizing the throughput rate of the DFSP. KBS will be applied to different application algorithms such as: matrix multiplication, one and two dimensional convolution and autocorrelation. We are presently developing the KBS on a VAX 780 using Franz Lisp.

University of Windsor, Windsor, Ontario, Canada.


The growth in the area of VLSI has led to the implementation of many special purpose signal processing hardware. Real time applications of signal processing require high speed computations. A general purpose data flow signal processor (DFSP) has been developed previously which is based upon a binary tree structure. A Residue Number System (RNS) is used to perform arithmetic operations using look up tables. The DFSP utilizes pipelines, parallel and distributed processing approaches to achieve high throughput rates. The DFSP utilizes two types of cells, tree cells and base cells. Tree cells perform arithmetic operations using look up tables and require RAMs. Base cells will have separate memories to store coefficients and data and are required to perform simultaneous data read and write operations. A scheme is proposed to utilize two data memories to read and write data at the same time using a read/write control signal. Data can be written in one memory and previously written data can be written from the other memory and their function can be switched. An arithmetic operation will be performed on the data read and its corresponding coefficient. The output will be forwarded to the upward cells for further processing. These cells will also be used for off line loading of the look up tables. The proposed design will be simulated on VAX-730 and will be tested for different algorithms.

University of Windsor, Windsor, Ontario, Canada.

Expertise: A Pervasive But Surprising Theme in Software Engineering. Laura Marie Leventhal, Computer Science Dept., Bowling Green State University, Bowling Green, OH 43403.

Expertise is a pervasive issue in software engineering. Yet it is not a figurative concept in software engineering research or education. Clearly it is a significant role in the communication between designers and consumers, the design of the human-computer interface, and other software engineering tasks.

A widely-held belief about expertise is that experts simply "know more." A sampling of recent expertise research, including studies of computer scientists, suggests that this is an inadequate description. Not only do experts "know more," but their use of that knowledge differs from novices. The computer science expert, like experts in other fields, uses well-developed perceptual processes.

Modeling Transportation Patterns of Commonmodity Classifications. Smith, Alan D., Department of Quant. and Natural Sciences, Robert Morris College, Pittsburgh, Pa. 15219.

Recent years have shown profound advances in applying quantitative approaches in logistics and planning. These ap-
SECTION M. PSYCHOLOGY

Sunday, April 26, 1986

ISADORE NEWMAN, PRESIDING

1:30 SECTION BUSINESS MEETING

The purpose of this study was to compare body composition (percent fat and lean body weight) and physical activity levels between active and sedentary college women. Subjects were members of The University of Akron women's varsity volleyball team, (X_age = 19.6, SD + 1.4; X_ht = 173.9 cm, SD + 5.3; and X_wt = 64.4 kg, SD + 5.5) and female participants in university bowling and archery classes, (X_age = 21.0, SD + 2.4; X_ht = 164.7 cm, SD + 6.5; and X_wt = 60.2 kg, SD + 11.0). A physical activity Index was used to identify activity levels of the two groups and ranged from 40-70 (X = 54.0, SD + 12.5), and the sedentary group ranged from 12-66 (X = 35.5, SD + 20.6). Body composition data were obtained from circumference measurements to predict percent body fat (active group X = 21.1, SD + 1.7; sedentary group X = 22.1, SD + 7.1). Lean body weight estimates resulted in mean values of 50.3 kg and 46.2 kg for the active and sedentary groups, respectively. The f-test used to analyze the means indicated significant differences (p<.02) between activity levels, height, total body weight, and lean body weight. These results showed that the female volleyball players were taller, weighed more and had more lean weight. There was no significant difference in % fat between the groups.

THE EFFECT OF MANIPULATING THE SPATIAL DIMENSION OF THE PRESENTATION AND RECALL METHODS IN SERIAL PATTERN LEARNING STUDIES.

Christopher H. Edmonds, Dept. of Psychology, Univ. of Toledo, Toledo, Ohio 43606.

The effect of stimulus redundancy upon learning serial patterns was examined in 80 subjects. Stimulus redundancy was manipulated in terms of the presentation and recall methods employed. Analysis of the data indicates that subjects learned random and hierarchically structured serial patterns at equal rates except when stimulus redundancy occurred in both the presentation and recall methods. In this condition, subjects performed better at sequences at a faster rate than hierarchically structured sequences. These results are interpreted in terms of a learning mechanism which is highly sensitive to stimulus organization to such an extent that the inclusion of redundant stimulus dimensions does not change the rate of learning hierarchically structured sequences. In contrast, random sequences lack any inherent organization and subsequently the addition of stimulus redundancy increases the number of ways in which subjects may associate elements of the sequence to one another. This redundancy results in an increased rate of learning random sequences. These results support prior serial pattern learning studies which argue that the learning process is highly sensitive to the organization of stimulus events.


This investigation focused on the identification and description of the respective factor structures of self concept for black, white and hispanic highschool seniors that will provide the researcher with information about the concept of self concept. Further, it is believed that this improved understanding will lead to an elucidation of the potential modifying variables associated with that concept. This study made use of the High School and Beyond Dataset. This dataset was based on a sample of 58,000 cases nationwide, and in a stratified sample of the population of high school seniors across the nation. Forty items were selected for factor analysis. These were chosen as being related to self concept by expert judges. Further, these are items that educational administrators have long shown interest in, which further validated the item choices. Items dealt with such topics as: locus of control, self perceptions, school success, self esteem, values, and other's perceptions. This information has implications in the field of psychology, such as personality assessment and treatment.

SUCCESS IN STUDENT TEACHING AS PREDICTED BY CAREER DECISIONS AND ACADEMIC SUCCESS: A QUALITATIVE AND QUANTITATIVE STUDY. Carolyn R. Benz, College of Education, The University of Akron, Akron, OH 44325

Student teaching is the final stage of preparation for preservice teachers. This experience provides a microcosm of initial teaching performance that is usually supervised. In this study success in student teaching (ratings by supervisors on several teaching competencies) was correlated to both qualitative and quantitative measures. A qualitative analysis of student essays revealed rationales for choosing a teaching career. Themes emerging from the descriptive analysis of these written essays and results were related to student success in student teaching. A second, quantitative analysis, was conducted using the demographic factors of age, sex, and GPA in all courses as well as grades received in selected preservice courses as predictors of performance ratings of supervisors. The presentation will report on the complete findings. Preliminary analysis suggests that classroom management and discipline are less well developed in student teachers at both the elementary and secondary levels, and are unrelated to grades received in previous coursework.


This paper, an update of an earlier paper, "The Teaching/Learning Process: State of the Science Circa 1983", will look at the effect that the "back to basics" movement, emphasis upon management by objectives, and the call for merit pay for teachers has had on the teaching/learning process. Focus will be upon how these rather straight forward approaches to resolving educational issues have really affected the complex teaching/learning process. Among the complex variables discussed will be: (1) teacher characteristics, (2) student characteristics, and (3) instructional and organizational characteristics of classrooms. Teacher characteristics will be primarily described from the perspective of student evaluations of instructors and demographic data. Student characteristics will be discussed in terms of (1) personal characteristics, (2) past teaching experiences and (3) learning styles. The instructional/organizational section will consider these instructional modes: (1) lecture, (2) teacher managed programs, and (3) cognitive styles. Suggestion for future integrative research will be offered.
The major purpose was to assess response differences between the two groups with respect to quantitatively addressing the first five stages of Erik Erikson's Psychosocial Stages Theory. Both adolescent groups were given the EPIS. The EPIS contains 60 statements responded to using a five-point scale where 1 equals "Never or almost never true" and 5 equals "Always or almost always true." There are twelve statements, arranged in random order, which correspond to each of the five subscales. The subscales are: Trust, Autonomy, Initiative, Industry and Identity.

An overall 2 (gender) x 2 (adolescent groups) ANOVA with repeated measures was employed. T-tests also were performed on each subscale between the two groups. The overall ANOVA revealed a significant effect of adolescent groups (F(1,80)=37.25, p<0.01) and of subscales (F(4,120)= 26.94, p<0.01). The T-tests revealed significant differences between the two groups on each subscale. The delinquents appear to have had more difficulty resolving crises at each developmental stage.

The EPIS appears to hold promise for investigations which may lead to a better understanding of delinquents.

A DEPRESSED COMMUNITY: SEX DIFFERENCES IN LOCUS OF CONTROL AND LIFE SATISFACTION MEASURES.
M. R. St. Jean, 301 Arch Ave, Mt. Vernon, OH 43050, and S. Staats, Dept. Psychology, The Ohio State University Newark, OH 43055

The community surveyed has an especially high unemployment rate of 14.9%. It is predicted that this should lead to a decreased life satisfaction and decreased sense of personal control over one's fate. Locus of control is an important personality variable moderating negative life events. Recent research has substantiated this premise, and this article presents stronger support. A survey was administered to 10 females and 12 males ranging in age from 22 to 55, who had resided in the community for at least 10 years. An analysis of the 90-item scales of control and the three other measures of satisfaction indicated that women were happier than males (means of 5.3 and 7.6, respectively) and were more internally controlled (means of 10.5 and 15.5 respectively). The most significant difference between men and women was the fatalistic aspect of locus of control, (21 vs. 6.0). It (22 = 35 p<0.01). A possible hypothesis is that high unemployment and the intense competition for the few jobs available result in lack of self-confidence and a fatalistic attitude in males. Cultural stereotypes may impose limits on females to be employed, allowing them more sense of control.

THE EFFECT OF STIMULUS CONTOUR AND ORIENTATION ON 8 WEEK OLD INFANTS' VISUAL PREFERENCES. A. Ellis, M. Coyle, R. Haaf. Department of Psychology, 2001 Bancroft St. The University of Toledo, Toledo, OH 43606

Karmel proposed a single quantitative measure of stimulus contour (amount of contour) for predicting infants' visual preferences. Others have indicated several variables related to a contrast sensitivity function (CSF), such as spatial frequency and orientation. Three experiments were conducted to examine the interaction between stimulus contour and its orientation on the visual preferences of 8 week old infants. In Experiment 1 the infants were presented with 5 square wave gratings in one of three orientations, vertical, horizontal or oblique. On each trial the infant was presented with two stimulus patterns. In Experiment 2 each infant saw 3 square wave gratings in one of three orientations. Preferences were determined by the delayed recall procedure. In Experiment 3, the stimuli were checkerboard patterns composed of checks or rectangles. Each infant was presented with either 5 checkerboards, 5 vertical rectangles, or 5 horizontal rectangles. Infants' responses in all the studies were significantly related to amount of contour. Further research was suggested on this type of orientation preference in line wave and infant visual acuity and preferences.

A RE-EXAMINATION OF THE EXTERNALITY EFFECT.
D. Turkely, Department of Psychology, The University of Toledo, Toledo, OH 43606

Milewski and others have proposed that young infants below the age of two months cannot discriminate changes within a compound stimulus. This differential responsiveness was
regarded as due to maturation since four month olds were able to distinguish both internal and external changes of stimuli. Salapatek and Kessen found that infants up to two months of age were boundary scanners and research done on the recognition of boundaries revealed that the first and detection of the nose and mouth followed. In this study, using a standard habituation procedure, infants of two and four months were used to vary in proximity to the boundary. It was hypothesized that especially the two month olds could be persuaded to search internally if the inner element was touching the edge of the external form. This would explain why infants are biased to the eye region rather than the nose and mouth due to the relative closeness of the eyes to the edge of the face. Results from this study reveal that the younger infants were sensitive to the manipulation of adjacency within a form and differentially looked at the test stimuli as compared to the habituation stimulus.

**EFFECTS OF PRACTICING RELAXATION TECHNIQUES ON COMPETITIVE ANXIETY AND PERFORMANCE OF AGE-GROUP SWIMMERS.** Kayla Hughes. 33E. Streetsboro St., Hudson, OH 44236

The purpose of the study was to explore the use of relaxation techniques, as outlined by Benson (1975), as a means of reducing anxiety levels prior to a sport competition situation. Subjects (N=18) were age-group swimmers and were 12 years of age or older. Trait anxiety (SCAT: Martens, 1977) was measured at a practice before relaxation training and at a practice after training. Subjects were matched on the basis of team membership, gender, and trait anxiety scores and then randomly assigned to either relaxation training or fitness training (control) groups. State anxiety measures (SCAT: Martens, 1977) were taken at a practice and meet prior to relaxation/fitness training and at a practice and meet after relaxation/fitness training. Next event times in meters/seconds were used as performance measures. A-trait remained relatively stable from pre-training in the relaxation response to post-training. The trait anxiety means were comparable to norms (Martens, 1977). In relation to state anxiety, swimmers who learned and practiced the Relaxation Response did not demonstrate a reduction in A-trait as compared to normative swimmers who did not learn the Relaxation Response.

**LUBRICATION**

Robert Baraona
6025 Regency Drive
Painesville, OH 44077

A lubricant is a substance used to reduce friction. In this experiment various solid and liquid lubricants were used to test the following:

1. Measure the coefficient of friction (F) between lubricated and unlubricated surfaces.
2. Measure the viscosity of liquid lubricants.
3. Investigate the effects of a) Type of solid surface and lubricant on F b) Area of contact and lubricant on F c) Load and lubricant on F

An inclined plane was used to measure F. A simple falling ball viscometer was used to compare the different viscosities of liquid lubricants. All experiments were conducted in the same environment. Conclusions reached are as follows:

4. Lubricants reduce friction
6. Load does effect lubrication
5. Type of metal surface effects lubrication
7. Viscosity is related to a liquid's lubricating ability.

**DO THE PRICES OF SECURITIES ON THE AMERICAN STOCK EXCHANGE MOVE RANDOMLY?**

David James 2604 Lantz Road, Xenia, Ohio 45385

Many smaller companies, very important in national job formation, are traded on the American Stock Exchange (AMEX). Daily closing prices for the American Stock Exchange (AMEX) Index were analyzed and tested for randomness. A total of 960 closing readings were collected, giving 903 daily changes. The changes and the percent changes were analyzed and charted. Simulated index readings were randomly generated, and were compared to the actual data.

If the changes were at random, they would tend to follow a normal distribution curve. The changes were tested for normality using the Chi Square Test. Only four times in 10,000 would normal samples yield those results, giving strong evidence to doubt randomness. Next, the Wald-Wolfowitz Runs Test was used to check for evidence of non-random "runs" or "groupings" in the sequence of changes. The hypothesis of randomness could be rejected at the 1/10,000 level.

The study briefly explored the importance and implications of these findings. Conclusion: These tests gave us strong reason to doubt that AMEX prices move randomly.

**EXTENSION OF GEOMETRY INTO HIGHER DIMENSIONS**

Christopher Allen Grove, 3100 Putnam Avenue
Hamilton, OH 45015

My research deals with extending standard geometry into higher dimensions and making comparisons between geometries of each dimension. Besides specific postulates for particular dimensions, general postulates applicable to all dimensions can be assumed. From these, general theorems can be derived. Definitions are also generalized, so that formulas for areas, volumes, and other quantities can be derived for higher-dimensional equivalents of spheres, pyramids, prisms, etc. The close correlation between corresponding theorems shows that geometry can be generalized much farther than has been done previously.

**THE ENVIRONMENTAL IMPACT OF EFFLUENT ON WATER QUALITY OF THE GREAT MIAMI RIVER**

John Sherman 146 Harthorn Dr., Vandalia, Ohio 45379

The quality of water in The Great Miami River is a concern from recreation and wildlife welfare to the more immediate threat of contamination of human water supplies. A 3 1/2 mile section of the river was studied. Four specific sites with similar habitat were selected in September, 1984. Macro, micro and chemical analysis were conducted regularly to date. The section of river being studied has been found to contain two depression zones due to effluent discharges from sewage treatment plants. One of the zones is located in Tipp City and the other in Vandalia, Ohio. Both biotic and abiotic qualities of the water and the surrounding
habitats have been studied. Qualities that were tested include pH, ammonia, temperature, and dissolved oxygen. Other methods of monitoring include the Biotic Index and using algae as a pollution indicator. Extensive observations were taken including algae abundance, depth, substrate materials, current speeds, core samples etc. Experiments such as mapping the depression zone by tracking suspended solids and studying the effect of specific impurities on algae were conducted. Results obtained were very effective in determining the extent of the pollution impact and possible solutions to the problem. The testing methods used revealed the discharge of effluent to be polluting the Great Miami River. The investigation of how and at what rate does an aquatic habitat recover once effluent discharge has been eliminated, is also considered to be very significant in the understanding of the total pollution impact on the aquatic environment. In November, 1985 Tipp City and Van Dalia sewage treatment plants were shut down. A comparative study of pollution impact and recovery rate is under investigation.

9:30 EFFECTS OF RADIATION HORMESIS ON PARAMECIIUM BURSARIA Todd F. Gabel, 72 Spring Creek Drive, Westerville, Ohio 43081

The purpose of this research was to study the effects of small doses of radiation on a living organism in an attempt to validate the concept of radiation hormesis. Hormesis is believed to be the principle that substances normally causing harmful effects to living organisms can have beneficial effects if applied in small amounts. The idea was tested by exposing Paramecium bursaria to x-ray radiation. The study was conducted by first inoculating a sterile nutrient broth infusion with a stock culture of Paramecium bursaria. After nine (9) weeks of growth, ten (10) glass tubes were inoculated with the culture; cell counts were taken; three (3) of the groups were irradiated (x-ray); and one (1) group was maintained as a control. Three (3) levels of radiation were used including 1 Krads, 3.16 Krads, and 5 Krads, one (1) level per one (1) group. Cell counts were taken on each group on consecutive days after irradiation and prepartations of the irradiated cells were calculated using the control group as the basis of determining the percentage change.

The process was repeated using 31.6 Krads and 50 Krads of irradiation. It was found that for each irradiated group the percentage of cell reproduction was greater on days following irradiation when compared to the control groups. It was also determined that greater amounts of radiation produced greater ages of cell reproduction. What the harmful level of irradiation was not determined and is one area of further study.

9:45 THE EFFECTS OF GIBBERELLIC ACID ON PLANT GROWTH Secil T. Metzler, 2700 Rte. 29 N., Urbana Ohio 43078

Pisum Sativum var. Little Marvel treated with gibberelllic acid at a concentration of 100mg/L had an average growth of .6 inches per day while the controls grew .1 inches per day. Using the Student’s T-test the difference between treatment and control plants was significant at the .05 level.

Passiflora Vulgaris var. Pinto treated with 10^-6 giberelllic acid solution grew an average of 2 inches per day as did 10^-5. A 10^-4 solution resulted in .9 inches growth and a 10^-3 solution in .7 inches growth per day. The control plants grew .5 inches per day. The Student’s T-test showed the 10^-3 mg/treatment to be significantly different from the 10^-4, 10^-5, and control treatments. The 10^-4 treatment was also significantly different from the 10^-5, 10^-6, and plant treatments. There was no significant difference between 10^-7 and 10^-8 treatments or between the 10^-9, 10^-10 treatments, and control treatments.

10:00 RANDOMIZATION OF THE TRIDAC KOCH CURVE: CAN IT BE USED TO MODEL LANDMASSES? Sandra E. Vanholt, 539 Stinchcomb Dr. #1, Columbus, Ohio 43202.

The purpose of this study was to determine if an algorithm can be created to randomize the tridac Koch curve to simulate landmasses. The tridac Koch curve was analyzed and a program was developed utilizing an incremental plotter. By stretching the x and y axes, drawings resembling landmasses were produced.

Although this program was based on the use of the equilateral triangle, it was designed so that subroutines incorporating squares, pentagons, and other polygons can be easily added. The program would then randomly select subroutines; it is hoped that the pictures produced will more closely resemble landmasses. Possible applications of this investigation may be found in the field of computer graphics.

My project’s purpose is to determine what type of airflow would be practical for slow flying aircraft. I started my project by designing a wind tunnel and measuring apparatus that would give me accurate results. Eleven different airflows, covering a wide range of designs, were made using knowledge of aerodynamics. Each airflow was made with a span of 6 inches and a height of 4.5 inches. Each airflow was made using two balsa wood ribs made from 1/16 inch balsa sheet. Sails were made using 1/16 inch by 1/16 inch balsa strips. The airflows were covered with sheet mylar and were attached to the ribs using heat glue. The airflows were tested using a balanced apparatus. A 6.3 gram weight was removed, so when the airflow was being tested it had to lift this weight. The angle of attack could then be set. The airflow velocity was varied by changing the speed of the wing tunnel fans. The voltage to the fans was monitored to compare the air velocity required to lift the 6.3 grams. My most efficient airflow had a large leaping edge and a deeply cambered cross section, similar to that of a bird’s wing.

10:30 COMPARATIVE VEGETATION SAMPLING OF A MODELLOT Helinda Whetstone, Rt. 4, Box 166; Van Wert, OH 45891

Vegetation sampling was undertaken in Helstrand Woods, section fifty-two in Pleasant Township of Van Wert County, Ohio in September of 1985. This woodland was willed to the county in 1944 we of which the majority of the woods be left untouched. Sampling was taken in two habitats, a mature forest and a low lying flood plain near Town Creek. The data was then compared to similar data collected in 1980.

Data indicated the dominant species in the mature forest were Carya ovata and Tilia americana. In the flood plain, the dominant species were Acer rubrum and Praximus americana.

Species found in 1980, but not in 1985 include Carya tomentosa, Asimina triloba, Quercus alba, and Quercus prinus. New species found in 1985 are Celtis occidentalis, Cornus spp., Crataegus spp., Carya gabra, Cercis canadensis, and Acer negundo.

Relative dominance, relative frequency, and relative density were also calculated and compared for all species.


The purpose of this project was to find the cause of the tingling sensation experienced when certain metals contact braces and the tongue. The first step was to see if there was any measurable phenomenon which correlated to the presence of the sensation. An electrical voltage was successfully measured by placing various types of metals into the mouth, and attaching them to a volt meter. Voltages as high as 0.75 volts were recorded when using galvanized steel. Voltages as high as 0.65 volts were recorded when using zinc. This same test was done using braces material and a saline solution instead of the mouth, and voltages as high as 0.75 volts were recorded when using galvanized steel. The next step in this project was to test other individuals who wore braces to see if they received a tingling sensation. Each subject tested six different metals and rated their tingling sensation on a scale from 1-5 (5 being the greatest sensation). They all rated galvanized steel and zinc at 5. At the end of my experiment I found that what I had been creating was a weak battery formed with the metal, braces and mouth chemicals. The tingling sensation was in direct correlation with the amount of voltage between the metals and braces material.

SECTION M JUNIOR ACADEMY

Afternoon Session - SNYDER MEMORIAL 216

Saturday, April 26, 1986

Daniel H. Elwell, Presiding
Although my conclusion is realistic, I feel I must add the fact that natron has been discovered in sachets and jars. After extensive testing on all three theories, I concluded more controversy among scientists than any other step. I noticed how advanced the techniques seemed for such ancient tians. There are three theories of how the corpse was dehydrated. The first, being dehydration through fire, the second being the removal of both the roots of both corpses and dehydrated roots. The solution of the chemicals was prepared by dissolving one gram of solute into ten millimeters of water, thus creating a 0.1% concentration w/w. The petri dishes were inverted at ninety degree angles every twenty-four hours. The effects on root growth and geotropic response were then studied. Results showed that different chemicals affected root growth and geotropic response in different ways.

1:30 THE EMBALMING OF EGYPTIAN MUMMIES
Elyte A. Howard
30 Roosevelt Drive
Springfield, Ohio 45504

As a result of my research, I have gained a lot of valuable knowledge about the mummies and embalming of Egyptian mummys. When I probed into the world of embalming, I noticed how advanced the techniques seemed for such ancient times. There are many steps to complete when embalming a mummy. The main focus of my experiments was the sixth step; dehydration of the corpse. This process has aroused more controversy among scientists than any other step. There are three theories of how the corpse was dehydrated. The first, being dehydration through fire, the second being dehydration by limestone, and thirdly, the natron theory. After extensive testing on all three theories, I concluded that dehydration through a narrow beam was a very effective method of preserving a corpse in ancient times. Although my conclusion is realistic, I feel I must add the fact that natron has been discovered in sachets and jars in most embalmer's workshops. Natron also has been found in wads of cloth used to stuff mummies.

1:45 SOLVENTS VARIABLES IN CHROMATOGRAPHY
Karen Schwank - 7090 Kirby Avenue N.E.
North Canton, Ohio 44711

Extracts of Spinacia oleracea, containing plant pigments, were used to demonstrate the effects of various solvents systems in separating pigments through thin-layer chromatography. Volume-to-volume ratios of acetone, chloroform, and petroleum ether were varied as the pigment bands separated according to molecular weight and polarity. Carotenoids, the lightest pigments, almost always had the highest Rf values. Acetone only produced lower Rf values for carotenoids than for the chlorophylls. Dual combinations of 50:50, 70:30, and 30:70 (v/v) ratios of chloroform:petroleum ether, chloroform:acetone, and petroleum ether: acetone were compared with standards of chloroform, acetone, and petroleum ether by themselves. The 70:30 (v/v) petroleum ether: acetone solution produced the best separation. Eight different bands were identified. Chlorophyll a and b however were not clearly separated. Pairs of bands, 111, vivv of petroleum ether, acetone, and chloroform gave the best separation with a 70:25:5 (viv:v) solution respectively. Eleven different separate bands were identifiable.

2:00 MAGNETOHYDRODYNAMICS EXPERIMENTING WITH THE VARIABLES
Phillip Savage
South Eastern High School, Route 2, Patriot, Ohio 45658

Plasma traveling through a magnetic field generates an electric load. While traveling through the field the gas is seeded with an Alkali metal to speed up ionization. The energy produced by this method is 20-25% more efficient than conventional steam power. Improvements on electrode life and the tapping of the plasma flow have been accomplished by testing different metals for corrosion and heat resistance and conductivity.

2:15 THE EFFECT OF ACIDITY ON GROWTH AND ANTIBIOTIC PRODUCTION OF SOIL FUNGI FROM DIFFERENT GEOGRAPHICAL LOCATIONS
Kyle Thompson, 11500, Gettysburg Darke Co. Rd. New Paris, OH 45347

Soil samples which might contain fungi with certain antibiotic characteristics were collected from random geographical locations of the world. Fungi were then isolated from each sample into a pure culture. Each fungus separated was then streak tested against Rhodotorula rubra, Pseudomonas soli, and Bacillus subtilis to test for antibiotic production. The results exhibit that antibiotic characteristics were then tested for growth on agar plates in which the pH had been adjusted to pH values of 4.5, 6, 8, and 10. The pH of the original soil samples was determined. An analysis of the resulting experimental data was made. The experimental results indicated an increase in the number of fungi possessing antibiotic qualities in soil samples with pH ranges from 6.0 to 7.5 and 1.0 to 4.7.

2:30 DOES AGING INFLUENCE HUMAN CORRECTNESS IN MANUAL TASKS?
Chris L. Amerson
2954 Chestnut
Toledo, Oh. 43606

The purpose of this study was to determine if age has any influence on human correctness in psychomotor performance. Correctness was defined as neatness and accuracy in a task. Seventy volunteers, ages ranging from approximately twenty to sixty-five, participated in this study at the University of Toledo. Each subject performed psychomotor tests. Each volunteer was tested in three areas: mental aptitude/categorizing ability, finger dexterity, and two-hand coordination. A standard categorizing test was given to test mental aptitude. An adding machine was utilized to test finger dexterity, and an "Etch-A-Sketch" was utilized to test two-hand coordination. The results of this study show that there is a correlation between age and the amount of time necessary to execute each of the manual dexterity tests. A correlation also exists between performance on the categorizing test and performance on both the manual dexterity tests. No correlation resulted between age and the number of mistakes on either of the manual dexterity tests.

2:45 MEASUREMENT OF ABSOLUTE REFLECTANCE UTILIZING THE INTEGRATING SPHERE
Ridell/James IV. 3254 Perry Rd. Bellbrook, OH 45305

The purpose of this investigation was to develop an apparatus to measure absolute reflectance of paint samples in the visible spectrum. The difference in reflectance that existed between paint samples irradiated with sunlight versus artificial light was investigated. An integrating sphere was built out of fiberglass and epoxy with a Uvadum Sulfide light detector to measure the absolute reflectance of these samples. The detector was calibrated in terms of resistance versus the amount of light incident on its surface. The light source consisted of a small auto light bulb at the top of the world. The sample was focused onto the sample with a biconvex lens. To simulate sunlight, a bluish filter was placed over the source. In the first set of experiments it was proven that specular samples were more reflective under sunlight than artificial light. In a second set of experiments, reflectance of rough versus smooth surfaces was compared using gray and black military camouflage paint. In experiment 1, yellow was confirmed to be the best color for school buses because of its high reflectance percentage. Experiment II proved that rough surfaces are less reflective than smooth for low reflectance on combat aircraft. However, only rough black was notably different than its smooth counterpart.

3:00 HOW IS HEALING AFFECTED BY ZINC AND VITAMIN C?
Suzanne Voisard, 10752 Orange Hall Road, Dayton, Ohio 45430

After research on the healing process, factors involved, zinc, and vitamin C were completely utilized. Hypothesis was determined. Supplemental daily doses of zinc, vitamin C, or both will increase the rate of healing of surgical incisions in the...
first eight days. Sixteen rats were given skin lesions under surgical conditions. They were put in four groups: Control, zinc, vitamin C, and both. They were given daily supplements in their water. They were housed separately in a totally controlled environment. This experiment was to see if types of sound raise vital signs to the extent of hypertension. Results were statistically significant, with red and far-red light causing an increase in vital signs.

4:45 THE EFFECTS OF RED/FAR-RED REVERSIBILITY ON THE GERMINATION OF GRAND RAPIDS LETTUCE SEEDS
Mark A. Gillespie
401 Silver Oak St.
Dayton, Ohio 45424

In this experiment, Grand Rapids lettuce seeds were illuminated with red and far-red light. The results show that red light increases seed germination, while a short illumination period with far-red light decreases germination. When the far-red light illumination period is increased, germination increases to the same level or percentage as that with red light.
achieved with the red light. Prolonged illumina
tions with both red and far-red light yield
equivalent, very high germination percentages.
The conclusion is, red light converts phyto-
chrome pigment to the active, Pr form, while
short duration exposure to far-red light can
reverse phytochrome to the inactive, Pfr form.

5:00 READING COMPREHENSION AND HOW IT IS AFFECTED
BY DISTRACTION. Amy Wolford, 103 Elm Street,
Walbridge, Ohio 43665.

Six different tests were given to 46 second grade
students at Walbridge Elementary School, Walbridge, Ohio
to see what their comprehension level was and how it was
affected by distraction. The distractors used were tele-
vision and radio. The children comprehended best when
they could read a story alone while it was completely quiet
in the room, and they did the worst when they were distracted
per television or by a song with a rapid beat on radio.
It was concluded that children read and comprehend a story
best when it is quiet and they read to themselves, because
this way they are able to read at their own pace and under-
stand more. The other three tests proved children compre-
prehended fairly well when a story was read to them, when
they were following along while a story was being read to
them, and also when a story was read to them while a slow,
easy-listening song was playing in the room. This shows
three other methods teachers can use to get children to
comprehend other than just letting them read alone all the
time.

5:15 THE EFFECTS OF WHOLE-BODY HYPERTHERMIA,
CHEMOTHERAPY, AND COMBINED WHOLE-BODY HYPER-
THERMIA AND CHEMOTHERAPY ON NORMAL ANIMAL TIS-
SUE. Jill E. Thomsen, 3411 Worley Pl. Toledo, Ohio 43608

In phase one of this study, rats were given whole-body hyper-
thermias at 40-41 degrees Celsius for 20, 40, 60, 90, 120 or
150 minutes. No deaths were recorded during the four
week observation period following treatment. Rats were also
given hyperthermia at 41-42 degrees Celsius, employing the
same procedure. At 20 minutes, a 75% survival rate was
recorded. At 40 minutes, survival dropped to 0%. All
deaths that occurred were within eight days of treatment.
In phase two of this study, rats were injected with Adriamycin, a common chemotherapeutic agent, at doses of
5 mg/kg, 10 mg/kg, 15 mg/kg, 20 mg/kg, and 25 mg/kg. At
doses of 5 mg/kg and 10 mg/kg, no deaths were noted. At
a dose of 15 mg/kg, a 50% survival rate was ob-
served; at doses of 20 mg/kg and 25 mg/kg survival dropped
to 0%. All deaths that occurred were within eight days of
injection. No deaths were recorded during the four
week observation period following treatment. Rats were also
recorded. At 40 minutes, survival dropped to 0%. All
deaths that occurred were within eight days of treatment.
In all cases where Adriamycin was used, death was
caused by cardiotoxicity and nephrotoxicity.

SECTION N. JUNIOR ACADEMY
Poster Session - Student Union, Ingman Room
Saturday, April 26, 1986

Board A DESIGN AND CONSTRUCTION OF A COMPUTER-
CONTROLLED ANOMALOSCOPE. Allen W.
Ingling, 4483 S. Section Line Road,
Walbridge, Ohio 43665.

An anomaloscope is an optical instrument used for the diagnosis of red-green color blindness and
color anomalies. A new design, using compu-
ter control instead of optical control, reduces
cost while increasing ease of use, flexibility,
and performance.

Observers match halves of a yellow-red/green
dipartite field by adjusting the intensity of the
yellow side and the red/green (R/G) ratio of the
other side. After the observer adjusts the halves
of the bipartite field until they match, the com-
puter records the intensity and the R/G ratio for
use in diagnosis.

Linear control of light intensity is achieved by
directly regulating tungsten bulb sources and
monitoring the sources with linear photodiodes.
The computer functions as the comparator in a
servo system, adjusting light intensity according
to the observer's settings, and maintains the R/G
mixture at constant luminance. A triac control
interface and a digital photometer were construc-
ted to allow the computer to adjust and monitor
lamp intensity.

Board B @ 3:00 PM A DETERMINATION OF INCREASED SOLU-
BILITY OF Ag$_2$CrO$_4$ IN THE PRESENCE OF
SELECTED FOREIGN IONS. Mary Mederski.
Perkins High School, 3714 Campbell St.
Sandusky, Ohio, 44870.

A solubility-product constant, Ksp, is accurate-
ly calculated by considering both the concen-
trations of the ions and their activities. In
the solubility equilibrium of:

$$2 \text{Ag}^+ + \text{CrO}_4^{2-} \rightleftharpoons \text{Ag}_2\text{CrO}_4 (s)$$

the Ksp from the activity coefficients of the silver ion and the activity coefficients of
the chromate ion. The effect of foreign ions on a
solubility equilibrium can not be accurately
determined solely by applying LeChatelier's prin-
ciple. The ionic strength of the above system
was calculated to predict this salt effect in
the presence of Na$^+$ and NO$_3^-$ ions. As the ionic
strength of the NaNO$_3$ was increased, the solu-

cibility also increased. But no foreign ion at
a concentration greater than 0.1M had no
effect on the solubility of the precipitate.
My data indicated the necessity to consider activity coefficients in the calculation of Ksp.
As the concentration of an inert salt was increased, the activity coefficients approached unity.

Board C THE IN VITRO PROPAGATION OF THE AMER-
ICAN CHESTNUT. Kathleen Devault, 727
Road 153, East Liberty, Ohio, 43319.

The American chestnut, Castanea dentata, has been
nearly eradicated by the chestnut blight, Endothia
purpurea. Dusty, naturally, American chestnuts have been working
with both the chestnut and the blight for a number of years. Keys and Oech have been working
with chestnut embryos; they have been able to induce leaf and stem growth but not shoot growth.
This project deals with the evaluation of media for
rooting of this plant.
The root media developed by Keys and Oech has not
proven to be successful. A modification in which the
nutrients are reduced by half proved not to be
successful. In hope of bringing about more shoot
production, the shoots were placed in olive
media before being placed in shoot media. This
also proved unsuccessful.

Board D @ 2:00 PM THE SPECTROSCOPIC CHARACTERIZATION
OF EPOXY-MINE SYSTEMS. Debbi A. Czerniawski
1506 Norwalk Avenue, Cleveland, Ohio 44113.

The polymer, an epoxy-mine system, is composed of the epoxy
Tetraglycidyl Diamino-Diphenyl Methane (TGDDM) and the amine
Diaminodiphenyl Sulfone (DDS) whose concentration ranges from 10 to 40
mols of relative amounts of TGDDM. The Fourier Transform infrared
Spectrometer (FTIR) was used to produce readable frequency spectra.
Qualitative analysis was achieved by comparison of the various system
and component monomer spectra with attention to the peaks produced by
primary amine, epoxide and ether groups. Quantitative analysis was
accomplished by two aromatic rings found in the center of each monomer.
These are stable, generally non-reactive and can be used as reference
points in measurement for subtraction of spectra to the exact ions or
ions of the TGDDM and DDS are tetrafunctional monomers. TGDDM has epsilon
at its reactive sites which decrease with the extent of reaction. These
ions have no preference in reactivity and bond randomly. The DDS primary
amines are very reactive towards 0.20. It is seen in the
qualitative comparison that there is a definite decrease in both the
primary amine and the epoxy group at the DDS concentration increases. As the
monomers reacted in polymerization, the epoxides at the reactive sites of
the DDS and the primary amine at the reactive sites of the DDS
disappeared. The amounts of ether groups, protons of a side
reaction with DDS, increased.

42
In the development of a seamless implantable artificial heart including drive systems, there are several problems to be overcome. The first major difficulty in designing, then constructing a valve that will fit the heart and operate smoothly, easily, and last for long periods of time under the pressure required. Another aspect which must now be considered is the production of a seamless artificial heart to reduce the risk of malfunction.

The next problem being to develop a portable drive unit that is intergradable with the heart, which will make the heart function but small enough to make the patient able to move about after development of the portable drive unit it must be perfected, and also the stationary unit already developed must be improved upon. The final problem is to produce the artificial heart in different sizes to fit men, women, and children.

A commercial yogurt, whole milk, and homogenized milk were inoculated with a Bulgarian yogurt culture. Fermentation was produced. The cultures were suspended in a.salt-water agar and b.) EM agar. The fermentation period occurred at a.) room temp b.) 10°C c.) 5°C. Samples were taken at 10 day intervals for 30 days and slides were prepared with a gram stain. Gram + and Gram - were identified and acid content determined. Bacterial cultures were identified as a.) lactobacillus b.) lactococcus c.) lactobacillus bulgaricus d.) lactococcus. Only slight variations were found in any cultures.

In order to demonstrate the advantages of an underground home compared to a conventional home it was concluded that the sun would not heat the home as fast as in an underground home. In the winter, it takes longer to heat a conventional home because of the loss of heat through structural design.

Bacterium churingiensis 4060 M56 will be genetically transformed by DNA (deoxyribonucleic acid) extracted from bacillus subtilis. B. churingiensis 4060 M56 will then be transformed by DNA from M56 previously transformed by B. subtilis. The number of cells transformed per ug/ml of DNA will be compared. It is anticipated that the use of DNA from previously transformed cells will yield a much higher rate of transformation.

In this experiment, two 3-volt motors were attached to each other, rotor to rotor. One motor was run, turning the other one as a generator. The power input to the motor was recorded as was the output of the generator. These two data were compared to find the efficiency of a direct current motor in the role of a generator compared to in the role of a motor. The peak efficiency, which occurred before maximum input power was reached, was slightly above 21%. Thus, a direct current motor is much less efficient in the role of a generator than in the role of a motor.

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like the Space Shuttle. But NASA is trying to avoid that possibility by spending years on design before building anything. The station should cost about $8 billion spread over seven years; NASA hopes to get another $2 billion from other countries.

Solar power is the answer to electrical power and thermal control. It would have to generate sixty-five to one hundred kilowatts of power so NASA designed a gallium arsenide cell that is twice as efficient as silicon cells. Oxygen could be supplied by means of plants, chemicals, and bringing it up in cylinders. Water could be brought up in tanks. Attitude control will be kept by the use of rocket thrusters. Waste removal could be done by lithium hydride. The needs can be fulfilled; the main problem is finding the most efficient methods.

Although it is a controversial issue, there is a growing wealth of scientific research that indicates undeniably that life signs at the molecular level. One scientist would therefore follow that abortion is the denial of the unborn basic human right to life. Very early in the life of the fetus there is a regular heartbeat, which is a legal sign of life. Brain waves can be recorded. Fingerprints exist, these are all signs of a legal identity. While living in the womb, the fetus reacts to sound, touch, and can cry. He can suck his thumb, react to pain, and move purposefully. Potential life or viability (which means "capable of living") begin at the moment of conception. The value of life cannot be measured in terms of its worth or value to society. Life is precious, and must be respected. With these facts and others in mind, it is difficult to argue that anyone has the right to purposely terminate a pregnancy.

Two major world-wide competitions have been sponsored by the Defense Advanced Research Projects Agency (DARPA). The objective of each competition was to prepare pure ethanol by fermentation and purify it by distillation. The corollary objective was to obtain pure 95% ethanol in a single distillation.

The ethanol was fermented in blackberry juice and distilled using a simple still composed of a round bottomed flask, a glass coil heating mantle, glass ball packed distillation column, a water cooled condenser and a receiver. Three distillations were carried out; one normal, one with cornstarch packed above the glass beads, and one done normally but the ethanol was purified by slurring the distillate with cornstarch. The purity of the ethanol was determined by refractive index, using a graph, standards, and a commercial refractometer. Using a pycometer, where the specific gravity was plotted against concentration. The purity of cornstarch was used was higher than my 95% standard as opposed to the 89% from a single distillation. A test with permanganate to determine unsaturated impurities showed that the cornstarch also removed unsaturates while the simple distillation was only partially effective.

A classical game theory two-person zero-sum game entitled "Prisoner's Dilemma" is used extensively to describe the interactions between people. In prisoner's dilemma, a player's score depends on his choice or the opponent. Two major world-wide competitions have been sponsored by Dr. Axelrod, in which computer scientists, computer scientists, and mathematicians proposed strategies which were evaluated against one another. One of all the strategies proposed, a simple procedure called "tit-for-tat" was considered the best. To evaluate tit-for-tat against a variety of other procedures, a simple procedure was developed which plays 800 rounds of the prisoner's dilemma game rapidly evaluating one strategy against another strategy were developed and compared. Of the strategies analyzed so far tit-for-tat remains the best. Continuing work will attempt to evaluate a very large number of strategies in an attempt to empirically prove that tit-for-tat is best against all possible strategies.

This project was designed to study the effects of different wavelengths of light on the growth of bean and radish plants. The temperature, moisture content and amount of light were held constant. Plants were grown in the two drainage systems. The maximum conservation benefits; subterranean or tile drainage, has its limitations on how much water it can take off the field. Therefore to obtain the maximum conservation benefits, surface drainage is needed also. Subsurface drainage pulls the drainage systems together by taking the excess water off the field that the subsurface drainage system could not.

The two drainage systems working together help in preventing erosion. Because of the controlled drainage pathways, water is less likely to form unwanted rills in the field; which is one major cause of erosion. This measure in preventing erosion has been proven effective by increasing crop yields, longer growing seasons, and even through more efficient operation of farm machinery.
Most work in tissue culture must be done under sterile conditions. This is the hardest part of attempting tissue culture without a lab. I thoroughly cleaned my work area, then rinsed the stainless steel surface with Clorox. I sterilized an aquarium with Clorox, then placed it on the side with the open side facing me. I pressure cooked my scalpel and forceps then placed them in 70% ethanol. Without a laminar flow hood, work must be done fast to avoid contamination. I chose a young leaf of a laboratory African violet. The leaf was put into a jar of antiseptic solution for 40 minutes, then into a 10% sodium hypochlorite solution for 5 minutes. I rinsed the leaf for 30 seconds in 70% ethanol. Using the forceps which were further sterilized by a stainless steel wire burner, the leaf was placed into a petri dish and covered. Uncovering the dish for only a few seconds, the sides of the leaf were cut off and the center was cut into squares using the flame sterilized scalpel. The explants from the center of the leaf were placed into previously prepared multiplication medium. The mouth of the jar was flamed before closing. The jar was then located to permit monitoring of photoperiod and temperature during growth of the culture.

The history and success rates of isografts - grafts of tissue between genetically identical members of a species - of bone marrow in humans are discussed, including present methods of obtaining and preparing marrow. An experiment in which an isograft of bone marrow was performed on a Lewis Resistant rat was done. The hypothesis was that if the rat, after receiving 1000 rads of cesium radiation, and lived through the procedure, the marrow cells injected into the rat would migrate to the bone marrow and begin to produce cells. The techniques used to obtain, prepare, and inject the marrow are explained, also. The rat was then monitored: food and water intake, as well as white blood cell counts, were monitored. The rat lived 18 days after the isograft; the white blood cell count went from 300 to 4,900 in 12 days, and many immature forms of white blood cells were seen in the blood. The conclusion reached was that the isograft had been viable, even though the rat died after 18 days. This was determined by removing a femur from the dead rat and printing a hologram of the marrow. These slides were examined by a pathologist and myself. A sufficient number and variety of cells were present to provide an immune defense system for the rat.

As a result of the glaciation of the surface during the Pleistocene Epoch the preglacial surface was eroded. The preglacial surface was the Sharon Conglomerate. Glacial materials were deposited over this stratigraphic unit. The glaciation is ground moraines, kames, and kettles which are common on the present ground surface. Within the township many large glacial erratics can be found. Stratification and groves can be found on the erratics. The rock formations below the glacial till are determined from records of water wells, drill cuttings, wall charts and well logs of gas wells, and oil and gas wells. The current surface topography is a result of the preglacial topography and the modification of glaciation. The current surfaces are drained by a poorly connected dewatered drainage system. The township has a continental divide or water shed passing through it. The divide separates the drainage to the Ohio River from that of Lake Erie. The continental divide has been placed on a local township map. Reworking of the glacial sediments occur largely in the streams.

This investigation tested the effect of color on the perception of taste. A bill of the flavor mixture was colored to resemble three popular synthetic fruit drinks. Uncolored lemonade was used as a control. Eighty subjects were selected as a control. Eighty subjects (High School students, ranging in the ages of fourteen to sixteen) were tested. They were asked to taste a specified drink and identify the flavor. The hundred percent of the subjects identified the flavor of the experimental drinks as the one implied by the color. One hundred percent identified the lemonade control correctly. Thus, the results supported the hypothesis that color perception affects the perception of taste.

Lubricating oil is used in machinery (specifically the FCC compressor) to prevent wear on its rotating parts. The oil, when it begins to deteriorate, does not protect machinery adequately. Therefore, several tests have been developed to determine the condition of the used oil. Two tests were used extensively in this research: a Three Hour Copper Strip Corrosion Test and the Neutralization Number Test. The copper strip corrosion test indicates how corrosive the used oil is compared to ASTM standards on an incremental rating scale. The Neutralization Number Test shows the total Acid Number of the used oil. A third test, Suspended Solids was used on samples to determine the amount of sediment contained in them. The purpose of the experiment was to determine which test most accurately reflects the status of used oil. Results showed that the three hour copper strip corrosion test gives a lower rating of corrosiveness than the 19 hour test that is currently used but is more sensitive to variations. The Neutralization Number test shows more sensitivity and is used at Sinclair.
Thus, my conclusion is that sleep-learning does, in fact, work to a certain extent.

9:15 EXPERIMENTS IN USING FUZZY CLASSIFICATION METHODS FOR ANALYSIS OF COMPUTER IMAGES TO DETECT SPECIFIC CORONARY VESSEL OCCLUSION.
K. J. Cios and W. P. Kuo, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606.

A system for classification of cardiac images has been developed. The system uses fuzzy classification techniques for recognition of preprocessed images obtained from the Medical College of Ohio in Toledo. The original images were measured in the anterior, lateral, and anterior oblique projections.

In the system, which is based on the principle of learning with a teacher, several fuzzy clustering techniques have been applied to generate partitions of the whole data set of patients into subsets of patients with left anterior descending, right coronary and circumflex coronary artery occlusions. Classification was performed using combinations of features in measurement and transformed spaces. Linear orthogonal transformations were used to transform the original data. Different metrics were tried as a measure of similarity between the data vectors in both feature and measurement spaces. In addition some performance indices were calculated to analyze classification validity.

9:30 DEVELOPMENT OF A MATHEMATICAL BLOOD-PERFUSION/TEMPERATURE-MODEL FOR HYPERThERMIA TREATMENT OF TUMOR TISSUE.
Masoud Panahnejad and James B. Parson, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606, and Andrew J. Weigand, Department of Radiation Therapy, Medical College of Ohio, CS 10018, Toledo, OH 43699.

Recent research has suggested that a major cooling mechanism of tissue is blood flow. Experimental studies have shown that blood flow in tumor tissue is much less than in normal tissue, perhaps one to fifteen percent. The reduction in blood flow due to limited blood flow in tumors provides the basis for the differential heating of tumor and normal tissue desired in hyperthermia. Accurate knowledge of the relationship between blood perfusion and tissue temperature is a vital component in maximizing the therapeutic effectiveness for hyperthermia treatment.

This paper reports research directed toward developing an improved mathematical model of blood flow (perfusion) and blood-flow cooling. Starting from thebio-heat transfer equation (Penne, 1948), subsequent research results are used to motivate a series of assumptions and approximations for the simplified model. The resulting simple model is a linear, constant-coefficient, first-order differential equation relating the tissue temperature T(t) and the blood perfusion rate w. The mathematical solution of this simplified model is being compared with experimental data for normal and tumor canine tissue during hyperthermia treatment.

9:45 SCANNING PHOTOMICROGRAPHY OF NUCLEAR MEDICINE IMAGE SEQUENCES FOR DIAGNOSIS OF CANINE KIDNEY STENOSIS.
Yantin Shang and James B. Parson, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606, and W. J. Potvin and J. P. Windham, Department of Radiology, Medical College of Ohio, CS 10018, Toledo, OH 43699.

Temporal image sequences can be used to reveal functional information about an organ by recording the emission from a radioactive tracer injected into the patient's body. Image processing techniques are often applied to these sequences to enhance the process of interest as an aid to diagnosis. This paper describes recent efforts to apply this image filtering technique to 90-second renal perfusion studies to enhance the diagnosis of canine kidney stenosis.

The processing consists of three steps. First, the temporal images are used to obtain background-subtracted time activity curves for the aorta, left and right kidneys and bladder regions of interest. Second, these activity curves are fit by a mathematical model designed to distinguish between the vascular and cortex portions of the kidney activity. Third, using templates for normal canine vascular and cortex time activity curves as signature vectors for the signals in the image, a system for recognition of preprocessed images obtained from the Medical College of Ohio in Toledo. The original images were measured in the anterior, lateral, and anterior oblique projections.
This paper deals with the design of a number of structures in civil engineering using optimization techniques. These techniques are mathematical processes by which the best of all possible choices among the different design alternatives is obtained. The use of optimization entails the usage of a computer. For that, many algorithms have been developed. Among these are the Complex, the Gradient Projection, the Minimax, and the Variable Metric algorithms. These algorithms were used to successfully solve the following structural design problems: I-section columns, slender beams, determine and indeterminate trusses, box plate structures, concrete beams and concrete plates.

### SECTION 0. ENGINEERING
#### AFTERNOON SESSION - ENGINEERING SCIENCE 2048

**1:30 SECTION BUSINESS MEETING**

**2:00 DESIGN OF ENZYME-PH ELECTRODES R. L. Stevens, S. Varanasi, Dept. of Chem. Engr., U of Toledo, 2801 W Bancroft, Toledo, OH 43606**

There is currently considerable interest in the development of biochemicals. In many biomedical applications, information about biochemicals can be used to monitor and regulate the concentrations of biochemicals in body fluids. Very selective sensors can be made by a process in which the substrate of interest undergoes a chemical reaction, catalyzed by an immobilized enzyme, yielding products which can be sensed by an electrode specific to that species; often, the enzymatic reaction leads to formation of ionic products which are monitored using "ion-specific" electrodes. Two frustrating problems often encountered with ion-selective electrodes are their susceptibility to interference from other ions and their tendency to exhibit non-reproducible behavior depending on pH. Another problem is that the enzymatic reaction may involve a variety of enzymes or substrates, making the design of enzyme-pH electrodes more involved. A preliminary theoretical model is developed here which identifies important criteria for the successful design and operation of enzyme-pH electrodes. On this basis we were able to explain the response behavior of enzyme-pH electrodes developed by Nilsson et al. Biochim Biophys. Acta 320 (1973).

**2:15 IMPROVED SAMPLED-DATA PI FEEDBACK CONTROLLER USING INTELLIGENT (NONLINEAR) SUMMER.** George V. Chreishi and James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606

Feedback control is often used to provide desirable system response, as measured by zero steady-state error, short settling time, small overshoot and similar properties of both the transient and state-state response of the system for standard test inputs. Conventional proportional-plus-integral (PI) feedback controllers designed for desirable step response may not meet the specifications for the response to initial conditions and unknown disturbances. The performance of modified PI feedback for sampled-data (discrete-time) controllers for linear time-invariant plants is investigated in this paper. The modification involves the incorporation of nonlinearity in the integral (sum) component of the feedback. This innovation represents an adaptation of a similar technique for analog (continuous-time) controllers called "intelligent" integral control. Design procedures and relations are presented and illustrated by an example application. Simulation results show the advantages of the "intelligent" summer in providing faster response with smaller overshoot and zero steady-state error for the system response to an initial condition and an unknown constant disturbance.

**2:30 A NEW MODELING TECHNIQUE FOR THE GLASS RESISTANCE IN GLASS MELTERS.** A. Ghansaky, Dept. of Electrical Engineering, University of Toledo, Toledo, OH 43606

One of the design elements involved in sizing the electrical power equipment for glass furnaces is the determination of the glass resistances between operating electrodes. All methods to date used for this purpose are approximate and are based on simple models considering the resistance between only two electrodes at the time. This paper presents a technique to develop a resistance model to any general configuration of electrodes and supply voltages in glass furnaces. The technique is based on relating the glass conductivity as represented by Ohm's law to its electrostatic property as represented by Gauss's law. The resistance model is designed through a finite difference method, using the finite element method and the finite element program. A digital computer program has been developed to implement the proposed technique and example results are presented.
The influent COD varied from 107 to 14,560 mg/l. After the soil columns, the efficiency was from 92.32 to 98% present in the septic tank effluents and septages. The objective of this laboratory research is to evaluate the feasibility of batch activated sludge process in the treatment of oil refinery wastewater dilutions and hydraulic detention times on the batch reactor performance regarding organic pollutant removals was examined. The oil refinery wastewaters were obtained from oil refinery in Toledo and Lima, Ohio. From the effluents from the API separators. Wastewaters were diluted in various concentrations ranging from 20 to 80%. After batch activated sludge treatment, 32 to 81.6% of influent COD was removed. The best COD removal efficiency was 81.6% based on an influent COD of 221 mg/l. The COD removal efficiency increased with increasing hydraulic detention time in the batch reactors. The initial feed to microorganisms (F/M) ratios had a significant effect on the COD removal efficiency. At higher F/M ratios the COD removal efficiency increased.

3:00 CONCENTRATION CENGOMACS FOR A MOMENTUM PLUME NEAR A COASTAL SITE. By D. Schroeder, S. T. Thomas and A. Kumar. The University of Toledo, Civil Engineering Department, 2801 W. Bancroft, Toledo, Ohio 43606.

In this paper, nonograms to compute ground level concentrations near a coastal plant are developed for an elevated, momentum-type pollution source under lake breeze conditions. The nonograms use wind speed and effective source height, lake-land temperature difference, and convective velocity scale as variables. Unit concentrations are plotted as a function of downwind distance for specific values of the variables within suitable ranges. The graphs are prepared using a coastal plume model, EMCOD, developed at The University of Toledo. The model is based on Plume Model for a Thermal Internal Boundary Layer at a Coastal Site under Lake Breeze Conditions. The model also accounts for meteorological conditions and source characteristics.

3:15 SENSITIVITY ANALYSIS OF A GAUSSIAN MODEL. By S. Kang, S. T. Thomas & A. Kumar. The University of Toledo, Civil Engineering Department, 2801 W. Bancroft, Toledo, Ohio 43606.

This paper examines the sensitivity of various inputs to ground level concentrations near a coastal plant. The sensitivity index is defined as the rank input variables according to the degree of sensitivity. The U.S. EPA guideline model, PDMIS, is the specific model used in this analysis. PDMIS calculates downwind concentrations of pollutants based on input of meteorological data such as wind speed, atmospheric stability, boundary layer height, and ambient temperatures as well as source data, such as emission rate and stack characteristics. Results indicate that errors in classifying atmospheric stability and wind speed have the largest effect on output. The sensitivity of the model also appears to be receptor dependent.

3:30 SOIL COLUMN TREATMENT OF SEPTIC TANK EFFLUENTS AND SEPTAGES FOR ORGANIC POLLUTANT REMOVAL. By Yung-Tse Hung, and Jerry R. Taricska, Department of Civil Engineering, Cleveland State University, Cleveland, Ohio 44115.

The objective of this laboratory research is to determine the effectiveness of downflow soil columns in the treatment of septic tank effluents and septages. The soil columns had media bed volumes ranging from 392 to 585 ml with hydraulic loading rates of 0.0302 to 1.122 gpd/ft². The influent COD varied from 107 to 14,560 mg/l. After soil column treatment, the effluent (COD) was reduced to 1448 mg/l. Based on the cumulative COD value the COD removal efficiency was from 92.32 to 98%. The soil columns used as tertiary treatment could effectively remove COD present in the septic tank effluents and septages.
A major limiting factor in the application of biotechnology to plant science is the lack of basic information concerning the developmental processes in plants and the genes involved in these processes. A major factor in the yields of crops is the heterotic effect found in hybrid plants when compared with their parents. However we understand neither the basis for heterosis nor how to identify which combinations of parents will yield an heterotic hybrid. This still has to be determined on the basis of trials involving many plants. A screen to identify such sources of combining ability at the laboratory level would allow an earlier selection of potential use of material. The determination of the molecular basis of heterosis would also help to identify the reasons such heterotic effects are not observed in many other crop species. The use of plant tissue culture to generate agronomically important traits is unproven in many species but the ability to control the amount of variation would be important. One character which may prove useful in developing predictive screens for heterosis and culture induced variation is the stability of the plant genome and this is presently being investigated.

Markovian techniques are used to project expected levels of production (scenarios) over time. Some of the realities of spatial diffusion and innovation are discussed, because supply constraints in the transplantation of the embryo will limit the rate of technology diffusion and adoption of genetic methods of growth enhancement by breeders.

New advances in biotechnology allowing the transfer of specific cloned genes into the genetic composition of both agricultural plants and animals open new vistas for agriculture. Technologies derived from these basic advances offer the opportunity for agricultural producers to produce new and existing food products with higher profit margins and to produce a wide range of new non-food agricultural products. Application of these technologies offers the promise of new partnerships between the agricultural producer and the commercial sector including the chemical, pharmaceutical and food processing industries to the benefit of all.
Watershed morphometry and water chemistry were used to determine diatom species that may be useful biological indicators of waters threatened by human disturbance. Alinity values determined by acid titration to a fixed end-point ranged from 5.6 to 6.6, indicating that the lakes fall in the category of extremely soft to slightly soft water. Human disturbances are very sensitive to acidification and other processes. Streams characterized by thin, poorly developed granitic soils, and sulfate were significantly elevated in water taken downstream from the industrial area. Peak concentrations were observed in samples from Tiffin, Potsdam, New York. Analyses of the rainwater indicated concentrations of DDT and other persistent chlorinated pesticides in rainwater. The timing of rainfall contamination by these solutes, iron, nitrate, nitrite, phosphate, and sulfate and algal composition while measuring their 14C-production. Rainfall needs to be assessed for both terrestrial and herbicides coincide with the timing of their application. From April through August 1985, rainfall samples were collected at four sites, including West Lafayette, Indiana; Tiffin, Ohio; Parsons, West Virginia and Petoskey, Michigan. The rains were categorized as heavy or light, and the total rainfall was determined for each sample. Iron and phosphate were determined for each sample. Iron and phosphate were higher in concentration in water taken upstream from the industrial area. The levels of chloride, dissolved solids, and sulfate were significantly elevated in water taken downstream from the industrial area.

Correlations between diatom species-assemblages, and water chemistry were then used to determine diatom species that may be useful biological indicators of waters threatened by human disturbance.
might be used to evaluate nutrient and/or light conditions. The response of phytoplankton communities to enrichment was examined in limnocorral set in an oligotrophic arctic lake, Vokluk Lake, Alaska. Six corrals (5 m diameter) were treated with Nitrogen and Phosphorus, added at 0, 2 and 10 times the normal nutrient loading for the lake. In the lake, without enrichment, the algal fluorescence decreased seasonally as the algae became N and P limited. In the corrals, the DCMU induced fluorescence was proportional to nutrient treatment over most of the 36 day experimental season. The cellular fluorescence capacity (CFC) of the algae in darkened carboys, containing water from the corrals, remained constant over the 4 day duration of the experiment; however, nutrient exhaustion caused a decrease in CFC, which was most severe in the control corral which had no nutrients added.

10:45 GREEN LEAF DECOMPOSITION IN TWO-SOUTHERN STATES. Jennifer Jaroszak and Dr. J. Van McKittrick. 190 N. Foutain Ave., Springfield, OH 45504

Green Acer Rubrum leaves in mesh bags were placed in an ambient stream and a post-thermal stream. The rates of decomposition were 0.046 and 0.0395 respectively. These values are approximately twice the rate of previously published data for autumn Acer Rubrum leaves. Macroinvertatae were collected and key, and the effect of predators was measured. These factors influenced the decomposition rate. Our data suggests that green leaf decomposition is faster than autumn leaf decomposition. Possible reasons for the difference include temperature and bitter food quality of green leaves.

SECTION R. ECOLOGY

Second Morning Session - Bowman Oddy 1049

Saturday, April 26, 1986

R. Boerner, Presiding

9:00 RELATIONSHIPS BETWEEN THE SEDIMENT SEED BANK AND EARLY SERAL VEGETATION OF A NEWLY CREATED MARSH IN SANDUSKY BAY. Carol E. Stigley, J. L. Reutter, Ronald L. Stuckey and R.E.J. Boerner. Graduate Program in Environmental Biology, Center for Lake Erie Area Research, and Department of Botany, The Ohio State University, Columbus, Ohio 43210

Construction of Big Island Wetlands was initiated in autumn 1983 as a result of mitigation requirements of the development of The Harbour condominiums at the mouth of Pipe Creek, Sandusky, Ohio. Approximately 50 ha were diked into four connected cells. The dual purposes of the sediment disposal and the creation of a wetland area to replace that lost to construction. During late summer 1985, the early seral vegetation of the four marsh cells was mapped using a combination of aerial photography and ground sampling. To determine the importance of the sediment seed bank in the development of this early seral vegetation, 40 sediment samples were taken each of the cells during spring 1985. The samples were split into subsamples for greenhouse germination trials. Half of the subsamples were given mudflat conditions and the other half submersed to simulate conditions in the flooded portion of the marsh cells. All seedlings were harvested after two months and identified. The samples were then given a cold treatment to break dormancy of any remaining viable seeds and the greenhouse treatment repeated. The species composition and relative abundance patterns of the seed bank of each cell were compared to the early seral vegetation by rank correlation.

9:15 THE EFFECTS OF LEAF LITTER REDISTRIBUTION ON SOIL NUTRIENT AVAILABILITY IN HARDWOOD FOREST WATERSHEDS. Kooeser, James G. and R.E.J. Boerner. Environmental Biology Program and Department of Botany, The Ohio State University, 1735 Neil Ave., Columbus, Ohio 43210

Many forest watersheds in the eastern U.S. are composed of a series of patches of different tree species associated on soils of different nutrient availability. The post-litterfall redistribution of hardwood litter may be a factor in maintaining the gradients of soil nutrient availability among these forest patches. To evaluate the importance of this litter redistribution, a 2 yr. study was undertaken in Neotoma valley, a 72 ha. watershed in south-central Ohio. Net litter input (vertical litterfall + redistribution) was greater on the drier SW-facing slope than on the more moist NE-facing slope, and ridgetops had smaller net inputs than terraces and lower valley sites. Rates of litter movement varied with season and with litter type; most redistribution occurred in the spring, though seasonal variation was greater on the NE-facing slope. Oak litter was redistributed to a greater degree than was non-oak litter, especially on the drier SW-facing slope. Forest sites with the greatest net litter inputs also had higher soil fertility, at least in terms of extractable N and P levels.

9:30 EFFECTS OF SLUDGE APPLICATION ON POPULATIONS OF DAUCUS CAROTA AND ASCLEPIAS SYRIACA. Erik Cregash, Shari Koelsch-Runge and Johnna Sholtis. Department of Botany, The Ohio State University, Columbus, Ohio 43210

At an abandoned field near Groveport, Ohio, a comparison of populations of a biennial, Daucus carota, and a perennial, Asclepias syriaca, was undertaken for examination of differences attributable to a singular application of anerobic digested sewage sludge. In 1982, 1.9 ha. of sewage sludge at 20% solids was applied to the study site. Although sludge application had no significant effect on the density of Asclepias syriaca, plant height, basal stem diameter and the number of pods produced per plant were significantly greater on the site treated with sludge. This indicates that increased nutrient levels may not only increased vegetative growth, but also increased reproductive output by increasing pod production and consequently seed production.

9:45 DISTRIBUTION AND SEEDLING ECOLOGY OF PURPLE LOOSESTRIFE IN OHIO’S LAKE ERIE MARSHES. Gregory R. Balogh. Ohio Coop. Wildl. Res. Unit, The Ohio State Univ., 1735 Neil Ave., Columbus, OH 43210

Purple loosestrife (Lythrum salicaria) is an introduced wetland perennial plant that has spread widely to marshes in the midwestern U.S., including dried-out wetland and waters with little value to wildlife. This study was conducted to document the extent of Lythrum infestation in Ohio’s Lake Erie marshes, and to study aspects of Lythrum seedling ecology which may aid in its control. Color transparencies taken from fixed-wing aircraft in August 1984 were inspected for indication of Lythrum occurrence. Slides covered Ohio’s Erie, Lucas, Ottawa, and Sandusky marshes, and 20% of Ohio’s Lythrum grew. Digitization of projected images revealed 1210 ha of Lythrum infested wetland, and 77 ha of Lythrum infested upland. Loosestrife seedlings were destroyed or removed at various stages until seedling mortality was apparent. Nearly 100% mortality was obtained by the 8th week of flooding at all depths. Competition planting experiments conducted on mudflats in Ottawa county showed that Lythrum (Polygonum lapathifolium) could out-compete Lythrum for resources in the first year of growth when both species were planted at naturally occurring seed densities (767 and 149 seed/ha, respectively). Nutseed (Lythrum salicaria) and Walters millet (Echinochloa walteri) were not effective competitors.

10:00 SEED WEIGHT OF AMARANTHUS RETROFLEXUS L. IN RELATION TO LENGTH OF GROWING SEASON AND MOISTURE AVAILABILITY. Andrew J. King and Alison A. Smith. Department of Zoology and Graduate Program in Environmental Biology, The Ohio State University, 1735 Neil Ave., Columbus, OH 43210

Seed weight variability can have important consequences for the growth and establishment of annual plants. In particular, there has been a great deal of interest in clinal variation and the selective advantage of large seed weight variation in Amaranthus retroflexus L. (redrock pigweed) have suggested clinal trends, however results have been complicated by a high correlation between low moisture availability and short growing season. One analysis of bulk seed suggested that plants growing in drier areas produce heavier seeds and do plants experiencing a shorter growing season. In our study, seeds collected from individual plants growing in areas that differed in moisture content. Sections of each area had been disturbed at different times, so the length of the growing seasons were known. ANOVA of bulk seed samples indicates that plants experiencing the shorter growing
Eccological studies can be divided into two approaches which consider organisms and the abiotic environment as systems processing energy and materials. The evolutionary ecology and ecosystem school of thought seem to present a paradox. The former accentuates any organismic relationships as an organizing force in nature whereas the latter necessarily mostly facilitation within systems. The goal of this paper is to suggest bridge between evolutionary and ecosystem paradigms. We begin by suggesting that synergistic associations may be particularly important in structuring communities and influencing ecosystem processes. We develop the idea of the keystone mutualism and use the consortium concept. We apply this term to closely associated species groups, and argue that examination of consortia structure and function provides a framework in which evolutionary and ecological levels are related. Within this framework a model is presented in which organisms increase fitness by interacting in ways that predictably augment ecosystems processes. Thus individual benefit is best served through indirect mutual facilitation.

GEOGRAPHIC VARIATION AND GENETIC VARIATION IN CARABID BEETLES: A. David Fisher, Dept. of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221. Genetic variability and geographic variation were studied in two subspecies of the carabid beetle, Harmonia axyridis, from data on eleven enzymatic loci obtained by polyacrylimide gel electrophoresis. Genetic variability levels in A. axyridis were compared with those found in three other genera of cave carabids, Metepeira, Pseudanopthalmus, and Pseudanopthalmus. The results suggest that selection may play a role in determining the levels of genetic differentiation between taxa. Genetic differentiation appears to be maintained by geographic barriers to gene flow. The principal geographic barriers are nonconservative, clastic strata and large rivers. The cave dwelling Metepeira, Metepeira, and Metepeira are found in overlapping ranges in Southeastern Kentucky. The ranges of these genera are interrupted by a three-sided "River Triangle" composed of the Ohio, Kentucky, and Indiana Rivers. Electrophoretic data were analyzed using statistical methods (e.g. Nei's Index, Rogers Coefficient of genetic similarity, and F-statistics) to assess the effect of these rivers as geographic barriers. Individuals were compared with data accumulated on Metepeira, other Metepeira species, and Pseudanopthalmus. A pair of coexisting carabid beetles that maintain a level of genetic differentiation between taxa due to geographic barriers to gene flow are described in a separate karst region.

 SECION R. ECOLOGY

THIRD MORNING SESSION - BOWMAN ODDY 1053
SATURDAY, APRIL 26, 1986

GEORGE UETZ, PRESIDING

9:00 EXPERIMENTAL EVALUATION OF POPULATION INTERACTIONS IN TWO SPECIES OF DESMOSAGENIDAE: S. desmognathus quadrarmculatus and D. monticola. Roger E. Bouw and Douglas H. Taylor, Department of Zoology, Miami University, Oxford, OH 45056.

The nature of population interactions in two species of desmognathus salamanders, Desmognathus quadrarmculatus and D. monticola, was examined in a controlled laboratory situation. An artificial stream tank (6.3 x 1.1 m) was divided into four equal sized quadrants. Each quadrant contained six different substrate types ranging from sand to large rock. One half the tank width contained a stream of water; the other half contained the substrate types built up upon a pea gravel streambank. Each salamander species was divided into two groups according to body size. Data were obtained by recording salamander substrate preference at the end of a 72 hour period. Controls for each size class were collected by randomly introducing six conspecifics into a stream quadrant. All four groups of salamanders preferred large rock substrate under these conditions. With the number of salamanders remaining constant, experimental runs involved the introduction of different sized conspecifics or congeners to control quadrants. The results showed that intraspecific displacement occurred in D. monticola but not in D. quadrarmculatus. Intraspecific displacement was found in D. monticola but not in D. quadrarmculatus. These data indicate that the substrate selection of all sizes of D. monticola was altered significantly in the presence of any sized D. quadrarmculatus.
A. tepidariorum

First Afternoon Session - Bowman Oddy 1045
Saturday, April 26, 1986
Peter C. Fraleigh, Presiding

1:30 SECTION BUSINESS MEETING

2:00 ECOLOGY KEYNOTE SPEAKER
WILLIAM C. COOPER
MANAGED SUBMERGIBLE RESEARCH IN LAKE SUPERIOR

3:00 TOXICITY OF A CLONAL ISOLATE OF THE CYANOBACTERIUM (BLUE-GREEN ALGA) MICROCYSTIS AERUGINOSA FROM LAKE ERIE.
Wayne W. Carmichael, Maria M. Pinotti and Peter C. Fraleigh, Department of Biological Sciences, Wright State University, Dayton, Ohio 45435. 3rd of Biology, University of Toledo, Toledo, Ohio 43606.

Single cell isolates of Microcystis aeruginosa Kütz have been made from 2 m vertical haul plankton net samples, taken in Lake Erie several miles outside Maumee Bay on June 25 and August 4, 1985. The isolates, termed C1 and C2, were chosen for culturing on BG-11 medium and tested for toxicity by the mouse and Daphnia assay. Lyophilized cells of both strains were toxic to mice and had an LD₅₀ of between 100 and 400 mg/kg body weight. Mouse toxicity signs included: death within 1-3 hours; livers enlarged and engorged with blood (liver weight 8-10% of body weight vs. 4-6% for controls); centriobular to panlobular hemorrhagic necrosis of the liver; all other organs normal. These signs are consistent with strains of toxic M. aeruginosa studied in other areas of the world. The toxin of C1 was purified by organic extraction, gel filtration and high performance liquid chromatography (HPLC). Purified toxin has a mouse LD₅₀ consistent with other peptide hepatotoxins of M. aeruginosa. Further analysis of the toxin will be presented. To our knowledge, this is the first toxic isolate of M. aeruginosa from Lake Erie and verifies that toxic cyanobacteria can be a component of its phytoplankton population.

3:15 BACTERIAL LYSIS OF APHANIZOMENON FLOS-AQUAE: TIM MAHONEY, JEFFREY C. BURNHAM AND PETER C. FRALEIGH, Medical College of Ohio and University of Toledo 43699.

Four bacterial strains with the ability to lyse the cyanobacterium Aphanizomenon flos-aquae have been isolated. Two have been identified as Streptomyces sp strain 30 and Streptomyces sp strain 19 while a third has been identified as a Bacillus sp strain 6919 and the fourth, strain P4 has yet to be identified. All four varieties have shown the ability to both lyse test tube cultures of Aphanizomenon in a B11 medium and form blue-green mats on lawns of Creiptocystis sp grown on BG11 agar. Significant lysis has also been demonstrated in larger agitated liquid cultures. This bacterial lysis of Aphanizomenon is significant because this species has shown a resistance to lysis by previously tested microbial predators and it is one of the dominant species in many algal blooms. The isolation of these bacterial predators therefore enhances the possibility for biological control of these unwanted cyanobacteria. Control of the Aphanizomenon blooms would help to reduce problems of estriolination, cyanobacterial toxin production, taste/odor and aesthetics in Lake Erie.
area and that these species may potentially interact.

whereas white perch fed more on zooplankton. Both species plankton, and benthos. Diets differed, however, in that analyses indicated that both species fed on fish, zoo-

of prey taxa by number and biomass. Results of these examined in Sheldon's Marsh and Old Woman Creek, two shallow, collected from April through October, 1983 using trap nets. native white bass populations. Diets of both species were compared to assess diet similarity and potential of competition between these species. White perch, a recent colonizer of Lake Erie, has increased in abundance and may potentially effect two-inshore areas in the central basis of Lake Erie. Fish were

in a Sedgwick-Rafter cell. During the three days samples obtained from Lake Erie. Net samples (0.07 for Myxococcus fulvus BG02 has been shown to lyse cyanobacteria. Effective as control agents in a multispecies system. control densities. The elimination of the Nostoc and Aphanizomenon suggests that the myxococci can exert species specific control in a multispecies system. control densities respectively. By day 7 the Aphanizomenon was eliminated in the treated flasks; however by day 14 it had also died in the control flasks. Nostoc was not detectable by day 14 in the control flasks. By day 21 the Aphanizomenon and Scenedesmus had increased 50% over control densities while Selenastrum remained at about 50% of the control densities. The elimination of the Nostoc and Aphanizomenon suggests that the myxococci can exert species specific control in a multispecies system. control densities. The elimination of the Nostoc and Aphanizomenon suggests that the myxococci can exert species specific control in a multispecies system. control densities. The elimination of the Nostoc and Aphanizomenon suggests that the myxococci can exert species specific control in a multispecies system.

COPREDATION OF LAKE ERIE CYANOBACTERIA

BY TWO STRAINS OF MYXOCOCUS, M. F. Cunningham*, P. C. Fraleigh, J. C. Burnham*, Otsego High School, University of Toledo, and Medical College of Ohio. *P.O. Box 168; Tontogany, Ohio 43565.

Two strains of myxococci, Myxococcus xanthus strain WD 295 and Myxococcus fulvus strain WD02 were tested for their ability, in combination, to trap and lyse the cyanobacteria Aphanizomenon flos-aquae, Anabaena spiroides, and Microcystis aeruginosa present in samples obtained from Lake Erie. Samples (0.07 M) were concentrated, resuspended in Lake Erie water, and cultured in side-arm Erlenmeyer flasks. After equilibration for two days, myxococci were added to give a final density of 20,000 cells/ml for each strain. Daily absorbance (A650-A700nm) was determined and samples were taken for counting in a Sedgwick-Rafter cell. During the three days following myxococcal inoculation, the mean absorbance of treated flasks was 39% of that of the controls. During the same period, mean cell densities in treated flasks as a percent of those in the control flasks were 3% for Aphanizomenon flos-aquae, 31% for Anabaena spiroides, and 4.5% for Microcystis aeruginosa. These data suggest that these two strains may be effective as control agents in a multispecies system of cyanobacteria.

DIETS OF WHITE BASS, MORONE CHRYSOPS, AND WHITE PERCH, M. AMERICANA, FROM TWO INSHORE LAKE ERIE MARSHES. Edward E. Emmons, Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403.

Diet of white perch and white bass were compared to assess diet similarity and potential of competition between these two species. White perch, a recent colonizer of Lake Erie, has increased in abundance and may potentially affect native white bass populations. Diets of both species were examined in Sheldon's Marsh and Old Woman Creek, two inshore areas in the central basis of Lake Erie. Fish were collected from April through October, 1983 using trap nets. Comparisons of diets were made using percent composition of prey taxa by number and biomass. Results of these analyses indicated that both species fed on fish, zooplankton, and benthos. Diets differed, however, in that fish prey comprised the major component of white perch diets whereas white perch fed more on zooplankton. Both species fed equally on benthos. These data suggest that white perch and white bass diets do overlap in these inshore areas and that these species may potentially interact.

ASSIMILATION OF ORGANIC DIETARY NITROGEN (organic matter=20%, C:N ratio=6.7:1) ingested by young-of-the-year gizzard shad (wet weight=1.5 g, standard length=4.5 cm) in Acton Lake, Ohio, was compared with that of fish fed two simulated detritus diets (low-quality diet: organic matter=10%, C:N ratio=4:0:1, high-quality diet: organic matter=85%, C:N ratio=6:6:1) at 18°C in the laboratory. Mean assimilation efficiencies for the total organic matter, total organic carbon, and total organic nitrogen in the diets ranged from 54-66, 51-04, and 65-78%, respectively. Fish exposed to the field diet and the low-quality diet exhibited greater assimilation of total organic matter and total organic nitrogen than fish fed the high-quality diet. The results indicate that young gizzard shad can assimilate a significant portion of the nutrients in detritus, and may also increase assimilation efficiency to compensate for low-quality detritus in the diet.
The body of adults is 2-3 mm long with a long caudal process which is 2-3 times the body length, for a total length of about one cm. As in the North American Polyphemus pediculus, the carapace is reduced to a broad patch. During adult emergence of eggs, which are collected from Lake Erie in early October 1985, numerous adults of Bythotrephes were discovered in several yellow perch (Perca flavescens), white perch (Morone americana) and white bass (Morone chrysops). The fishes were collected at several stations in the nearshore open waters of the central basin between Huron and Ashtabula, Ohio. The authors subsequently recovered live Bythotrephes from plankton tow samples taken outside Lorain Harbor in early December 1985. To our knowledge no previous records exist of this genus in North America.

TEMPORAL CHANGES IN THE INTERTIDAL COMMUNITIES OF A TIDAL INLET AT CAPE ANN, MASSACHUSETTS. Ralph W. Dexter, Department of Biological Sciences, Kent State University, Kent, Ohio 44242

From quadrant samples of 1/4 sq. m. taken in 6 intertidal communities (sandy beaches and bars, mud flats, mussel beds, rocky shores, low marshes and high marshes) from Mudflats to Cape Ann, Mass., temporal changes in abundance have been analyzed for 23 common and widely distributed macro-invertebrates between 1935-59 and 1956-58 (21 yr. interval), and between 1956 and 1960 (2 yr. interval). After 2 yrs., 5 spp. increased and 15 spp. decreased in general; 1 sp. increased on low marshes but decreased on other shores; and 4 spp. had no significant change. After 2 yrs., 5 spp. increased and 19 spp. decreased in general. 1 spp. increased on high marshes; and 10 spp. had no significant change. Three spp. showed no change during both intervals of time. In general, considerable change occurred after 21 yrs. (largely a decline), but only 52% changed after an interval of 2 yrs. The magnitude of changes was never great, and the communities remained fairly stable in composition.

3:30 THE CHIRONOMIDAE (DIPETERA) OF THE UPPER TUSCARAWAS RIVER. Christopher J. Wingard. Department of Biology, The University of Akron, Akron Ohio 44325.

Chironomid larvae were collected in the upper Tuscarawas River (Stark and Summit Counties, Ohio) from May to August 1985. Samples were taken from seven stations within a 13 km stretch on two occasions by modified shovel samplers and artificial substrates. Nine hundred and ten larvae were identified. Fifty-one taxa were recognized: 23 cibic Chironomini, 18 Orthocladiini, 4 Pentaneurini, 3 Tricladini, and one each of Diamesini and Procladini. Sixty-four percent of the genera collected were primarily collectors-gatherers of algae or detritus, 11% were shredders-herbivores of leaf litter or vascular hydrophytes, and 16% were predators. Eighty percent of the genera are widespread in their North American distribution. Two genera found in the river, Procladius and Paramecioniurus, are primarily northern genera while two others, Pedionomus and Pentaneura, are southern genera.

3:45 The Role of Relic Bogs and Fens in the Post-Glacial Distribution of Ohio Caddisflies (Trichoptera). Ralph J. Barone and David B. McPhail, Department of Zoological and Biomedical Sciences, Ohio University, Athens, Ohio 45701.

In Ohio, relic bogs and fens have existed as habitat islands since the retreat of the Wisconsinan glacier at least 10,000 years ago. Increasingly, preservation of these bogs and fens as well as many other wetlands, has become an immediate concern in natural areas management. Much emphasis has been placed on the flora, a great portion of which exists as rare or endangered species. In this study, emphasis has instead shifted to distribution of caddisflies among these habitat islands. It is known that Ohio lies on the extreme southern range for several northern species of caddisflies. During the past two years over 20,000 adult caddisfly individuals have been collected from fourteen bog and fen sites in nine counties. Identification of these individuals has provided the baseline data needed for preliminary analysis of habitat size, habitat isolation, and surrounding land use and their effect on distribution and abundance of caddisflies.

4:00 RECOVERY OF A LOTIC MACROINVERTEBRATE COMMUNITY FOLLOWING SURFACE MINING. David J. Robertson, Florida Institute of Phosphate Research, 1855 West Main Street, Bartow, FL 33830

In 1979, Mobil Chemical Company diverted 304m of a stream (Sink Branch) behind a plan of acid effluent from Big Four Creek (BF) into Sandy Run (SD), and Mine Run into Lake Hope. Recovery will be indicated when 1) the arithmetic mean of order-level taxa or 2) the geometric mean abundance of the BF fauna statistically exceeds that of the SD fauna or becomes indistinguishable from that based on our unpolished reference stream, Strodes Run (ST). Analysis by 3-way ANOVA indicates that October samples for the four years exceeded June samples, and the richest site occurred the poorer one with respect to taxonomic richness and faunal abundance; also for both categories, samples from BF exceeded those from SD, which were greater than but indistinguishable from those of ST. There was a low-level site x stream interaction for taxonomic richness and neither taxonomic richness nor faunal abundance; no interaction was found for either category between site x month, month x stream, or site x month x stream. While no recovery was seen between the first and the second biennium, it is hoped that the two combined can form a baseline against which a halftime of recovery can be determined.

4:15 BIOTIC OXIDATION IN ACIDIFIED AQUATIC Ecosystem. Jo Davison, Fred, L. Dir. Lambda Group, Inc. 1465 Summit St. Columbus, OH 43201.

The use of acidophilic microorganisms in coal fines cleaning and microbial mining is well documented. At Lambda Labs, we have developed a new application that has proved effective in raising the aquatic pH and oxidizing the sulfur, iron, aluminum, and other heavy metals that come from acid mine drainage and "acid deposition". These conditions have been associated with flora and fauna kills throughout the industrialized world. Both free floating and suspended biofiltering of symbiotic, synergistic mixotrophs from the taxonomic groups of Cyanochloranta, Chlorophyta, Chrysophyta, Mastigophora, Ciliata, and anaerobic and anaerobic bacteria are employed. Oxidation of sulfur and heavy metals is rapid for the first 2-3 wks., then decreases as the pH rises and new populations gain prominence. A natural Succession occurs in each case. Without filtering off the insoluble oxidized precipitates, succession to a neutral ecosystem takes 10-12 mos. to go from pH 1 to 5.7-6.2. Filtering reduces the time to 3-6 mos. under identical conditions, as some of the oxidized metals are reduced back if left in the sludge at the bottom.


Research being reported here covers the four-year period following completion of construction on the project in December 1979. The aim of the project was to reduce the acid effluent from Big Four Creek (BF) into Sandy Run (SD), and Mine Run into Lake Hope. Recovery will be indicated when 1) the arithmetic mean of order-level taxa or 2) the geometric mean abundance of the BF fauna statistically exceeds that of the SD fauna or becomes indistinguishable from that based on our unpolished reference stream, Strodes Run (ST). Analysis by 3-way ANOVA indicates that October samples for the four years exceeded June samples, and the richest site occurred the poorer one with respect to taxonomic richness and faunal abundance; also for both categories, samples from BF exceeded those from SD, which were greater than but indistinguishable from those of ST. There was a low-level site x stream interaction for taxonomic richness and neither taxonomic richness nor faunal abundance; no interaction was found for either category between site x month, month x stream, or site x month x stream. While no recovery was seen between the first and the second biennium, it is hoped the two combined can form a baseline against which a halftime of recovery can be determined.
Northern Ohio has numerous areas underlain with highly erodible glaciated lake silts. It is not uncommon for streams to be deflected by the silts and develop turbid waters and silted substrates. Such an event occurred in Silver Creek, the Mahoning River drainage, in March 1984. Qualitative investigations in October revealed an estimated 80% reduction in benthic insect taxa below the eroding silts. Quantitative investigations made in March and May, 1985 at two clear water and four silted stream sites revealed a relatively rapid recovery of benthic insects in the silted sites.

Nevertheless, Sorensen's Coefficient of Community Dissimilarity showed the greatest dissimilarity between benthic insect communities from clear and silted sites immediately below the silt outfall. The least dissimilar sites were those well downstream of the silt near the mouth. Because recolonization took place over a long period of time, benthic insect drift probably accounted for the majority of immigrants to the recolonizing sites.

SECTION R. ECOLOGY

Third Afternoon Session - Bowman Odd 1053
Saturday, April 26, 1986

MICHAEL C. MILLER, PRESIDING

3:00 PRELIMINARY OBSERVATIONS ON THE LIFE HISTORY OF TWO SPECIES OF SOREX. J. Michelle Cawthorn. Department of Biology. Bowling Green State University, Bowling Green, OH 43403

Life histories and population dynamics of shrews of the genus Sorex, common members of many small mammal communities, are not well known. These shrews are easily wet pit-fall trapped, and often are found alive in live traps. However, despite the fact that shrews have been deadfall trapped for many years, only one investigator in North America has handled one of these animals. In this study, an attempt is made to learn more about Sorex biology. Sorex cinereus and Blarina brevicauda are being live-trapped in the more about Sorex biology. Sorex cinereus, S. fumeus, and S. cinereus is the most cosmopolitan of the three in terms of habitat choice. These species are frequently captured in slightly different microhabitats; S. cinereus is the most cosmopolitan of the three in terms of habitat choice.

3:15 THE EFFECTS OF STIMULI ON AVIAN MOBILING BEHAVIOR. C. Ray Chandler. Department of Biology, Bowling Green State University, Bowling Green, Ohio 43403.

Using three combinations of two experimental stimuli (a mount and tape of an Eastern Screech-Owl), I tested the effects of stimuli on the duration and intensity of avian mobbing behavior. Out of 165 mount-only trials, only 11 (6.5%) were successful in attracting birds. Tape-only (N=169) and mount-and-tape (N=170) trials were equally successful in attracting birds (approx. 85% of all trials), but the mount-and-tape stimulus was more likely to initiate mobbing behavior. All stimuli were more likely to initiate mobbing behavior during the summer months. Birds responding to the mount-and-tape stimulus mobbed more intensely and for longer periods of time than those responding to the tape-only stimulus. These results suggest that birds are unlikely to detect a silent owl under natural conditions. However, the call of a Screech-Owl is readily detected and recognized and mobbing will result even without a visual stimulus. The addition of a visual stimulus provides a focus for anti-predator responses and results in maximal mobbing behavior.

4:45 IMPACT OF GLACIAL SILTS ON BENTHIC INSECTS OF SILVER CREEK, A NORTHEAST (PORTAGE COUNTY) OHIO STREAM. Ed Dwalt, Department of Biology, University of Akron, Akron, Ohio 44325

In Silver Creek, the Mahoning River drainage, many areas are underlain with highly erodible glaciers lake silts. A study was made of benthic insect communities in clear water and silted streams. The results showed a decrease in benthic insect abundance and diversity in the silted sites.

5:30 HABITAT RELATIONSHIPS OF WOOD WARBLLERS BREEDING IN NATIVE FORESTS OF CENTRAL AND SOUTH-CENTRAL OHIO. Kenneth E. Petit, Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Wood Warblers were studied for 15 species were found feeding significant numbers of wood warblers in central and south-central Ohio. During 1983 and 1984, 27 habitat variables were measured in 302, 0.04 ha circular plots centered on the perch sites of singing males. Principal components analysis and field observations were used to elicit patterns of warbler habitat selection and partitioning. The first three principal component axes combined to explain nearly 80% of the variation in habitat selection. These represent gradients from deciduous to coniferous associations, young to old-age stands, and woodlands with an abundance of small trees to stands with large, dense canopies and an open shrub layer. Most species occupied a narrow range of the entire forest gradient, generally remaining distinct from one another on the basis of habitat features. Although several groups of species shared similar for low and high density plots, they appeared to be ecologically separated on the basis of foraging techniques. With the high degree of niche separation, and the lack of interspecific aggression, competition, and predation by cowbirds, this appears to be a good factor affecting microhabitat distribution in this warbler community.
Reproductive success of House Wrens (Troglodytes aedon) rearing natural or experimentally altered broods was assessed by determining if females were producing clutch sizes equal to the number of offspring that they could successfully rear. Number of nestlings fledged and nesting weights at 12 days old were used as measures of success. Results from natural nests indicated that parents were equally successful in rearing their nestlings, regardless of clutch or brood size, in three of four breeding periods. However, the most common clutch size was smaller than the most productive observed during these periods. Enlarged broods fledged more offspring than control or reduced broods, but the nestlings weighed less. Nestlings in broods enlarged to seven weighed less than nestlings in natural broods of seven, whereas nestlings in broods reduced to five weighed more than nestlings in natural broods of the same size. Thus, parents of natural nests with clutches smaller than the most productive may not have been able to rear successfully more offspring if nestlings that fledged at lower weights experienced higher post-fledging mortality. Natural variations in clutch size may reflect individual variation in response to parental ability or territory quality rather than selection for an optimum clutch size at the population level.

SECTION R. ECOLOGY
Poster Session - Student Union, Ingran Room Saturday, April 26, 1986

Board H
9:00 AM VARIATIONS IN METAL UPTAKE IN LoliUM PERENNE-VAM ASSOCIATIONS. P. T. Arnold, C. E. Wilms, and L. A. Kapustka. Botany Department, Miami University, Oxford, OH 45056.

Seedlings of Lolium perenne were inoculated with one of four VAM isolates (Glomus spicatum, G. mosseae, G. deserticola, or Gigaspora gigantea). The inoculated seedlings were irrigated with nutrient solutions varying in toxic metal content (Cd at 1-, 5-, or 10 μM; Cu or Zn at 5-, 25-, or 50 μM). After 10 weeks post-emergence seedlings were harvested and the following data were obtained: aerial phytomass, root phytomass, shoot : root ratios, percentage mycorrhizal infection in metal treatments. Uptake of metals was amplified on average about 300% in all mycorrhizal associations compared to a model for passive uptake. Substantial differences in uptake patterns were evident among the four VAMs used in these experiments. These data suggest possible applications of inoculation and land management for optimal metal uptake.

Board I
9:00 AM PRODUCTIVITY AND VAM INFECTION LEVELS IN INCISED PRARIES. Paul T. Lattimore and Lawrence A. Kapustka. Department of Botany, Miami University, Oxford, OH 45056.

Seasonal burning (Fall, Early Spring, Late Spring and Early Summer) has been conducted on the Miami University Ecology Research Center 11-yr old "prairie" for the past 3 years. Annual measures of standing phytomass and community composition reveal variable responses to seasonal burn treatments. Measures of VAM infection during 1985 and 1986 revealed statistically higher levels of infection early in the growing season in plants from Late Spring burning treatments. Mid-summer and late summer measures of VAM infection levels reveal no differences among burn treatments. In 1985, similar measures of VAM infections were made from collections at the Konza Prairie and the Alwood Plots near Manhattan, Kansas. It is not known whether the early increases in VAM infection lead to the general increases in productivity of late summer burn treatments or if these are merely coincidential events.
Databases have become vital sources of information in the business and technical world. This paper will explore the types of information now available online and currently being accessed by researchers in most major corporations and research firms. New technology, management, R&D, government regulation and patent information of key importance to new product and company research is available for virtually any industry. Gathered from international business, defense and scientific publications, database producers, subdata vendors, have begun to apply vast database files to the research needs of individual industries, including but not limited to the medical and healthcare, legal, chemical, electronic and defense markets. Information typically may be available in hard copy, as well as online in the form of abstracts, indexes or full-text, to provide all researchers with instant access to information previously difficult or impossible to obtain.

This paper explores opportunities for information specialists as an increasingly competitive business and research environment transforms information into a strategic weapon. The challenge for information specialists is to position themselves and their information centers as bulwarks upon which the information needs of their employers resolve. By coordinating and building bridges among the information activities of each department, educating management about the applications of information technology to its tasks, and training users in the optimum use of these technologies the information manager can become an influential strategic planner rather than a service activity cost center. The information specialist is in a unique position to take the lead in answering academic, institutional and corporate information needs through the implementation of new technologies and research techniques. Examples of these from Mead Data Central, the leading online provider of full-text information, and an increasingly important source of bibliographic and reference material, are discussed in detail. Specific databases for scientific and research communities are highlighted.

Questions and Answers
While the world of scientific literature continues to grow at an astronomical rate, its basic structure remains the same. With improved technology, some of the materials may change format from hard copy to electronic, but the need to access them will remain unchanged. Informal communication among scientists will continue to be an important tool for information exchange. Technology will also allow this exchange to take place more rapidly. Information on specific experiments or techniques may flow from one researcher to another, but each researcher still needs to access and obtain specific information from the vast stores of scientific literature in the world. In order to do this effectively, the librarian or information specialist must continue to move from the passive mode of communicator or advisor where end user searching is involved.

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A library's place in the learning process is well documented. Since the dawn of the "Information Age", libraries have served their role as the repository of books by becoming information centers. Showcasing electronic access to vast reservoirs of data, the modern library has moved outside the confines of walls and space limitations to service the multidisciplinary information demands of its clientele. Today's librarian must be an information specialist, able to collect, organize, maintain, and disseminate tremendous quantities of data in a variety of formats. The proliferating use of microcomputers, both at home and work, has now given the "end-user" nearly equal access to data which was formerly exclusive to libraries. Arguments by librarians who are opposed to researchers accessing data files are mostly unfounded. A librarian's reluctance to become involved in end-user activities may have potential for adversely affecting library utilization. To promote better public relations, librarians should use their experience and training to help scientists and researchers become more self-sufficient by teaching proper data searching techniques and by providing a centralized consultation resource and referral service. Librarians should be careful to promote a positive image to remain a viable component within their organization.

End-user computer database searching by teaching and research departmental faculty can be efficiently implemented by utilizing a systematic three phase approach. The first phase involves the identification of an interested faculty member within the department. This individual will receive adequate levels of computer database searching training. In-house training must be complemented by formal vendor or database producer seminars. Once training has been completed, the faculty member should begin accepting database searches from other faculty and graduate students in the department. For an initial period of time, a librarian should offer and provide appropriate assistance. The second phase involves the training of other interested faculty by their trained and experienced colleague. The third phase involves the integration of end-user computer database searching into graduate research methods courses. This instruction could be managed by either a librarian or by searchers within the department. Through this phase approach, training can be better controlled and monitored, thus maintaining search quality. Also, a wider population is ultimately exposed to end-user searching.

A PHASE APPROACH TOWARDS DEPARTMENTAL END-USER DATABASE SEARCHING. Chris J. Miko, Science Library, Bowling Green State University, Bowling Green, OH 43403

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from places such as the British Lending Library and the Center for Research Libraries. On the horizon are full-text searching, such as the presently-existing LEXIS system for law libraries. Individual faculty are increasingly learning to 'talk' with fellow researchers using BITNET. They are using home computers and telephone modems to interface with campus mainframes. The future offers the possibilities of on-line catalogs, telefacsimile delivery of documents, transmission via TV satellite dishes, downloading of data bases. Libraries face the challenge of instructing faculty and students in the effective use of such sources through formally established programs. Inter-library cooperations forged these links and newer technologies will enable them to grow to enhanced levels. The library role may change but it will still be one of intermediary - certainly for undergraduates and very likely also for graduate students and faculty.

4:25 Questions and Comments
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<td>Lunch</td>
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<td>1:30</td>
<td>Section Business Meeting</td>
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<tr>
<td>6:30</td>
<td>Academy Banquet</td>
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<tr>
<td>7:30</td>
<td>Awards and President's Address</td>
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<tr>
<td>9:00</td>
<td>Annual Business Meeting and Election of Officers</td>
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